

$$a^2 + b^2 = ab^2$$
$$a(a+b) = (a \times a) + (a \times b)$$



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Number System, Simplification and Approximation

This chapter forms a basis of many other topics in mathematics. Let us begin by understanding various types of numbers.

(1) **Natural Numbers:** All the counting numbers are called natural number.

Example: 1, 2, 3, 4, 5,

(a) **Even Numbers:** The numbers which are exactly divisible by 2 are called even numbers.

Example: 2, 4, 6, 8, ...

(b) **Odd Numbers:** The numbers which leave a remainder 1 when divided by 2 are called odd numbers.

number.

Example: 2, 3, 5, 7, 11,

Co-primes → Two numbers which have no common factor between them except 1 are said to be co-prime to each other. The two numbers individually may be prime or composite.

Example: 13 and 29 are co-primes.

(d) **Composite Numbers:** Numbers which are divisible by other numbers along with 1 and itself are called composite numbers.

Example: 4, 6, 8, 9, 10,

The number 1 is neither prime nor composite.

(2) **Whole Numbers:** Natural numbers along with '0' form the set of whole numbers.

Example: 0, 1, 2, 3,

(3) **Integers:** All counting numbers and their negatives along with zero are called Integers.

Example:-4, -3, -2, -1, 0, 1, 2, 3, 4,

(4) **Rational and Irrational Numbers:** Any number which can be expressed in the form of $\frac{p}{q}$, where p and q are integers and $q \neq 0$, is a rational number.

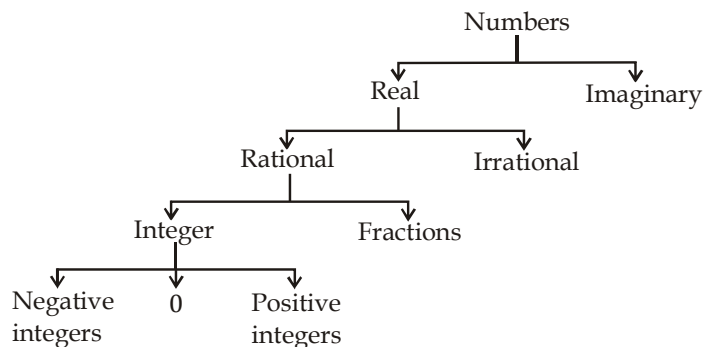
Example: $\frac{3}{5}$, 4, -6, etc.

Numbers which are represented by non-terminating and non-recurring decimals are called irrational numbers.

Example: $\sqrt{2} = 1.414.....$, $\sqrt{3} = 1.732.....$

(5) **Real Numbers:** Rational and irrational number taken together are called real numbers.

We can summarise the above discussion as follows :



Some important formula :

1. $a^2 - b^2 = (a + b)(a - b)$

2. $(a + b)^2 = a^2 + b^2 + 2ab$

3. $(a - b)^2 = a^2 + b^2 - 2ab$

4. $(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ac$
5. $(a + b)^3 = a^3 + b^3 + 3ab(a + b)$
6. $(a - b)^3 = a^3 - b^3 - 3ab(a - b)$
7. $a^3 + b^3 = (a + b)(a^2 + b^2 - ab)$
8. $a^3 - b^3 = (a - b)(a^2 + b^2 + ab)$
9. $a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ac)$

Tests of divisibility

Divisibility by 2: A number is divisible by 2 if its unit digit is zero or an even number.

Example: 248, 130

Divisibility by 3: A number is divisible by 3 if the sum of its digit is divisible by 3.

Example: $279 \rightarrow 2 + 7 + 9 = 18$.

18 is divisible by 3, hence 279 is divisible by 3.

Divisibility by 4: A number is divisible by 4 if the number formed by its last two digits is divisible by 4.

Example: 236784

Here, 84 is divisible by 4, hence 236784 is divisible by 4.

Divisibility by 5: A number is divisible by 5 if the number or its unit digit is either 5 or 0.

Example: 115, 240, etc.

Divisibility by 6: A number is divisible by 6 if it is divisible by both 2 and 3.

Example: 318, 396, etc.

Divisibility by 8: A number is divisible by 8 if the number formed by its last 3 digit is divisible by 8.

Example: 23816.

Here, 816 is divisible by 8, hence 23816 is divisible by 8.

Divisibility by 9: A number is divisible by 9 if the sum of all its digits is divisible by 9.

Example: $72936 \rightarrow 7 + 2 + 9 + 3 + 6 = 27$

27 is divisible by 9, hence 72936 is divisible by 9.

Divisibility by 11: A number is divisible by 11 if the difference of the sum of the alternate digits starting from the units digit and the sum of the alternate digits starting from the tens digit is either '0' or is a multiple of 11.

Example: 1 3 3 1

$(1 + 3) - (3 + 1) = 0 \Rightarrow 1331$ is divisible by 11.

Divisibility by 19: A number is divisible by 19 if the sum of the number formed by digits other than the unit digit and twice the unit digit is divisible by 19.

Example: $76 \Rightarrow 7 + (2 \times 6) = 19$.

Therefore 76 is divisible by 19.

Least Common Multiple (LCM)

LCM of two or more numbers is the least number which is divisible by each of these numbers.

Finding LCM

Write the numbers as product of prime factors. Then multiply the product of all the prime factors of the first number by those prime factors of the second number which are not common to the prime factors of the first number.

The product is then multiplied by those prime factors of the third number which are not common to the prime factors of the first two numbers.

The final product after considering all the numbers will be the LCM of these numbers.

Example: Find the LCM of 540 and 108?

$$540 = 2 \times 27 \times 10 = 2^2 \times 3^3 \times 5$$

$$108 = 2^2 \times 3^3$$

$$\text{LCM} = 2^2 \times 3^3 \times 5 = 4 \times 27 \times 5 = 540$$

Finding LCM by division

Choose one prime factor common to at least two of the given numbers write the given numbers in a row and divide them by the above prime number. Write the quotient for each number under the number itself. If a number is not divisible by the prime factor selected, write the number as it is Repeat this process until you get quotients which have no common factor.

The product of all the divisors and the numbers in the last line will be the LCM.

Example: Find the LCM of 36, 84 and 90

3	36, 84, 90
3	12, 28, 30
2	4, 28, 10
2	2, 14, 5
	1, 7, 5

$$\text{LCM} = 3 \times 3 \times 2 \times 2 \times 7 \times 5 = 1260$$

Highest Common Factor (HCF)

HCF is the largest factor of two or more given numbers.

HCF is also called Greatest Common Divisor (GCD).

Finding HCF by Factorisation method

Express each given number as a product of prime factors. The product of the prime factors common to all the numbers will be the HCF.

Example: Find the HCF of 144, 336 and 2016?

$$144 = 12 \times 12 = 3 \times 2^2 \times 3 \times 2^2 = 3^2 \times 2^4$$

$$336 = 2^4 \times 3 \times 7$$

$$2016 = 2^5 \times 7 \times 3^2$$

$$\text{HCF} = 3 \times 2^4 = 48$$

Finding HCF by Division method

Divide the greater number by the smaller number. Then divide the divisor by the remainder. Now, divide the second divisor by the second remainder

We repeat this process till no remainder is left. The last divisor is the HCF.

Then using the same method, find the HCF of this HCF and the third number. This will be the HCF of the three numbers.

Example: HCF of 144, 336

$$\begin{array}{r} 144 \overline{)336} (2 \\ \underline{288} \\ 48 \overline{)144} (3 \\ \underline{144} \\ 0 \end{array}$$

$$\text{HCF} = 48$$

LCM and HCF of fractions :

$$\text{LCM of fractions} = \frac{\text{LCM of Numerators}}{\text{HCF of Denominators}}$$

$$\text{HCF of fractions} = \frac{\text{HCF of Numerators}}{\text{LCM of Denominators}}$$

Simplification

BODMAS Rule

This rule depicts the correct sequence in which the operations are to be executed, so as to find out the value of a given expression.

- B** → Bracket
- O** → Of
- D** → Division
- M** → Multiplication
- A** → Addition
- S** → Subtraction

Thus in simplifying an expression, first of all the brackets must be removed, strictly in the order $()$, $\{\}$, $[\]$.

After removing the brackets, we must use the following operations strictly in the order :

(i) of (ii) Division (iii) Multiplication (iv) Addition (v) Subtraction

Approximation

One needs to solve the questions of approximation by taking the nearest approximate values and mark the answers accordingly.

Example: If the given value is 3.009, then the approximate value is 3.
If the given value is 4.45, then the approximate value is 4.50.

Example 1: $2959.85 \div 16.001 - 34.99 = ?$

- (a) 160 (b) 150 (c) 140 (d) 180 (e) 170

Sol. (b); $2959.85 \div 16.001 - 34.99 \cong 2960 \div 16 - 35 = 185 - 35 = 150$

Example 2: $(1702 \div 68) \times 136.05 = ?$

- (a) 3500 (b) 3550 (c) 3450 (d) 3400 (e) 3525

Sol. (d); $(1702 \div 68) \times 136.05 \cong (1700 \div 68) \times 136 = 3400$

Some shortcuts and tricks for calculations

Multiplication by a number close to 10, 100, 1000, etc

Example: $999 = 1000 - 1$; $101 = 100 + 1$

To multiply with such numbers, convert the number into the form of $(10 \pm C)$ or $(100 \pm C)$ etc.

Example: $46 \times 98 = 46 \times (100 - 2) = 46 \times 100 - 46 \times 2 = 4600 - 92 = 4508$

Multiplication by 5 or powers of 5: can be converted into multiplication by 10 or powers of 10 by dividing it by 2 and its powers.

Example: $2345 \times 125 = 2345 \times 5^3 = 2345 \times \left(\frac{10}{2}\right)^3 = \frac{234500}{8} = 293125$

Square of a number which ends with 5.

(1) Last two digits of the square are always 25.

(2) To find the number which comes before 25, perform the operation $n \times (n+1)$, where n is the digit before 5 in the original number.

(3) Put the number received in step 2 before 25 and you get the square.

Example: $(65)^2 = ?$

(1) Last two digits are 25.

(2) The digit before 5 is 6 perform $n \times (n + 1)$ operation on this = $6 \times (6 + 1) = 6 \times 7 = 42$

(3) Hence the square of 65 will be 4225.

Square of a number containing repeated 1's

- (1) Count the number of digits. Let the count be n.
- (2) Now, starting from 1, write the number till n.
- (3) Then, starting from n write the number till 1.

Example: Find the square of 1111?

Sol. There are four 1's. Now we write numbers from 1 to 4. Then again from 4 to 1. So, $(1111)^2 = 1234321$

Multiplying 2-digit numbers where the unit's digits add upto 10 and ten's digits are same

Example: $42 \times 48 = ?$

- (1) First multiply the unit digits of the numbers. $2 \times 8 = 16$
- (2) Then multiply 4 by $(4 + 1) \Rightarrow 4 \times 5 = 20$.
- (3) The answer is 2016.

Multiplying numbers just over/below 100

Example: $108 \times 109 = 11772$.

The answer is in two parts : 117 and 72.
 117 is $(108 + 9)$ or $(109 + 8)$, and 72 is 8×9 .

new, check for $107 \times 106 = \frac{11342}{\downarrow \rightarrow (7 \times 6)}$
 $(107+6)$
 or
 $(106+7)$

Multiplication of a 2-digit number by a 2-digit number

Example: $12 \times 13 = ?$

Sol. Steps:

- 1. Multiply the right-hand digits of multiplicand and multiplier (unit-digit of multiplicand with unit-digit of the multiplier).

$$\begin{array}{r} 12 \\ \times 13 \\ \hline 36 \end{array}$$

$6(2 \times 3)$

- 2. Now, do cross-multiplication, i.e., multiply 3 by 1 and 1 by 2. Add the two products and write down to the left of 6.

$$\begin{array}{r} 12 \\ \times 13 \\ \hline 36 \\ 12 \\ \hline 56 \end{array}$$

- 3. In the last step we multiply the left-hand figures of both multiplicand and multiplier (ten's digit of multiplicand with ten's digit of multiplier).

$$\begin{array}{r} 12 \\ \times 13 \\ \hline 36 \\ 12 \\ \hline 156(1 \times 1) \end{array}$$

So, the answer is 156.

Example: $325 \times 17 = ?$

Sol. Steps:

1.
$$\begin{array}{r} 325 \\ \downarrow \\ 17 \\ \hline 5 \end{array}$$

($5 \times 7 = 35$, put down 5 and carry over 3)

2.
$$\begin{array}{r} 3 \quad 2 \quad 5 \\ \quad \swarrow \searrow \\ \quad 1 \quad 7 \\ \hline \quad 2 \quad 5 \end{array}$$

($2 \times 7 + 5 \times 1 + 3 = 22$, put down 2 and carry over 2)

3.
$$\begin{array}{r} 3 \quad 2 \quad 5 \\ \quad \downarrow \quad \searrow \\ \quad 1 \quad 7 \\ \hline \quad 2 \quad 25 \end{array}$$

($3 \times 7 + 2 \times 1 + 2 = 25$, put down 5 and carry over 2)

So, answer is 5525

4.
$$\begin{array}{r} 3 \quad 2 \quad 5 \\ \quad \swarrow \quad \searrow \\ \quad 1 \quad 7 \\ \hline 5 \quad 5 \quad 2 \quad 5 \end{array}$$

Multiplication of a 3-digit number by a 3-digit number

Example: $321 \times 132 = ?$

Sol. Steps:

1.
$$\begin{array}{r} 321 \\ \downarrow \\ 132 \\ \hline 2(1 \times 2 = 2) \end{array}$$

2.
$$\begin{array}{r} 3 \quad 2 \quad 1 \\ \quad \swarrow \searrow \\ \quad 1 \quad 3 \quad 2 \\ \hline \quad 72 \quad (2 \times 2 + 3 \times 1 = 7) \end{array}$$

3.
$$\begin{array}{r} 3 \quad 2 \quad 1 \\ \quad \swarrow \searrow \\ \quad 1 \quad 3 \quad 2 \\ \hline \quad 72 \quad (2 \times 2 + 3 \times 1 = 7) \end{array}$$

4.
$$\begin{array}{r} 3 \quad 2 \quad 1 \\ \quad \swarrow \searrow \\ \quad 1 \quad 3 \quad 2 \\ \hline 2372 \quad (3 \times 3 + 1 \times 2 + 1 = 12, \text{ write down 2 and carry over 1}) \end{array}$$

5.
$$\begin{array}{r} 321 \\ \downarrow \\ 132 \\ \hline 42372 \quad (1 \times 3 + 1 = 4) \end{array}$$
 So, answer is 42372.

Some more short tricks:

(1) $2 + 22 + 222 + 2222 = 2 (1 + 11 + 111 + 1111)$
 $2 (1234) = 2468$

(2) $0.2 + 0.22 + 0.222 + 0.2222 + 0.22222 = 2 (0.1 + 0.11 + 0.111 + 0.1111 + 0.11111) = 2 (0.54321) = 1.08642$

(3) $2 + 8 + 22 + 88 + 222 + 888 + 2222 + 8888 + 22222 + 88888 = 2 (12345) + 8 (12345)$
 $= (12345) (2 + 8) = 12345 \times 10 = 123450$

(4) $(2222)^2 = 2^2 \times (1111)^2 = 4 \times (1234321) = 4937284$

(5) If unit digit in each number is 5 and difference of the numbers is 10, then they are multiplied as:

Example: (1) $65 \times 75 = \overset{\uparrow 48}{\underset{\downarrow}{(6 \times 8)}} \overset{\uparrow 75}{\underset{\downarrow}{(\text{Constant})}}$

(2) $125 \times 135 = \overset{\uparrow 168}{\underset{\downarrow}{(12 \times 14)}} \overset{\uparrow 75}{\underset{\downarrow}{\text{Constant}}}$

Percentage – fraction conversion:

The following percentage values of corresponding fractions must be on your tips :

Example: $62 \frac{1}{2}\%$ of 256 can be easily calculated if we know the fractional value of $62 \frac{1}{2}\%$ i.e., $\frac{5}{8}$.

$\left[\begin{array}{l} 1 = 100\% \\ \frac{1}{2} = 50\% \end{array} \right]$	$\left[\begin{array}{l} \frac{1}{3} = 33 \frac{1}{3}\% \\ \frac{2}{3} = 66 \frac{2}{3}\% \end{array} \right]$	$\left[\begin{array}{l} \frac{1}{4} = 25\% \\ \frac{3}{4} = 75\% \end{array} \right]$	$\left[\begin{array}{l} \frac{1}{5} = 20\% \\ \frac{2}{5} = 40\% \\ \frac{3}{5} = 60\% \\ \frac{4}{5} = 80\% \end{array} \right]$	$\left[\begin{array}{l} \frac{1}{6} = 16 \frac{2}{3}\% \\ \frac{5}{6} = 83 \frac{1}{3}\% \end{array} \right]$
---	--	--	--	--

$\left[\begin{array}{l} \frac{1}{7} = 14 \frac{2}{7}\% \\ \frac{2}{7} = 28 \frac{4}{7}\% \\ \frac{3}{7} = 42 \frac{6}{7}\% \\ \frac{4}{7} = 57 \frac{1}{7}\% \\ \frac{5}{7} = 71 \frac{3}{7}\% \\ \frac{6}{7} = 85 \frac{5}{7}\% \end{array} \right]$	$\left[\begin{array}{l} \frac{1}{8} = 12 \frac{1}{2}\% \\ \frac{3}{8} = 37 \frac{1}{2}\% \\ \frac{5}{8} = 62 \frac{1}{2}\% \\ \frac{7}{8} = 87 \frac{1}{2}\% \end{array} \right]$	$\left[\begin{array}{l} \frac{1}{9} = 11 \frac{1}{9}\% \\ \frac{2}{9} = 22 \frac{2}{9}\% \\ \frac{4}{9} = 44 \frac{4}{9}\% \\ \frac{5}{9} = 55 \frac{5}{9}\% \\ \frac{7}{9} = 77 \frac{7}{9}\% \\ \frac{8}{9} = 88 \frac{8}{9}\% \end{array} \right]$	$\left[\begin{array}{l} \frac{1}{11} = 9 \frac{1}{11}\% \\ \frac{2}{11} = 18 \frac{2}{11}\% \\ \frac{3}{11} = 27 \frac{3}{11}\% \\ \frac{4}{11} = 36 \frac{4}{11}\% \\ \frac{5}{11} = 45 \frac{5}{11}\% \end{array} \right]$
--	--	--	---

$\frac{1}{20} = 5\%, \frac{1}{19} = 5 + \frac{5 \times 5}{100} = 5.25, \frac{1}{21} = 5 - \frac{5 \times 5}{100} = 4.75\%$

Similarly,

$\frac{1}{25} = 4, \frac{1}{24} = 4 + \frac{4 \times 4}{100} = 4.16, \frac{1}{26} = 4 - \frac{4 \times 4}{100} = 3.84, \frac{1}{11} = 9.09\%, \frac{1}{7} = 14.2857\%, \frac{1}{22} = 4.54\%, \frac{1}{14} = 7.14\%$
 $\frac{1}{33} = 3.03, \frac{1}{28} = 3.57\%$

Finding the unit place digit when a number is raised to some power

(1) When the unit digit of a number is 0, 1, 5, or 6, then on raising that number to any power, the new number obtained will have its unit digit 0, 1, 5, or 6 respectively.

(2) When the unit digit of a number is 2:

Example: $(122)^{159}$

Divide 159 by 4

$\frac{159}{4} \rightarrow \text{remainder} = 3$

$(\text{unit digit of } 122)^3 = 2^3 = 8$

So, the unit digit of $(122)^{159} = 8$

(3) When the unit digit of the number is 3.

Example: $(53)^{145}$

Sol. $\frac{145}{4} \Rightarrow$ Remainder = 1

$$3^1 = 3$$

So, unit digit of $(53)^{145}$ is 3.

(4) When the unit digit is 4 :

Example: 144

if it is raised to an odd power \rightarrow Example : $(144)^{145}$ then unit place is 4.

if it is raised to an even power \rightarrow Example : $(144)^{144}$, then unit place is 6.

(5) When the unit digit is 7:

Example: $(327)^{329}$

Sol. $329 \div 4 \Rightarrow$ rem. = 1 $\Rightarrow 7^1 = 7 \Rightarrow$ So, unit digit = 7.

(6) when the unit is 8:

Example: $(88)^{178}$

Sol. $178 \div 4 \Rightarrow$ Rem. = 2 $\Rightarrow 8^2 = 64 \Rightarrow$ So, unit digit of $(88)^{178}$ is 4

(7) When the unit digit is 9 ;

Example: 119

if it is raised to an odd power

Example: $(119)^{119} \Rightarrow$ unit digit = 9

if it is raised to an even power \rightarrow

Example: $(119)^{118} \Rightarrow$ unit digit = 1



Finding minimum and maximum values in fractions:

Example: Find maximum value:

$$\frac{5}{7}, \frac{9}{4}, \frac{8}{13}, \frac{14}{15} \Rightarrow$$

Let us consider $\frac{5}{9}$ and $\frac{9}{4}$

$$\frac{5}{7} \begin{array}{c} \swarrow \quad \searrow \\ \quad \quad \end{array} \frac{9}{4}$$

$$5 \times 4 < 9 \times 7 \Rightarrow \frac{5}{7} < \frac{9}{4}$$

Now, let us take : $\frac{9}{4}$ and $\frac{8}{13}$

$$\frac{9}{4} \begin{array}{c} \swarrow \quad \searrow \\ \quad \quad \end{array} \frac{8}{13}$$

$$13 \times 9 > 4 \times 8 \Rightarrow \frac{9}{4} > \frac{8}{13}$$

$\frac{9}{4}$ is greater than both $\frac{5}{7}$ and $\frac{8}{13}$.

Now, let us compare $\frac{9}{4}$ and $\frac{14}{15}$

$$\frac{9}{4} \begin{array}{c} \swarrow \quad \searrow \\ \quad \quad \end{array} \frac{14}{15}$$

$$15 \times 9 > 4 \times 14 \Rightarrow \frac{9}{4} > \frac{14}{15}$$

So, $\frac{9}{4}$ is the greatest value among all given values.



Basic Questions

- | | |
|--|--|
| <p>1. 320% of $40 = ?$
 (a) 128 (b) 140 (c) 180
 (d) 60 (e) 210</p> <p>2. 14.28% of $49 = ?$
 (a) 8 (b) 11 (c) 7
 (d) 16 (e) 15</p> <p>3. $1\frac{1}{3} - 1\frac{1}{9} + 1\frac{1}{6} = ?$
 (a) $1\frac{5}{18}$ (b) $1\frac{7}{18}$ (c) $1\frac{1}{9}$
 (d) $1\frac{4}{9}$ (e) None of these</p> <p>4. $\frac{3}{7}$ of $49/6$ of $4/7 = ?$
 (a) 1 (b) 2 (c) 3
 (d) 4 (e) 5</p> <p>5. 25% of $48 + 50\%$ of $120 = ?\%$ of 1200
 (a) 4 (b) 5 (c) 6
 (d) 8 (e) 16</p> <p>6. $\sqrt{52 \times 27 \div 6 + 26 - 4} = ?$
 (a) $\sqrt{24}$ (b) $(16)^2$ (c) 24
 (d) $\sqrt{16}$ (e) None of these</p> <p>7. $4\frac{4}{5} \div 6\frac{2}{5} = ?$
 (a) $3/4$ (b) $5/7$ (c) $7/11$
 (d) $5/8$ (e) None of these</p> <p>8. $\frac{16}{24} + \frac{4}{10} - \frac{1}{6} = ?$
 (a) $\frac{9}{10}$ (b) $\frac{7}{10}$ (c) $\frac{5}{10}$
 (d) $\frac{3}{10}$ (e) None of these</p> | <p>9. $8000 \div 16 - 200 = ? \times 6$
 (a) 75 (b) 60 (c) 50
 (d) 25 (e) None of these</p> <p>10. $\frac{3}{5}$ th of 24% of $500 - 32 = ?$
 (a) 20 (b) 30 (c) 50
 (d) 40 (e) None of these</p> <p>11. $(\sqrt{2209} - 12) \times 5 = ?$
 (a) 175 (b) 180 (c) 225
 (d) 195 (e) None of these</p> <p>12. $\sqrt{8 \times 220 \div 11 + 85 - 20} = ?$
 (a) 15 (b) 25 (c) 35
 (d) 20 (e) None of these</p> <p>13. $1\frac{5}{6} + 2\frac{3}{5} + 4\frac{2}{3} = ?$
 (a) $2\frac{1}{10}$ (b) $7\frac{1}{10}$ (c) $6\frac{1}{10}$
 (d) $9\frac{1}{10}$ (e) None of these</p> <p>14. $\frac{1}{4}$ th of $\frac{1}{2}$ of $\frac{3}{4}$ th of $52000 = ?$
 (a) 4785 (b) 4877 (c) 4857
 (d) 4875 (e) None of these</p> <p>15. $\frac{3}{11}$ of $\frac{5}{7}$ of $(?) = 63$
 (a) 3134 (b) 312.4 (c) 323.4
 (d) 3100 (e) None of these</p> |
|--|--|

Prelims Questions

Level - 1

Directions (1-5): What will come in place of question mark (?) in the following questions.

- | | |
|--|--|
| <p>1. $\left(\frac{4\frac{4}{5} \text{ of } 25}{48}\right) \div \left(\frac{5}{4} \text{ of } 32 + \frac{3}{7} \text{ of } 21\right) = ? \text{ of } \frac{1}{49}$
 (a) 3.5 (b) 3 (c) 2.5
 (d) 4 (e) 5</p> <p>2. $\sqrt{7}$ of $6 + 20\%$ of $95 = \frac{1}{2}$ of 62
 (a) 3 (b) 4 (c) 5
 (d) 6 (e) 7</p> | <p>3. $\left(\frac{5}{3} \text{ of } 6\frac{3}{5} \text{ of } \frac{9}{11}\right) + ?^2 = 45$
 (a) 5 (b) 7 (c) 4
 (d) 8 (e) 6</p> <p>4. $\left(\frac{4}{7} \times \frac{14}{5} \div 2\right) - \left(\frac{3}{10} \text{ of } ?\right) = \frac{4}{5} - 3$
 (a) 10 (b) 8 (c) 9
 (d) 11 (e) 12</p> <p>5. $4\frac{4}{5} + 2\frac{1}{15} - \frac{27}{5} = 2\frac{1}{5} \div 3 \times ?$
 (a) $\frac{2}{9}$ (b) 1 (c) 2
 (d) 3 (e) $\frac{1}{9}$</p> |
|--|--|

Directions (6-10): What will come in place of question mark (?) in the following questions.

6. $\left(\frac{4 \text{ of } 25}{5}\right) \div \left(432 - 20^2 + \frac{3}{7} \text{ of } 21\right) \times (82) = ? \text{ of } \frac{1}{64}$
 (a) 50 (b) 45 (c) 35
 (d) 30 (e) 40

7. $55\% \text{ of } 900 + 70\% \text{ of } 1050 = ?\% \text{ of } 3000$
 (a) 41 (b) 42 (c) 43
 (d) 44 (e) 45

8. $73823 - 34156 + 4756 + 6758 - 9849 = 41499 - 160 - ?$
 (a) 5 (b) 7 (c) 4
 (d) 8 (e) 6

9. $\frac{5599}{1331} \times \frac{3773}{2036} \times \frac{88}{49} = ? - 6^2$
 (a) 44 (b) 46 (c) 48
 (d) 50 (e) 52

10. $84 \times \frac{1}{4} \div 21^2 + ? = \frac{7}{147} \times 21 - \frac{20}{21}$
 (a) 2 (b) 1 (c) 0
 (d) 3 (e) 4

Directions (11-15): What will come in place of question mark (?) in the following questions

11. $\sqrt{5776} - \sqrt{1444} + \sqrt{729} = 43 + ?$
 (a) 25 (b) 20 (c) 26
 (d) 24 (e) 22

12. $78 \times 26 \div 6 + 1262 = 1311 + (?)^2$
 (a) 17 (b) 22 (c) 15
 (d) 13 (e) 19

13. $1484 \div 28 + 1462 \div 34 - 12 \times 7 = ?$
 (a) 12 (b) 14 (c) 18
 (d) 16 (e) 20

14. $42.5 \times 15 + 37.5 \times 25 = 1420 + ?$
 (a) 145 (b) 165 (c) 155
 (d) 170 (e) 185

15. $2450 + 3760 - 3830 = 6000 - ?$
 (a) 3610 (b) 3620 (c) 3580
 (d) 3600 (e) 3520

Directions (16-20): What will come in place of question mark (?) in the following questions

16. $\sqrt{\frac{3840}{60} + \frac{1440}{40} - \frac{1330}{70}} = ?$
 (a) 10 (b) 9 (c) 8
 (d) 7 (e) 11

17. $25 \times 18 + \frac{4200}{40} - \frac{525}{105} = 740 - ?$
 (a) 200 (b) 220 (c) 190
 (d) 170 (e) 150

18. $3845 + 4380 + 2640 - 5965 = (?)^2$
 (a) 75 (b) 60 (c) 80
 (d) 70 (e) 72

19. $400 \div 20 \times 35 + 6666 \div 33 + ? = 1100$
 (a) 180 (b) 198 (c) 195
 (d) 205 (e) 200

20. $28 \times 14.5 + 1680 \div 15 + 445 = 1000 - ?$
 (a) 27 (b) 37 (c) 47
 (d) 50 (e) 40

Directions (21-25): What will come in place of question mark (?) in the following questions

21. $\sqrt{256} \times \sqrt{169} + 3600 \div 12 = 800 - ?$
 (a) 312 (b) 280 (c) 292
 (d) 324 (e) 296

22. $37.5 \times 14 + 800 - (26)^2 + 136 = ?$
 (a) 785 (b) 800 (c) 810
 (d) 825 (e) 765

23. $5430 + 3780 - 6430 = 2260 + ?$
 (a) 530 (b) 490 (c) 500
 (d) 520 (e) 510

24. $2160 \div 12 + 5740 \div 14 - 3150 \div 15 + ? = 400$
 (a) 16 (b) 32 (c) 28
 (d) 24 (e) 20

25. $\sqrt{3481} \times 7 + \sqrt{5625} \times 4 = 500 + ?$
 (a) 213 (b) 223 (c) 203
 (d) 233 (e) 243

Direction (26-30): What will come in place of (?) question mark.

26. $50\% \text{ of } 128 + \frac{\sqrt{16}}{2} \times 4 = ? + 10$
 (a) 64 (b) 62 (c) 60
 (d) 56 (e) 82

27. $\frac{\sqrt[3]{1331}}{11} + \sqrt{81} + ? = 27$
 (a) 19 (b) 18 (c) 17
 (d) 16 (e) 15

28. $(3)^2 \times (3)^6 \times (9)^2 \div (27)^2 = (3)^?$
 (a) 4 (b) 6 (c) 7
 (d) 5 (e) 8

29. $123 + 447 - 170 + 500 = ? - 200$
 (a) 1300 (b) 1100 (c) 1000
 (d) 1030 (e) 1173

30. $(14)^2 + 179 + (5)^2 = (?)^2$
 (a) 10 (b) 20 (c) 30
 (d) 40 (e) 22

Directions (31-35): What will come in place of question mark (?) in the following questions

31. $\sqrt{841} + \sqrt{1296} - \sqrt{1024} = \sqrt{?}$
 (a) 1156 (b) 1089 (c) 1024
 (d) 961 (e) 1225
32. $14400 \div 36 + 15600 \div 12 + 450 = 1800 + ?$
 (a) 410 (b) 330 (c) 390
 (d) 350 (e) 370
33. $7450 + 5880 - 6890 = 9000 - ?$
 (a) 2560 (b) 2760 (c) 2460
 (d) 2850 (e) 2480
34. $32 \times 25 + 44 \times 18 + 348 \div 6 = ?$
 (a) 1550 (b) 1620 (c) 1650
 (d) 1600 (e) 1690
35. $\sqrt{1225} \times 28 + 203 \times 7 = (?)^2$
 (a) 47 (b) 45 (c) 49
 (d) 51 (e) 53

Directions (31-40): What will come in place of question mark (?) in the following questions

36. $\sqrt{961} + \sqrt{1369} - \sqrt{1444} = \sqrt{361} + \sqrt{?}$
 (a) 196 (b) 169 (c) 144
 (d) 121 (e) 81
37. $52500 \div 7 + 64680 \div 6 = 19500 - ?$
 (a) 1220 (b) 1260 (c) 1280
 (d) 1340 (e) 1390
38. $28.5 \times 34 + 2320 \div 8 = (36)^2 - ?$
 (a) 51 (b) 47 (c) 43
 (d) 34 (e) 37
39. $47 \times 27 + 15600 \div 8 + 181 = ?$
 (a) 3320 (b) 3420 (c) 3370
 (d) 3400 (e) 3460
40. $112.5 \times 5 + 4560 \div 6 - 175 \times 7 = ?$
 (a) 103.5 (b) 91.5 (c) 97.5
 (d) 110.5 (e) 115.5

Directions (41-45): Find the value of question marks (?) in the following questions.

41. 80% of ? = $\sqrt{250 \times 44 + 40\% \text{ of } 8500}$
 (a) 80 (b) 120 (c) 150
 (d) 180 (e) 240
42. $? \times 40 \div 24 \times 27 = \frac{594}{115} \times \frac{2300}{264}$
 (a) 1 (b) 2 (c) 3
 (d) 4 (e) 5
43. 20% of $(40 \times \sqrt{?}) = (32)^2 + (16)^2$
 (a) 160 (b) 2560 (c) 16
 (d) 25600 (e) 256

44. $? + 13 \times 50 = 420 + 45\% \text{ of } 800 + 220$
 (a) 300 (b) 350 (c) 400
 (d) 450 (e) 250
45. $(?)^{\frac{3}{2}} = 256 \times (2)^8 \div (8)^5 \times 32$
 (a) 4 (b) 256 (c) 64
 (d) 1024 (e) 16

Directions (46-50): What will come in place of question mark (?) in the following questions

46. $56 \times 28 + 7680 \div 6 - 37 \times 24 = ?$
 (a) 1880 (b) 1990 (c) 1910
 (d) 1960 (e) 2020
47. $(28)^2 + (12)^3 + (38)^2 = (65)^2 - ?$
 (a) 275 (b) 269 (c) 281
 (d) 264 (e) 259
48. $7560 + 8165 + 6780 = 18000 + ?$
 (a) 4620 (b) 4580 (c) 4505
 (d) 4475 (e) 4540
49. $\sqrt{2401} + \sqrt{3969} - \sqrt{3136} = 32 + ?$
 (a) 28 (b) 32 (c) 26
 (d) 30 (e) 24
50. $1750 \times \frac{1}{7} + 900 \times \frac{3}{8} + 3240 \times \frac{2}{9} = ?$
 (a) 1307.5 (b) 1368.5 (c) 1425.5
 (d) 1268.5 (e) 1487.5

Directions (51-55): What should come in place of question mark (?) in the following questions?

51. 48% of 525 + ? % of 250 = 499
 (a) 88.8 (b) 76.6 (c) 82.6
 (d) 98.8 (e) 92.8
52. $\frac{5}{2}$ of $\frac{7}{8}$ of $\frac{1}{28}$ of 1600 = 260 + ? - 499
 (a) 264 (b) 480 (c) 364
 (d) 342 (e) 420
53. $\sqrt{5^2 \times 41 \times 5} - 17^2 - 75 = ?$
 (a) 69 (b) 71 (c) 79
 (d) 63 (e) 89
54. $\sqrt{256 \times 49} + (19)^2 + 11 = (?)^2$
 (a) 484 (b) 22 (c) 24
 (d) 42 (e) 26
55. $252 + 520 \div 20 + 420 = 121 + ?$
 (a) 587 (b) 577 (c) 527
 (d) 477 (e) 627

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Level - 2

Directions (1-5): What approximate value will come in place of question mark (?) in the following questions. (You are not expected to calculate the exact value)

- 40.02% of 601 - 249.97 = ? - 69.98% of 910
(a) 607 (b) 627 (c) 637
(d) 617 (e) 647
- 42001 ÷ 60 × 29.95 = ? × 41.99
(a) 540 (b) 520 (c) 500
(d) 460 (e) 480
- (42.02)² + (6.98)² - (27.02)² = (33.01)² - ?
(a) 1 (b) 2 (c) 3
(d) 4 (e) 5
- $\frac{699.97}{52} \div \frac{11}{207.99} \times \frac{121}{77.02} = ?$
(a) 400 (b) 410 (c) 390
(d) 420 (e) 380
- 29.97% of ? + $\sqrt{399.81} = (14.98)^2 + 31.99$
(a) 750 (b) 730 (c) 760
(d) 790 (e) 830

Directions (6-10): What approximate value will come in place of question mark (?) in the following questions. (You are not expected to find the exact value)

- $\frac{125.98}{154.03} \times \frac{198.02}{17.99} - \frac{156.05}{101.98} \times \frac{51.03}{78.03} = ?$
(a) 8 (b) 25 (c) 35
(d) 50 (e) 0
- 80.08% of 349.98 + 45.02% of 799.99 = ?% × 255.95
(a) 300 (b) 270 (c) 235
(d) 250 (e) 200
- $\sqrt{1224.99} \div 6.99 = ? - 1799.98$
(a) 1600 (b) 1810 (c) 1950
(d) 1710 (e) 1900
- 2744.98 - 1417.99 = ? + 987.98
(a) 369 (b) 299 (c) 119
(d) 229 (e) 339
- ?² = 44.99 % of 4500.02 - 24.99% of 3959.98 + 87.01 × 2.97
(a) 0 (b) 16 (c) 36
(d) 56 (e) 80

Directions (11-15): What approximate value will come in place of question mark (?) in the following questions. (You are not expected to find the exact value)

- 1749.98 ÷ 350 × 49.79 + 111.03 = (?)²
(a) 19 (b) 39 (c) 29
(d) 9 (e) 49

12. ? × 625.04 = 15625.01 + 9999.99
(a) 41 (b) 25 (c) 60
(d) 12 (e) 68

13. 29.98% of 701 - 350.01 + 82% of 501 = ?
(a) 230 (b) 290 (c) 270
(d) 250 (e) 310

14. 5759.99 ÷ 45.01 + 11.99 = ? × 10.03
(a) 60 (b) 2 (c) 46
(d) 30 (e) 14

15. 1395.98 + 412.04 - 2703.99 = ? - (31.02)²
(a) 28 (b) 45 (c) 65
(d) 85 (e) 98

Directions (16-20): What approximate value will come in place of question mark (?) in the following questions. (You are not expected to find the exact value)

16. 41.979 × $\frac{22}{7}$ + 19.989% of 530.014 - 26.021 = ?
(a) 244 (b) 198 (c) 236
(d) 212 (e) 252

17. (23.012 × 22.989) + 20.985 × 7.014 = ?²
(a) 8 (b) 38 (c) 26
(d) 12 (e) 44

18. $\sqrt{1443.979} \div 18.981 + 3.5 \times \sqrt{16.017} = (?)$
(a) 16 (b) 30 (c) 8
(d) 26 (e) 10

19. 779.98 ÷ 48.014 × 15.989 = ?
(a) 280 (b) 248 (c) 275
(d) 242 (e) 260

20. 1485.988 + 212.04 - 1703.99 = ? - (11.02)²
(a) 95 (b) 115 (c) 130
(d) 102 (e) 135

Directions (21-25): What approximate value will come in place of question mark (?) in the following questions. (You are not expected to find the exact value)

21. 43.495 × $\frac{64.02}{31.99} \times \frac{1}{28.979} - 2.012 = ?$
(a) 4 (b) 12 (c) 6
(d) 1 (e) 8

22. (33.33 × 80.989 ÷ 99.99) + 3.024 - ? = 4.012
(a) 20 (b) 26 (c) 34
(d) 16 (e) 40

23. 20.021 + 4.969 + 30.499 - 50.022 = ?
(a) 5.5 (b) 2 (c) 8.5
(d) 12.5 (e) 14

24. 995.013 - 39.976 × 19.99 + 5.022 = 1.988 × ?
(a) 115 (b) 85 (c) 100
(d) 125 (e) 75

25. $(10.011)^2 + (23.989)^2 = 275.99 + (?)^2$
 (a) 34 (b) 6 (c) 28
 (d) 12 (e) 20

Directions (26-30): What approximate value will come in place of question mark (?) in the following questions. (You are not expected to find the exact value)

26. $33.989 \times \frac{4.01}{17.02} \times \frac{1}{3.99} - 2.012 = ?$
 (a) 0 (b) 3 (c) 5
 (d) 4 (e) 8
27. $(11.01 + 12.97) \times \frac{1}{7.99} + 5.956 = 18 - ?$
 (a) 15 (b) 13 (c) 5
 (d) 9 (e) 18

28. $119.022 + 40.99 + 9.03 = ?^2$
 (a) 10 (b) 13 (c) 17
 (d) 8 (e) 16

29. $58.99 + 52.11 - 47.94 + ? = 85.96$
 (a) 27 (b) 19 (c) 23
 (d) 15 (e) 30

30. $(14.96)^2 + (5.011)^3 + 50.02 = ?^2$
 (a) 28 (b) 16 (c) 25
 (d) 12 (e) 20

Directions (31-35): What approximate value will come in place of question mark (?) in the following questions

31. $112.5 \times 5.95 + 7799 \div 26 + 124.8 = ?$
 (a) 1150 (b) 1100 (c) 1200
 (d) 1250 (e) 1050
32. $57.5 \times 13.98 + 8748 \div 13.98 - 21.97 \times 8 = ?$
 (a) 1300 (b) 1350 (c) 1205
 (d) 1254 (e) 1150

33. $(25.98)^2 + (33.97)^2 + \sqrt{1440} - \sqrt{3136} = ?$
 (a) 1814 (b) 1864 (c) 1764
 (d) 1710 (e) 1920

34. $12449.5 + 7649.7 - 9874.8 + 8274.9 = ?$
 (a) 19200 (b) 17000 (c) 17500
 (d) 18000 (e) 18500

35. $(15.98)^3 + 9320 \div 7.99 - 7304.8 \div 4.99 = ?$
 (a) 3750 (b) 3800 (c) 3600
 (d) 3690 (e) 3850

Directions (36-40): What approximate value will come in place of question mark (?) in the following questions. (You are not expected to find the exact value)

36. $1999.92 \div 49.87 \times 3.01 + 5.13 = (?)^3$
 (a) 5 (b) 8 (c) 9
 (d) 2 (e) 3

36. $59.9\% \text{ of } 319.94 + 9.99\% \text{ of } 1600.01 = -177 + (?)^2$
 (a) 26 (b) 33 (c) 23
 (d) 20 (e) 40

38. $1.101 + 11.01 + 101.01 \div 1.01 = ?$
 (a) 109 (b) 116 (c) 101
 (d) 113 (e) 117

39. $\sqrt{2024} \times \sqrt{9.21} - 35.01 = ? \times 10.1$
 (a) 10 (b) 12 (c) 14
 (d) 20 (e) 15

40. $1390.98 \div 26.04 \times 1.99 = ? - 16^2$
 (a) 324 (b) 413 (c) 400
 (d) 343 (e) 363

Directions (41-45): In each of the following questions, find the exact value of (?).

41. $2\frac{3}{5} + 3\frac{2}{3} - 1\frac{1}{2} = ? + 1\frac{23}{30}$
 (a) 2 (b) 4 (c) 3
 (d) 1 (e) 0

42. $15 \div 5 \times 4 - 2 = ? - 9$
 (a) 23 (b) 19 (c) 17
 (d) 15 (e) 20

43. $2^3 \times 4^6 \div 8^2 = (2)^{? - 2}$
 (a) 7 (b) 6 (c) 9
 (d) 11 (e) 8

44. $\frac{\sqrt{1521}}{\sqrt{169}} \times \frac{\sqrt{1444}}{\sqrt{361}} \times (10)^2 = \sqrt{100} \times ?$
 (a) 40 (b) 80 (c) 70
 (d) 50 (e) 60

45. $15\% \text{ of } 250 + 35\% \text{ of } 750 - 75 = (?)^2$
 (a) 15 (b) 16 (c) 18
 (d) 10 (e) 20

46. $7.5 \times 8 - 10 = ? \times 2.5$
 (a) 15 (b) 20 (c) 25
 (d) 30 (e) 35

47. $7394 + 6295 - 3689 = ? \times 40$
 (a) 320 (b) 240 (c) 280
 (d) 250 (e) 300

48. $9 \times 9 \div 3 + 9 \times 123 = ? - 19 - 23$
 (a) 1176 (b) 1174 (c) 1177
 (d) 1175 (e) 1178

49. $13 \times 23 + 27 \times 37 = (?) - 302$
 (a) 1620 (b) 1540 (c) 1700
 (d) 1500 (e) 1600

50. $493 + 287 - 334 = -54 + ? \times 5$
 (a) 90 (b) 100 (c) 110
 (d) 95 (e) 85

Mains Questions

Directions (1-5): What will come in place of (?) in the following questions?

1. $\frac{54\% \text{ of } ?}{56 \div 48 \times 54} = (3)^2$
 (a) 1050 (b) 1200 (c) 1140
 (d) 1180 (e) 1100
2. $\{(15)^2 + (23)^2 - (17)^2\} \div 31 = ?$
 (a) 5 (b) 35 (c) 25
 (d) 45 (e) 15
3. $\left(\frac{?+65}{45\% \text{ of } 480}\right) \times 72 \div 35 \times 840 = ? \times 18$
 (a) 13 (b) 65 (c) 52
 (d) 26 (e) 39
4. $(?)^3 + (9)^2 = (12)^3 - 35\% \text{ of } 1800 - 80\% \text{ of } 360$
 (a) 14 (b) 12 (c) 9
 (d) 6 (e) 11
5. $? = \{(65\% \text{ of } 3400) \div (45\% \text{ of } 900)\} \text{ of } 648$
 (a) 3022 (b) 3536 (c) 3468
 (d) 3290 (e) 3812

Directions (6-10): What will come in place of (?) in the following questions?

6. $37\% \text{ of } 2500 + 11 \times 21 = (?)^2$
 (a) 32 (b) 34 (c) 27
 (d) 38 (e) 24
7. $\{(34 \times 23) + (24\% \text{ of } 4900)\} \div 22 = ?$
 (a) 89 (b) 35 (c) 48
 (d) 65 (e) 11
8. $126 + 25\% \text{ of } (317 + 1059 + 224) = ?$
 (a) 580 (b) 572 (c) 545
 (d) 526 (e) 512
9. $32\% \text{ of } 1200 \div (26\% \text{ of } 5500) \times 65 \times 132 = (?)^2$
 (a) 18 (b) 38 (c) 28
 (d) 8 (e) 48
10. $\frac{? \times 15 \times 100}{36} = 1625$
 (a) 45 (b) 39 (c) 63
 (d) 51 (e) 57

Directions (11-15): What comes at the place of question (?) Mark:

11. $26\% \text{ of } 250 + ?\% \text{ of } 640 = (15)^2$
 (a) 35 (b) 25 (c) 20
 (d) 15 (e) 45
12. $23 \times 13 + (11)^2 - ? = (19)^2$
 (a) 49 (b) 39 (c) 59
 (d) 29 (e) 19

13. $\frac{?}{24} + 65\% \text{ of } 260 = 4 \times 49.75$
 (a) 640 (b) 840 (c) 960
 (d) 720 (e) 800
14. $2.46 \times 15 + 25\% \text{ of } 92.4 = ? \times 15$
 (a) 10 (b) 2 (c) 8
 (d) 6 (e) 4
15. $460 + 927 - 433 + ? = (31)^2$
 (a) 1 (b) 9 (c) 3
 (d) 7 (e) 5

Directions (16-20): What will come in place of (?) in the following questions?

16. $45\% \text{ of } 600 \div \{(25 + 15)\% \text{ of } 500\} = ? \div 40$
 (a) 62 (b) 48 (c) 54
 (d) 58 (e) 46
17. $\frac{?-80}{15 \times 24} \text{ of } 432 \times 25 = 4800$
 (a) 260 (b) 230 (c) 250
 (d) 270 (e) 240
18. $(?)^2 = 210\% \text{ of } 800 + (38)^2 + 108 \times 9$
 (a) 64 (b) 54 (c) 84
 (d) 94 (e) 74
19. $? \times 23 = 24 \times 45 + 820 - 60\% \text{ of } 2400$
 (a) 20 (b) 50 (c) 40
 (d) 80 (e) 60
20. $? \% \text{ of } 3500 = 1684 - 488 - 31\% \text{ of } 1600$
 (a) 40 (b) 30 (c) 25
 (d) 20 (e) 35

Directions (21-25): Find the approximate value of (?) in the following questions.

21. $24.97\% \text{ of } 1799 - (11.012 \times 24.05) = ?$
 (a) 138 (b) 164 (c) 157
 (d) 186 (e) 123
22. $12.012\% \text{ of } (231.989 + 417.91) + 90.98 = (?)^2$
 (a) 13 (b) 15 (c) 8
 (d) 10 (e) 19
23. $(26.99 \times 48.023) \div 54.01 + 57.03\% \text{ of } 2500.034 = ?$
 (a) 1485 (b) 1498 (c) 1467
 (d) 1454 (e) 1449
24. $\frac{55.01\% \text{ of } 2199}{67.023 + 54.12} + (2.034 \times 12.01 + 6.02) = ?$
 (a) 28 (b) 40 (c) 62
 (d) 72 (e) 56
25. $513.89 - 122.11 + 56.987 + 221.123 = ?$
 (a) 670 (b) 690 (c) 780
 (d) 730 (e) 760

Directions (26-30): Find the approximate value of (?) in the following questions.

26. 57.034% of $4499 - 12.97 \times 4.99 = (?)^2$
 (a) 35 (b) 48 (c) 42
 (d) 50 (e) 40
27. $? = \frac{64.99 \times 36.03}{59.97\% \text{ of } 194.967} + 17.89$
 (a) 30 (b) 41 (c) 46
 (d) 35 (e) 38
28. $1191.12 - (52.03 + 1267.991) \div 55.034 = ?$
 (a) 1103 (b) 1057 (c) 1167
 (d) 1149 (e) 1111
29. $11.976 \div 484.01 \times 846.99 + (15.99\% \text{ of } 199) = ?$
 (a) 53 (b) 32 (c) 39
 (d) 48 (e) 60
30. $(12.011)^3 - (34.998)^2 + 154.034\% \text{ of } 490.04 = ?$
 (a) 1285 (b) 1279 (c) 1258
 (d) 1264 (e) 1272

Directions (31-35): Find the approximate value of (?) in the following questions.

31. $(?)^2 = (37.012\% \text{ of } 4500.03) \div 332.989 + 19.023 \times 3.99$
 (a) 13 (b) 9 (c) 11
 (d) 15 (e) 7
32. $? - 219.11 + 670.01 - 1331.03 = 37.034 \times 6.99$
 (a) 1097 (b) 1073 (c) 1123
 (d) 1047 (e) 1139
33. $\{(5.0023)^3 - (9.01)^2\} \text{ of } 14.978 = ? - 11.997\% \text{ of } 699.95$
 (a) 767 (b) 758 (c) 731
 (d) 744 (e) 713
34. $? \times 24.023 + \frac{1}{2} \text{ of } 419.991 = \frac{3}{4} \text{ of } 984.034$
 (a) 8 (b) 10 (c) 22
 (d) 14 (e) 16
35. $41.99\% \text{ of } 2299 - 45.03\% \text{ of } 1400.056 - 11.98 = (?)^2$
 (a) 13 (b) 11 (c) 18
 (d) 19 (e) 22

Direction (36 - 40): What approximate value should come in the place of questions (?) mark.

36. $\frac{144.01}{\sqrt[4]{?}} + 24.03\% \text{ of } 124.97 = (8.01)^2 - \sqrt{99.99}$
 (a) 16 (b) 4096 (c) 256
 (d) 1296 (e) None of these
37. $? \% \text{ of } 249.95 + (3.99)^3 = (6.01)^3 - \sqrt[4]{16.01}$
 (a) 60 (b) 40 (c) 48
 (d) 80 (e) 56

38. $28.03 \times ? + 12.99\% \text{ of } 1999.98 = (21.91)^2$
 (a) 12 (b) 6 (c) 8
 (d) 4 (e) 10
39. $647.89 + ?^4 = (30.99)^2 - 18.99\% \text{ of } 300.01$
 (a) 2 (b) 4 (c) 6
 (d) 8 (e) 12
40. $32.01\% \text{ of } ? + (17.99)^2 = 75.99\% \text{ of } 500.04$
 (a) 175 (b) 150 (c) 125
 (d) 225 (e) 275

Direction (41 - 45): What approximate value should come in the place of question (?) mark.

41. $28.01\% \text{ of } 224.99 + (9.01)^2 = ?^2$
 (a) 8 (b) 16 (c) 24
 (d) 12 (e) 6
42. $\frac{?}{18.01} + (14.01)^2 = (15.01)^2 - \sqrt[3]{124.99}$
 (a) 432 (b) 412 (c) 402
 (d) 442 (e) 472
43. $32.01 \times ? + (18.01)^2 = 80.01\% \text{ of } 1404.99$
 (a) 35 (b) 25 (c) 15
 (d) 45 (e) None of these
44. $56.01\% \text{ of } ? + (11.99)^2 = 68.01\% \text{ of } 499.99$
 (a) 250 (b) 300 (c) 150
 (d) 450 (e) 350
45. $?^3 \times 18.08 + \sqrt{625.01} = 2274.98$
 (a) 15 (b) 25 (c) 35
 (d) 5 (e) 45

Directions (46-50): Find the approximate value of (?) in the following questions.

46. $62.5\% \text{ of } 999.9 + (4.99)^2 = (?) \times 25.956$
 (a) 15 (b) 25 (c) 45
 (d) 55 (e) 35
47. $? \% \text{ of } \{(26.03)^2 - 19.023 \times 3.99\} = 1818.014$
 (a) 311 (b) 315 (c) 332
 (d) 303 (e) 327
48. $34.99 \times 49.980 \div 175.045 = ? - 19.98\% \text{ of } 1700.03$
 (a) 350 (b) 270 (c) 360
 (d) 380 (e) 320
49. $(53.97)^2 - (12.02)^3 + (17.992)^2 = ?$
 (a) 1548 (b) 1686 (c) 1512
 (d) 1584 (e) 1632
50. $\frac{1695.94}{? \% \text{ of } 799.9} + \sqrt{1023.98} = 58.47$
 (a) 30 (b) 8 (c) 48
 (d) 76 (e) 18

Directions (51-55): Find the approximate value of (?) in the following questions.

51. $? \times 24.99 = (243.02 + 647.023)$ of 44.97
 (a) 1674 (b) 1602 (c) 1646
 (d) 1628 (e) 1682
52. $(17.989)^3$ of $(35.04)^2 \div 5399.99 + (1.98)^3 = (?)^3$
 (a) 15 (b) 9 (c) 7
 (d) 13 (e) 11
53. 34.99% of 2499 – 17.97% of 3599 = $\frac{(?^2+4.99)}{3.03}$
 (a) 18 (b) 26 (c) 22
 (d) 28 (e) 36
54. 15.03% of ? = $1497.03 - 682.991 - 777.995$
 (a) 240 (b) 280 (c) 150
 (d) 360 (e) 350

55. $\frac{3.011}{4.99} \times \frac{9.021}{19.03} \times ? \times 64.99 = (11.023)^3 + 72.989$
 (a) 76 (b) 85 (c) 82
 (d) 71 (e) 88

Direction (56 – 60): What approximate value should come in the place of (?) mark :

56. 72.01% of $(? + 224.98) = (14.01)^2 + 199.99$
 (a) 325 (b) 375 (c) 225
 (d) 405 (e) 625
57. 16.01% of ? + 64.01% of 350.01 = 64.99% of 400
 (a) 125 (b) 225 (c) 275
 (d) 350 (e) 625
58. $\frac{128.05}{?} + (17.01)^2 = 19.99\%$ of 1525.01
 (a) 6 (b) 12 (c) 4
 (d) 16 (e) 8
59. $?^3 + (24.01)^2 = (25.01)^2 + 29.99\%$ of 49.99
 (a) 2 (b) 6 (c) 3
 (d) 8 (e) 4
60. ? % of 420.01 + $(12.01)^2 = 24.01\%$ of 1649.99
 (a) 54 (b) 60 (c) 64
 (d) 50 (e) 55

Directions (61-65): What approximate value will come in place of (?) in the following questions?

61. $234.01 \times \frac{?}{12.99} - 29.9\%$ of 499.9 = $810.01 \div 26.98$
 (a) 30 (b) 20 (c) 15
 (d) 10 (e) 25
62. $\frac{59.99}{180.01} \times \sqrt[2]{81.011} + 249.98\%$ of 160.01 = ?
 (a) 407 (b) 412 (c) 399
 (d) 395 (e) 403

63. $(5.01)^3 \times (23.99)^2 \div (44.98)^3 = (?)^2$
 (a) $\frac{13}{9}$ (b) $\frac{8}{9}$ (c) $\frac{5}{7}$
 (d) $\frac{12}{7}$ (e) $\frac{2}{7}$
64. $\{29.001 + 120.99\} \div (4.98)^2 + 4.01 \times (?)^2 = 75\%$ of $839.98 + 51.995$
 (a) 17 (b) 13 (c) 16
 (d) 15 (e) 14
65. $\sqrt{1520.98} + \sqrt{144.01} + \sqrt{576.001} + ? = 31.997\%$ of 799.9
 (a) 181 (b) 211 (c) 171
 (d) 201 (e) 191

Directions (66 – 70): What approximate value should come in place of Question mark (?) in the following equation?

66. $\frac{25\% \text{ of } 295.7 \times 32.02}{?} = \frac{36.99}{25\% \text{ of } \frac{1}{4}}$
 (a) 2 (b) 4 (c) 6
 (d) 8 (e) 1
67. $\frac{\sqrt[3]{404.99 \times 315.01 \times 245.40}}{\sqrt{33\frac{1}{3}\% \text{ of } 26.99}} = ?$
 (a) 100 (b) 105 (c) 110
 (d) 115 (e) 95
68. 19.66% of 144.87 – $\frac{266.47}{118.84} \times \frac{17}{18.84} = ?^3$
 (a) 5 (b) 7 (c) 0
 (d) 3 (e) 6
69. $\sqrt{82 \div 8.76 \div 9.25 \times 3.76} + \frac{181}{91.10} \times \frac{473.92}{237.40} + 7.91 = ?^{\frac{1}{2}}$
 (a) 100 (b) 400 (c) 256
 (d) 169 (e) 196
70. $6739 + 161 \times 4.966 - 74.99 \times 11.888 + 20\%$ of 121 – 10% of 109 = ?
 (a) 6657 (b) 7067 (c) 7167
 (d) 6587 (e) 6757

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Previous Year Question

Direction (1 – 5): What approximate value should come in the place of question mark in following question.

- $(89.99\% \text{ of } 7000.02 + (24.01)^2) \div ? = 1719.01$
(a) 4 (b) 3 (c) 2
(d) 6 (e) 5
- $32.01 \times 4.99 + ? = 64.03\% \text{ of } 349.97$
(a) 48 (b) 96 (c) 72
(d) 64 (e) 32
- $\frac{312.07}{?} + (12.99)^2 = 20.01\% \text{ of } 909.99$
(a) None of these (b) 48 (c) 6
(d) 12 (e) 24s
- $199.99 + 12.01\% \text{ of } 499.99 - \sqrt[3]{63.99} = ?^2$
(a) 12 (b) 16 (c) 14
(d) 18 (e) 8
- $\frac{84.01}{?} + 26.03\% \text{ of } 799.97 + \sqrt[4]{16.03} = (5.99)^3$
(a) 42 (b) 21 (c) 12
(d) 14 (e) 4

SBI PO Prelims 2020

Direction (6-10): Find the value of (?) in following approximation questions:

- $2^? = 32.01 \div 128.01 \times 1023.99 \div 7.99$
(a) 7 (b) 3 (c) 4
(d) 5 (e) 8
- $\frac{339.99}{?} = \sqrt{143.99} + \sqrt{64.01}$
(a) 17 (b) 20 (c) 10
(d) 34 (e) 40
- $34.02\% \text{ of } 550.09 \div ? = 297.07 \div \sqrt{728.95}$
(a) 14 (b) 21 (c) 8
(d) 27 (e) 17
- $(? \div 9.97) \times 12.08 = 20.12\% \text{ of } 1319.97$
(a) 220 (b) 240 (c) 260
(d) 280 (e) 200
- $? \% \text{ of } 179.99 = \frac{\sqrt{(24.02)^2 + (17.98)^2} + 60.01\% \text{ of } 659.98}{?}$
(a) 80 (b) 60 (c) 40
(d) 20 (e) 10

SBI PO Prelims 2018

Directions (11-15): What approximate value should come in place of the question mark (?) in the following questions?

Note: (You are not expected to calculate the exact value.)

- $24.001 \times 14.999 \times 9.998 = ?$
(a) 4200 (b) 3000 (c) 3600
(d) 4000 (e) 2500
- $14.003\sqrt{7} + 53.0345\sqrt{7} = \frac{67}{26.999} \times (?)$
(a) 801 (b) 720 (c) 729
(d) 721 (e) 744
- $10.11 \times 36.93 + \sqrt{48.875} \times 19.99 = 17.231 \times \sqrt{?}$
(a) 25 (b) 144 (c) 225
(d) 625 (e) 900

- $1898.88 \div 189.921 + 9.99 + (?)^2 = 83.89$
(a) 3 (b) 4 (c) 5
(d) 8 (e) 7

- $39.7\% \text{ of } 801 - 250.17 = ? - 63\% \text{ of } 801$
(a) 800 (b) 500 (c) 574
(d) 760 (e) 550

SBI PO Prelims 2017

Directions (16-20): What approximate value should come in place of the question mark (?) in the following questions? (You are not expected to calculate the exact value.)

- $57\% \text{ of } 394 - 2.5\% \text{ of } 996 = ?$
(a) 215 (b) 175 (c) 200
(d) 180 (e) 227

- $96.996 \times 9.869 + 0.96 = ?$
(a) 860 (b) 870 (c) 1080
(d) 965 (e) 1100

- $\frac{3}{5} \times \frac{1125}{1228} \times 7 = ?$
(a) 7 (b) 12 (c) 9
(d) 4 (e) 15

- $(\sqrt{329} \times 25) \div 30 = ?$
(a) 12 (b) 15 (c) 24
(d) 21 (e) 9

- $(638 + 9709 - 216) \div 26 = ?$
(a) 275 (b) 345 (c) 440
(d) 300 (e) 390

SBI PO Prelims 2016

Direction (21-25): What will come in the place of (?) mark in following question.

- $280 \div 4 \div 2 = 170 - ?$
(a) 105 (b) 115 (c) 125
(d) 135 (e) 145

- $(\sqrt{144} + \sqrt{169}) \times 3 = \frac{?}{5}$
(a) 375 (b) 325 (c) 350
(d) 275 (e) 475

- $(12 \times 5 \div 4) \times 8 = ?$
(a) 100 (b) 140 (c) 120
(d) 80 (e) 90

- $(120\% \text{ of } 750) \div ? = 25$
(a) 30 (b) 36 (c) 24
(d) 18 (e) 48

- $8\frac{1}{2} - 4\frac{5}{6} = ? - 3\frac{7}{12}$
(a) $3\frac{1}{4}$ (b) $3\frac{5}{12}$ (c) $2\frac{7}{12}$
(d) $7\frac{1}{4}$ (e) $5\frac{2}{3}$

26. $275 + 64\% \text{ of } 750 = 750 + ?$

- (a) 25 (b) 8 (c) 10
(d) 15 (e) 5

27. $\sqrt{225} + \sqrt{81} + 12^2 = ?$

- (a) 168 (b) 164 (c) 162
(d) 172 (e) 182

28. $\frac{510}{?} = \sqrt{324} + 3.25$

- (a) 12 (b) 48 (c) 24
(d) 6 (e) 18

29. $12.5\% \text{ of } (120 + ?) = 45$

- (a) 160 (b) 180 (c) 360
(d) 240 (e) 120

30. $572 \div 13 \times 12 - 16 = (8)^?$

- (a) 4 (b) 2 (c) 3
(d) 5 (e) None of these

SBI CLERK Prelims 2020

Direction (31 - 35): What will come in the place of question mark in following questions.

31. $(? \div 5 \div 7) \times 14 + 112 = 420$

- (a) 710 (b) 720 (c) 660
(d) 770 (e) 750

32. $(?)^{(4 \times 16 \div 32 + 1)} + 12^2 = 360$

- (a) 4 (b) 6 (c) 8
(d) 2 (e) 3

33. $50\% \text{ of } 128 + \frac{\sqrt{16}}{2} \times 4 = ? + 10$

- (a) 64 (b) 62 (c) 60
(d) 56 (e) 82

34. $\frac{\sqrt[3]{1331}}{11} + \sqrt{81} + ? = 27$

- (a) 19 (b) 18 (c) 17
(d) 16 (e) 15

35. $(14)^2 + 179 + (5)^2 = (?)^2$

- (a) 10 (b) 20 (c) 30
(d) 40 (e) 22

36. $28.5 \times 34 + 2320 \div 8 = (36)^2 - ?$

- (a) 51 (b) 47 (c) 43
(d) 34 (e) 37

37. $47 \times 27 + 15600 \div 8 + 181 = ?$

- (a) 3320 (b) 3420 (c) 3370
(d) 3400 (e) 3460

38. $112.5 \times 5 + 4560 \div 6 - 175 \times 7 = ?$

- (a) 103.5 (b) 91.5 (c) 97.5
(d) 110.5 (e) 115.5

39. $80\% \text{ of } ? = \sqrt{250 \times 44 + 40\% \text{ of } 8500}$

- (a) 80 (b) 120 (c) 150
(d) 180 (e) 240

40. $? \times 40 \div 24 \times 27 = \frac{594}{115} \times \frac{2300}{264}$

- (a) 1 (b) 2 (c) 3
(d) 4 (e) 5

41. $? + 13 \times 50 = 420 + 45\% \text{ of } 800 + 220$

- (a) 300 (b) 350 (c) 400
(d) 450 (e) 250

42. $12\% \text{ of } ? + 12.5\% \text{ of } 960 = 16 \times 12$

- (a) 840 (b) 960 (c) 800
(d) 600 (e) 400

43. $15 \times ? + 20\% \text{ of } 450 = 360$

- (a) 12 (b) 20 (c) 24
(d) 16 (e) 18

44. $75\% \text{ of } \frac{3}{4} \times \frac{8}{9} \times 1800 = ? + 600$

- (a) 300 (b) 400 (c) 250
(d) 480 (e) 540

45. $? \% \text{ of } 900 + 500 = 4 \times 197$

- (a) 28 (b) 25 (c) 36
(d) 40 (e) 32

IBPS CLERK Prelims 2020

Directions (46-50): What should come in place of question mark (?) in following questions?

46. $(48\% \text{ of } 625) \div 0.75 = ?$

- (a) 800 (b) None of these
(c) 40 (d) 4000 (e) 400

47. $\frac{(4)^8 + (18)^2}{7^2 + 121 - 73} = ?$

- (a) 1 (b) 2
(c) 4 (d) 5 (e) 3

48. $(4)^? \times 2 = \frac{(16)^2}{\sqrt[4]{16}}$

- (a) 2 (b) 3
(c) 4 (d) 1 (e) None of these

49. $4 \times (? + 120) = (8)^3$

- (a) 6 (b) 12
(c) 8 (d) 4 (e) 16

50. $? + 432 - 205 = 550$

- (a) 384 (b) 244
(c) 224 (d) 276 (e) 324

51. $12 \times 8 + (?)^2 = (14)^2$

- (a) 10 (b) 12
(c) 8 (d) 6 (e) 9

52. $40\% \text{ of } 400 + ? \% \text{ of } 300 = 250$

- (a) 40 (b) 36
(c) 25 (d) 30 (e) 20

53. $\sqrt{441} \div 7 = ? - 180$

- (a) 185 (b) 183
(c) 187 (d) 184 (e) 182

54. $\sqrt{576} - \sqrt{144} + \sqrt{729} = 36 + ?$

- (a) 1 (b) 4
(c) 5 (d) 2 (e) 3

55. $119 + 41 + 9 = ?^2$

- (a) 10 (b) 13
(c) 17 (d) 8 (e) 16

56. $12\% (? + 100) = 18$

- (a) 40 (b) 50
(c) 30 (d) 100 (e) 60

57. $\frac{\sqrt[3]{1331}}{11} + \sqrt{81} + ? = 27$

- (a) 19 (b) 18
(c) 17 (d) 16 (e) 15

58. $?^2 + \sqrt{400} = 6^2$

- (a) 3 (b) 4
(c) 2 (d) 1 (e) 5

59. $9\frac{1}{3} + 7\frac{1}{2} = ? + 5\frac{1}{6} + 6\frac{1}{3}$

- (a) 4 (b) $4\frac{1}{2}$
(c) 5 (d) $5\frac{1}{6}$ (e) 6

60. $(3^4 \times 9^7) \div 27^6 = 3^?$

- (a) 2 (b) 3
(c) 0 (d) 6 (e) 7

Solutions

Basic Questions

1. (a); $\frac{320 \times 40}{100} = 128$

2. (c); $14.28\% \text{ of } 49 = \frac{1}{7} \times 49 = 7$

3. (b); $1\frac{1}{3} - 1\frac{1}{9} + 1\frac{1}{6} = (1-1+1) + \left(\frac{1}{3} - \frac{1}{9} + \frac{1}{6}\right)$
 $= 1 + \left(\frac{6-2+3}{18}\right) = 1 + \frac{7}{18} = 1\frac{7}{18}$

4. (b); $\frac{3}{7} \text{ of } \frac{49}{6} \text{ of } \frac{4}{7} = \frac{3}{7} \times \frac{49}{6} \times \frac{4}{7} = 2$

5. (c); $\frac{1}{4} \times 48 + \frac{1}{2} \times 120 = x\% \text{ of } 1200$
 $12 + 60 = \frac{x \times 1200}{100}$ ∴ $x = \frac{72 \times 100}{1200} = 6$

6. (e); $\sqrt{52 \times \frac{27}{6} + 26 - 4} = \sqrt{26 \times 9 + 26 - 4}$
 $\sqrt{234 + 22} = \sqrt{256} = 16$

7. (a); $\frac{24}{5} \times \frac{5}{32} = \frac{3}{4}$

8. (a); $\frac{16}{24} + \frac{4}{10} - \frac{1}{6} = \frac{5 \times 16 + 12 \times 4 - 1 \times 20}{120}$
 $= \frac{80 + 48 - 20}{120} = \frac{108}{120} = \frac{9}{10}$

9. (c); $8000 \div 16 - 200 = ? \times 6$

$$? = \frac{\frac{8000}{16} - 200}{6} = \frac{500 - 200}{6} = 50$$

10. (d); $\frac{3}{5} \times \frac{24 \times 500}{100} - 32 = ?$ ∴ $? = 72 - 32 = 40$

11. (a); $(\sqrt{2209} - 12) \times 5 = (47 - 12) \times 5 = 35 \times 5 = 175$

12. (a); $\sqrt{8 \times \frac{220}{11} + 85 - 20}$
 $= \sqrt{8 \times 20 + 85 - 20} = \sqrt{140 + 85} = \sqrt{225} = 15$

13. (d); $1\frac{5}{6} + 2\frac{3}{5} + 4\frac{2}{3} = (1+2+4) + \left(\frac{5}{6} + \frac{3}{5} + \frac{2}{3}\right)$
 $= \left(7 + \frac{25+18+20}{30}\right) = 7 + \frac{63}{30}$
 $= 7 + \frac{21}{10} = \frac{91}{10} = 9\frac{1}{10}$

14. (d); $\frac{1}{4} \times \frac{1}{2} \times \frac{3}{4} \times 52000 = \frac{3}{4} \times 6500 = \frac{19500}{4} = 4875$

15. (c); $\frac{3}{11} \text{ of } \frac{5}{7} \text{ of } x = 63$

$$\frac{3}{11} \text{ of } \frac{5}{7} \text{ of } x = 63$$

$$x = \frac{63 \times 7 \times 11}{3 \times 5} = \frac{21}{5} \times 77 = 4.2 \times 77 = 323.4$$

Prelims Solutions

Level - 1

$$1. \text{ (c): } \left(\frac{4^{\text{of}25}}{48}\right) \div \left(\frac{5}{4}\text{of}32 + \frac{3}{7}\text{of}21\right) = ? \text{ of } \frac{1}{49}$$

$$\left(\frac{24}{5} \times \frac{25}{48}\right) \div (40 + 9) = ? \times \frac{1}{49}$$

$$? = 49 \times \frac{5}{98} = \frac{5}{2} = 2.5$$

$$2. \text{ (b): } \sqrt{?} \text{ of } 6 + 20\% \text{ of } 95 = \frac{1}{2} \text{ of } 62$$

$$\sqrt{?} \text{ of } 6 = \frac{62}{2} - \frac{20}{100} \times 95 = 12$$

$$? = 2^2 = 4$$

$$3. \text{ (e): } \left(\frac{5}{3}\text{of}6 \frac{3}{5}\text{of}\frac{9}{11}\right) + ?^2 = 45$$

$$\left(\frac{5}{3} \times \frac{33}{5} \times \frac{9}{11}\right) + ?^2 = 45$$

$$?^2 = 36$$

$$? = \pm 6$$

$$4. \text{ (a): } \left(\frac{4}{7} \times \frac{14}{5} \div 2\right) - \left(\frac{3}{10}\text{of}?\right) = \frac{4}{5} - 3$$

$$\left(\frac{4}{7} \times \frac{14}{5} \times \frac{1}{2}\right) - \left(\frac{3}{10} \times ?\right) = -\frac{11}{5}$$

$$\frac{4}{5} - \frac{3}{10} ? = -\frac{11}{5}$$

$$? = 10$$

$$5. \text{ (c): } 4\frac{4}{5} + 2\frac{1}{15} - \frac{27}{5} = 2\frac{1}{5} \div 3 \times ?$$

$$\frac{24}{5} + \frac{31}{15} - \frac{27}{5} = \frac{11}{5} \times \frac{1}{3} \times ?$$

$$\frac{22}{15} = \frac{11}{15} \times ?$$

$$? = 2$$

$$6. \text{ (e): } \left(\frac{4^{\text{of}25}}{64}\right) \div \left(432 - 20^2 + \frac{3}{7}\text{of}21\right) \times (82) = ? \text{ of } \frac{1}{64}$$

$$\left(\frac{5}{16}\right) \div (432 - 400 + 9) \times (82) = ? \times \frac{1}{64}$$

$$? = \frac{5}{16} \times \frac{1}{41} \times 82 \times 64 = 40$$

$$7. \text{ (a): } 55\% \text{ of } 900 + 70\% \text{ of } 1050 = ?\% \text{ of } 3000$$

$$\frac{55}{100} \times 900 + \frac{70}{100} \times 1050 = \frac{?}{100} \times 3000$$

$$495 + 735 = 30 \times ?$$

$$30 \times ? = 1230$$

$$? = 41$$

$$8. \text{ (b): } 73823 - 34156 + 4756 + 6758 - 9849 =$$

$$41499 - 160 - ?$$

$$41332 = 41339 - ?$$

$$? = 7$$

$$9. \text{ (d): } \frac{5599}{1331} \times \frac{3773}{2036} \times \frac{88}{49} = ? - 6^2$$

$$14 = ? - 36$$

$$? = 50$$

$$10. \text{ (c): } 84 \times \frac{1}{4} \div 21^2 + ? = \frac{7}{147} \times 21 - \frac{20}{21}$$

$$84 \times \frac{1}{4} \times \frac{1}{441} + ? = 1 - \frac{20}{21}$$

$$\frac{1}{21} + ? = \frac{1}{21}$$

$$? = 0$$

$$11. \text{ (e): } \sqrt{5776} - \sqrt{1444} + \sqrt{729} = 43 + ?$$

$$76 - 38 + 27 = 43 + ?$$

$$? = 65 - 43 = 22$$

$$12. \text{ (a): } 78 \times 26 \div 6 + 1262 = 1311 + (?)^2$$

$$2028 \div 6 + 1262 = 1311 + (?)^2$$

$$338 + 1262 = 1311 + (?)^2$$

$$(?)^2 = 1600 - 1311 = 289$$

$$? = \sqrt{289} = 17$$

$$13. \text{ (a): } 1484 \div 28 + 1462 \div 34 - 12 \times 7 = ?$$

$$? = 53 + 43 - 84 = 12$$

$$14. \text{ (c): } 42.5 \times 15 + 37.5 \times 25 = 1420 + ?$$

$$637.5 + 937.5 = 1420 + ?$$

$$? = 1575 - 1420 = 155$$

$$15. \text{ (b): } 2450 + 3760 - 3830 = 6000 - ?$$

$$2380 = 6000 - ?$$

$$? = 6000 - 2380 = 3620$$

$$16. \text{ (b): } \sqrt{\frac{3840}{60} + \frac{1440}{40} - \frac{1330}{70}}$$

$$= \sqrt{64 + 36 - 19}$$

$$= \sqrt{81} = 9$$

$$17. \text{ (c): } 25 \times 18 + \frac{4200}{40} - \frac{525}{105} = 740 - ?$$

$$450 + 105 - 5 = 740 - ?$$

$$? = 740 - 550$$

$$= 190$$

$$18. \text{ (d): } 3845 + 4380 + 2640 - 5965 = (?)^2$$

$$(?)^2 = 10865 - 5965$$

$$= 4900$$

$$? = \sqrt{4900}$$

$$= 70$$

$$19. \text{ (b): } 400 \div 20 \times 35 + 6666 \div 33 + ? = 1100$$

$$20 \times 35 + 202 + ? = 1100$$

$$? = 1100 - (700 + 202)$$

$$= 1100 - 902 = 198$$

$$20. \text{ (b): } 28 \times 14.5 + 1680 \div 15 + 445 = 1000 - ?$$

$$406 + 112 + 445 = 1000 - ?$$

$$963 = 1000 - ?$$

$$? = 1000 - 963 = 37$$

21. (c): $\sqrt{256} \times \sqrt{169} + 3600 \div 12 = 800 - ?$
 $16 \times 13 + 300 = 800 - ?$
 $208 + 300 = 800 - ?$
 $? = 800 - 508$
 $= 292$

22. (a): $? = 37.5 \times 14 + 800 - (26)^2 + 136$
 $? = 525 + 800 - 676 + 136$
 $? = 1325 - 540$
 $= 785$

23. (d): $5430 + 3780 - 6430 = 2260 + ?$
 $9210 - 6430 = 2260 + ?$
 $2780 = 2260 + ?$
 $? = 2780 - 2260$
 $= 520$

24. (e): $2160 \div 12 + 5740 \div 14 - 3150 \div 15 + ? = 400$
 $180 + 410 - 210 + ? = 400$
 $590 - 210 + ? = 400$
 $? = 400 - 380$
 $= 20$

25. (a): $\sqrt{3481} \times 7 + \sqrt{5625} \times 4 = 500 + ?$
 $59 \times 7 + 75 \times 4 = 500 + ?$
 $413 + 300 = 500 + ?$
 $? = 713 - 500$
 $= 213$

26. (b): $\frac{128}{2} + \frac{4}{2} \times 4 = ? + 10$
 $64 + 8 = ? + 10$
 $? = 62$

27. (c): $\frac{11}{11} + 9 + ? = 27$
 $1 + 9 + ? = 27$
 $? = 17$

28. (b): $(3)^2 \times (3)^6 \div ((3)^2)^2 \div (3^3)^2$
 $\Rightarrow \frac{3^{2+6+4}}{3^6} \Rightarrow \frac{3^{12}}{3^6} = 3^6$

29. (b): $123 + 447 - 170 + 500 = ? - 200$
 $570 - 170 + 500 + 200 = ?$
 $? = 1100$

30. (b): $196 + 179 + 25 = (?)^2$
 $(?)^2 = 400$
 $? = 20$

31. (b): $\sqrt{841} + \sqrt{1296} - \sqrt{1024} = \sqrt{?}$
 $29 + 36 - 32 = \sqrt{?}$
 $\sqrt{?} = 33$
 $? = (33)^2$
 $= 1089$

32. (d): $14400 \div 36 + 15600 \div 12 + 450 = 1800 + ?$
 $400 + 1300 + 450 = 1800 + ?$
 $2150 = 1800 + ?$
 $? = 2150 - 1800$
 $= 350$

33. (a): $7450 + 5880 - 6890 = 9000 - ?$
 $? = 9000 - 6440$
 $= 2560$

34. (c): $32 \times 25 + 44 \times 18 + 348 \div 6 = ?$
 $? = 800 + 792 + 58$
 $= 1650$

35. (c): $\sqrt{1225} \times 28 + 203 \times 7 = (?)^2$
 $(?)^2 = 35 \times 28 + 203 \times 7$
 $= 980 + 1421$
 $= 2401$
 $? = \sqrt{2401}$
 $= 49$

36. (d): $\sqrt{961} + \sqrt{1369} - \sqrt{1444} = \sqrt{361} + \sqrt{?}$
 $31 + 37 - 38 = 19 + \sqrt{?}$
 $\sqrt{?} = 30 - 19$
 $\sqrt{?} = 11$
 $? = (11)^2$
 $= 121$

37. (a): $52500 \div 7 + 64680 \div 6 = 19500 - ?$
 $7500 + 10780 = 19500 - ?$
 $18280 = 19500 - ?$
 $? = 19500 - 18280$
 $= 1220$

38. (e): $28.5 \times 34 + 2320 \div 8 = (36)^2 - ?$
 $969 + 290 = 1296 - ?$
 $1259 = 1296 - ?$
 $? = 1296 - 1259$
 $= 37$

39. (d): $? = 47 \times 27 + 15600 \div 8 + 181$
 $= 1269 + 1950 + 181$
 $= 3400$

40. (c): $? = 112.5 \times 5 + 4560 \div 6 - 175 \times 7$
 $= 562.5 + 760 - 1225$
 $= 1322.5 - 1225$
 $= 97.5$

41. (c): $80\% \text{ of } ? = \sqrt{250 \times 44 + \frac{40 \times 8500}{100}}$
 $\Rightarrow \frac{80}{100} \times ? = \sqrt{11000 + 3400}$
 $\Rightarrow ? = \sqrt{14400} \times \frac{10}{8}$
 $\Rightarrow ? = 120 \times \frac{10}{8} = 150$

42. (a): $? \times \frac{40}{24} \times 27 = \frac{594}{115} \times \frac{2300}{264}$
 $\Rightarrow ? \times 45 = 45$
 $\Rightarrow ? = 1$

43. (d): $\frac{20}{100} \times 40 \times \sqrt{?} = 32^2 + 16^2$
 $\Rightarrow \sqrt{?} = \frac{1}{8} \times (1024 + 256)$
 $\Rightarrow \sqrt{?} = \frac{1}{8} \times 1280 = 160$
 $\Rightarrow ? = (160)^2 = 25600$

44. (b): $? + 13 \times 50 = 420 + \frac{45}{100} \times 800 + 220$
 $\Rightarrow ? + 650 = 420 + 360 + 220$
 $\Rightarrow ? = 1000 - 650 = 350$

45. (e): $(?)^{\frac{3}{2}} = 256 \times (2)^8 \div (8)^5 \times 32$
 $\Rightarrow (?)^{\frac{3}{2}} = \frac{2^8 \times 2^8}{2^{15}} \times 2^5$
 $\Rightarrow (?)^{\frac{3}{2}} = (2)^6 = 64$
 $\Rightarrow ? = (64)^{\frac{2}{3}} = 16$

46. (d): $56 \times 28 + 7680 \div 6 - 37 \times 24 = ?$
 $? = 1568 + 1280 - 888$
 $= 1960$

47. (b): $(28)^2 + (12)^3 + (38)^2 = (65)^2 - ?$
 $784 + 1728 + 1444 = 4225 - ?$
 $3956 = 4225 - ?$
 $? = 4225 - 3956$
 $= 269$

48. (c): $7560 + 8165 + 6780 = 18000 + ?$
 $22505 = 18000 + ?$
 $? = 22505 - 18000 = 4505$

49. (e): $\sqrt{2401} + \sqrt{3969} - \sqrt{3136} = 32 + ?$
 $49 + 63 - 56 = 32 + ?$
 $56 = 32 + ?$
 $? = 56 - 32$
 $= 24$

50. (a): $? = 1750 \times \frac{1}{7} + 900 \times \frac{3}{8} + 3240 \times \frac{2}{9}$
 $= 250 + 337.5 + 720$
 $= 1307.5$

51. (d): $\frac{48}{100} \times 525 + \frac{?}{100} \times 250 = 499$
 $? = \frac{247 \times 100}{250} = 98.8$

52. (c): $\frac{5}{2} \times \frac{7}{8} \times \frac{1}{28} \times 1600 = 260 + ? - 499$
 $? = 499 + 125 - 260$
 $= 364$

53. (a): $? = \sqrt{5125 - 289 - 75}$
 $= \sqrt{4761} = 69$

54. (b): $(?)^2 = 16 \times 7 + 361 + 11$
 $= 484$
 $? = 22$

55. (b): $252 + 26 + 420 = 121 + ?$
 $? = 577$

Level - 2

1. (b): $40.02\% \text{ of } 601 - 249.97 \approx ? - 69.98\% \text{ of } 910$
 $40\% \text{ of } 600 - 250 \approx ? - 70\% \text{ of } 910$
 $240 - 250 \approx ? - 637$
 $? \approx 627$

2. (c): $42001 \div 60 \times 29.95 \approx ? \times 41.99$
 $\frac{42000}{60} \times 30 \approx ? \times 42$
 $21000 \approx 42 \times ?$
 $? \approx 500$

3. (e): $(42.02)^2 + (6.98)^2 - (27.02)^2 \approx (33.01)^2 - ?$
 $42^2 + 7^2 - 27^2 \approx 33^2 - ?$
 $1764 + 49 - 729 \approx 1089 - ?$
 $? \approx 5$

4. (a): $\frac{699.97}{52} \div \frac{11}{207.99} \times \frac{121}{77.02} \approx ?$
 $\frac{700}{52} \div \frac{11}{208} \times \frac{121}{77} \approx ?$
 $\frac{700}{52} \times \frac{208}{11} \times \frac{121}{77} \approx ?$
 $? \approx 400$

5. (d): $29.97\% \text{ of } ? + \sqrt{399.81} \approx (14.98)^2 + 31.99$
 $30\% \text{ of } ? + \sqrt{400} \approx 15^2 + 32$
 $30\% \text{ of } ? + 20 \approx 225 + 32$
 $30\% \text{ of } ? \approx 237$
 $? \approx 790$

6. (a): $\frac{125.98}{154.03} \times \frac{198.02}{17.99} - \frac{156.05}{101.98} \times \frac{51.03}{78.03} = ?$
 $\frac{126}{154} \times \frac{198}{18} - \frac{156}{102} \times \frac{51}{78} \approx ?$
 $? \approx 9 - 1 \approx 8$

7. (d): $80.08\% \text{ of } 349.98 + 45.02\% \text{ of } 799.99 = ?\% \times 255.95$
 $80\% \text{ of } 350 + 45\% \text{ of } 800 \approx ?\% \times 256$
 $280 + 360 \approx ?\% \times 256$
 $? \approx \frac{640}{256} \times 100 = 250$

8. (b): $\sqrt{1224.99} \div 6.99 = ? - 1799.98$
 $\sqrt{1225} \div 7 \approx ? - 1800$
 $5 \approx ? - 1800$
 $? \approx 1810$

9. (e): $2744.98 - 1417.99 = ? + 987.98$
 $2745 - 1418 \approx ? + 988$
 $? \approx 339$

10. (c): $?^2 = 44.99\% \text{ of } 4500.02 - 24.99\% \text{ of } 3959.98 + 87.01 \times 2.97$
 $?^2 \approx 45\% \text{ of } 4500 - 25\% \text{ of } 3960 + 87 \times 3$
 $?^2 \approx 1296$
 $? \approx 36$

11. (a): $1749.98 \div 350 \times 49.79 + 111.03 = (?)^2$
 $\frac{1750}{350} \times 50 + 111 \approx (?)^2$
 $? = 19$

12. (a): $? \times 625.04 = 15625.01 + 9999.99$
 $? \times 625 \approx 15625 + 10000$
 $? \approx 41$

13. (c): $29.98\% \text{ of } 701 - 350.01 + 82\% \text{ of } 501 = ?$
 $30\% \text{ of } 700 - 350 + 82\% \text{ of } 500 \approx ?$
 $? \approx 210 - 350 + 410 \approx 270$

14. (e): $5759.99 \div 45.01 + 11.99 = ? \times 10.03$
 $5760 \div 45 + 12 \approx ? \times 10$
 $? \approx \frac{140}{10} \approx 14$

15. (c): $1395.98 + 412.04 - 2703.99 = ? - (31.02)^2$
 $1396 + 412 - 2704 \approx ? - (31)^2$
 $? \approx 961 - 896 \approx 65$

16. (d): $41.979 \times \frac{22}{7} + 19.989\% \text{ of } 530.014 - 26.021 = ?$
 $42 \times \frac{22}{7} + 20\% \text{ of } 530 - 26 \approx ?$
 $? \approx 132 + 106 - 26 \approx 212$

17. (c): $(23.012 \times 22.989) + 20.985 \times 7.014 = ?^2$
 $(23 \times 23) + 21 \times 7 \approx ?^2$
 $?^2 \approx 529 + 147 \approx 676$
 $? \approx 26$

18. (a): $\sqrt{1443.979} \div 18.981 + 3.5 \times \sqrt{16.017} = (?)$
 $\sqrt{1444} \div 19 + 3.5 \times \sqrt{16} \approx ?$
 $? \approx \frac{38}{19} + 3.5 \times 4$
 $? \approx 2 + 14 \approx 16$

19. (e): $779.98 \div 48.014 \times 15.989 = ?$
 $\frac{780}{48} \times 16 \approx ?$
 $? \approx \frac{780}{3} \approx 260$

20. (b): $1485.988 + 212.04 - 1703.99 = ? - (11.02)^2$
 $1486 + 212 - 1704 \approx ? - (11)^2$
 $? \approx 1698 - 1704 + 121 \approx 115$

21. (d): $43.495 \times \frac{64.02}{31.99} \times \frac{1}{28.979} - 2.012 = ?$
 $43.5 \times \frac{64}{32} \times \frac{1}{29} - 2 \approx ?$
 $? \approx 1$

22. (b): $(33.33 \times 80.989 \div 99.99) + 3.024 - ? = 4.012$
 $\left(\frac{33.33}{99.99} \times 81\right) + 3 - ? \approx 4$
 $? \approx 26$

23. (a): $20.021 + 4.969 + 30.499 - 50.022 = ?$
 $20 + 5 + 30.5 - 50 \approx ?$
 $? \approx 5.5$

24. (c): $995.013 - 39.976 \times 19.99 + 5.022 = 1.988 \times ?$
 $995 - 40 \times 20 + 5 = 2 \times ?$
 $? \approx 100$

25. (e): $(10.011)^2 + (23.989)^2 = 275.99 + ?^2$
 $10^2 + 24^2 = 276 + ?^2$
 $? = 20$

26. (a): $33.989 \times \frac{4.01}{17.02} \times \frac{1}{3.99} - 2.012 = ?$
 $34 \times \frac{4}{17} \times \frac{1}{4} - 2 \approx ?$
 $? \approx 0$

27. (d): $(11.01 + 12.97) \times \frac{1}{7.99} + 5.956 = 18 - ?$
 $(11 + 13) \times \frac{1}{8} + 6 \approx 18 - ?$
 $? \approx 9$

28. (b): $119.022 + 40.99 + 9.03 = ?^2$
 $119 + 41 + 9 \approx ?^2$
 $? \approx 13$

29. (c): $58.99 + 52.11 - 47.94 + ? = 85.96$
 $59 + 52 - 48 + ? \approx 86$
 $? \approx 86 - 63 \approx 23$

30. (e): $(14.96)^2 + (5.011)^3 + 50.02 = ?^2$
 $15^2 + 5^3 + 50 \approx ?^2$
 $225 + 125 + 50 \approx ?^2$
 $?^2 \approx 400$
 $? \approx 20$

31. (b): $112.5 \times 5.95 + 7799 \div 26 + 124.8 = ?$
 $? = 675 + 300 + 125$
 $? = 1100$

32. (d): $57.5 \times 13.98 + 8748 \div 13.98 - 21.97 \times 8 = ?$
 $? = 805 + 625 - 176$
 $? = 1254$

33. (a): $(25.98)^2 + (33.97)^2 + \sqrt{1440} - \sqrt{3136} = ?$
 $? = (26)^2 + (34)^2 + \sqrt{1444} - \sqrt{3136}$
 $? = 676 + 1156 + 38 - 56$
 $? = 1814$

34. (e): $12449.5 + 7649.7 - 9874.8 + 8274.9 = ?$
 $? = 12450 + 7650 - 9875 + 8275$
 $? = 18500$

35. (b): $(15.98)^3 + 9320 \div 7.99 - 7304.8 \div 4.99 = ?$
 $?(16)^3 + 9320 \div 8 - 7305 \div 5$
 $? = 4096 + 1165 - 1461$
 $? = 3800$
36. (a): $2000 \div 50 \times 3 + 5 = (?)^3$
 $? = 5$
37. (c): $\frac{6}{10} \times 320 + \frac{1}{10} \times 1600 = -177 + (?)^2$
 $(?)^2 = 529$
 $? = 23$
38. (d): $1.101 + 11.01 + \frac{101.01}{1.01} = ?$
 $\Rightarrow ? = 1 + 11 + 101$
 $? = 113$
39. (a): $45 \times 3 - 35 = ? \times 10$
 $? = \frac{100}{10}$
 $? = 10$
40. (e): $\frac{1391}{26} \times 2 + 256 = ?$
 $? = 363$
41. (c): $2\frac{3}{5} + 3\frac{2}{3} - 1\frac{1}{2} - 1\frac{23}{30} = ?$
 $? = \frac{13}{5} + \frac{11}{3} - \frac{3}{2} - \frac{53}{30}$
 $? = 3$

42. (b): $3 \times 4 - 2 + 9 = ?$
 $? = 19$
43. (d): $\frac{8 \times 16 \times 16 \times 16}{8 \times 8} = (2)^{? - 2}$
 $\Rightarrow (2)^{? - 2} = (2)^9 \Rightarrow ? - 2 = 9$
 $\Rightarrow ? = 11$
44. (e): $\frac{39}{13} \times \frac{38}{19} \times 100 = ? \times 10$
 $? = 60$
45. (a): $\frac{3}{20} \times 250 + \frac{7}{20} \times 750 - 75 = (?)^2$
 $\frac{75}{2} [1 + 7] - 75 = (?)^2$
 $? = 15$
46. (b): $\frac{60 - 10}{2.5} = ?$
 $? = 20$
47. (d): $10000 = ? \times 40$
 $? = 250$
48. (a): $9 \times 3 + 1107 + 42 = ?$
 $? = 1176$
49. (e): $299 + 999 + 302 = ?$
 $? = 1600$
50. (b): $493 + 287 - 334 + 54 = ? \times 5$
 $? = 100$

Mains Solutions

1. (a): $\frac{\frac{54}{100} \times ?}{56 \times \frac{1}{48} \times 54} = 9$
 $\Rightarrow \frac{54 \times ?}{7 \times 9} = 9$
 $\Rightarrow \frac{?}{50 \times 7} = 3$
 $\Rightarrow ? = 1050$

2. (e): $\{225 + 529 - 289\} \times \frac{1}{31} = ?$
 $? = \frac{465}{31}$
 $? = 15$

3. (c): $\left(\frac{? + 65}{\frac{45}{100} \times 480}\right) \times 72 \times \frac{1}{35} \times 840 = ? \times 18$
 $? = \left(\frac{? + 65}{216}\right) \times 72 \times \frac{1}{35} \times 840 \times \frac{1}{18}$
 $\Rightarrow ? = (? + 65) \times \frac{4}{9}$
 $\Rightarrow 9 \times ? = 4 \times ? + 260$
 $\Rightarrow 5 \times ? = 260$
 $? = 52$

4. (c): $(?)^3 = 1728 - \frac{35}{100} \times 1800 - \frac{80}{100} \times 360 - 81$

$(?)^3 = 1647 - 630 - 288$
 $(?)^3 = 729$
 $? = 9$

5. (b): $? = \left\{ \left(\frac{65}{100} \times 3400 \right) \div \left(\frac{45}{100} \times 900 \right) \right\} \times 648$
 $? = \left\{ 2210 \times \frac{1}{405} \right\} \times 648$
 $? = 3536$

6. (b): $(?)^2 = \frac{37}{100} \times 2500 + 231$
 $(?)^2 = 925 + 231$
 $(?)^2 = 1156$
 $? = 34$

7. (a): $\left\{ 782 + \frac{24}{100} \times 4900 \right\} \times \frac{1}{22} = ?$
 $? = \frac{782 + 1176}{22}$
 $? = \frac{1958}{22}$
 $? = 89$

8. (d): $126 + \frac{25}{100} \times (1600) = ?$
 $? = 400 + 126$
 $? = 526$

$$9. \text{ (e): } (?)^2 = \frac{32}{100} \times 1200 \div \left(\frac{26}{100} \times 5500\right) \times 65 \times 132$$

$$(?)^2 = 384 \div 1430 \times 65 \times 132$$

$$(?)^2 = 384 \times \frac{1}{1430} \times 65 \times 132$$

$$(?)^2 = 2304$$

$$? = 48$$

$$10. \text{ (b): } \Rightarrow \frac{? \times 15 \times 100}{36} = 1625$$

$$\Rightarrow ? = \frac{1625 \times 36}{15 \times 100}$$

$$? = 39$$

$$11. \text{ (b): } \frac{26}{100} \times 250 + \frac{?}{100} \times 640 = 225$$

$$65 + 6.4 \times ? = 225$$

$$6.4 \times ? = 160$$

$$? = \frac{160}{6.4}$$

$$? = 25$$

$$12. \text{ (c): } 299 + 121 - ? = 361$$

$$? = 420 - 361$$

$$? = 59$$

$$13. \text{ (d): } \frac{?}{24} + \frac{65}{100} \times 260 = 199$$

$$\frac{?}{24} = 199 - 169$$

$$? = 30 \times 24$$

$$? = 720$$

$$14. \text{ (e): } 2.46 \times 15 + \frac{25}{100} \times 92.4 = 15 \times ?$$

$$36.9 + 23.1 = 15 \times ?$$

$$? = \frac{60}{15}$$

$$? = 4$$

$$15. \text{ (d): } 1387 - 433 + ? = 961$$

$$? = 961 - 954$$

$$? = 7$$

$$16. \text{ (c): } \left(\frac{45}{100} \times 600\right) \div \left(\frac{40}{100} \times 500\right) = ? \times \frac{1}{40}$$

$$270 \div 200 = ? \times \frac{1}{40}$$

$$? = 270 \times \frac{1}{200} \times 40$$

$$? = 54$$

$$17. \text{ (e): } \frac{?-80}{360} \times 432 \times 25 = 4800$$

$$(? - 80) \times 30 = 4800$$

$$? - 80 = 160$$

$$? = 240$$

$$18. \text{ (a): } (?)^2 = \frac{210}{100} \times 800 + 1444 + 972$$

$$(?)^2 = 1680 + 2416$$

$$(?) = \sqrt{4096}$$

$$? = 64$$

$$19. \text{ (a): } ? \times 23 = 1080 + 820 - \frac{60}{100} \times 2400$$

$$? \times 23 = 1900 - 1440$$

$$? = \frac{460}{23}$$

$$? = 20$$

$$20. \text{ (d): } \frac{?}{100} \times 3500 = 1684 - 488 - \frac{31}{100} \times 1600$$

$$? \times 35 = 1196 - 496$$

$$? = \frac{700}{35}$$

$$? = 20$$

$$21. \text{ (d): } \frac{25}{100} \times 1800 - (11 \times 24) = ?$$

$$? = 450 - 264$$

$$? = 186$$

$$22. \text{ (a): } \frac{12}{100} \times (232 + 418) + 91 = (?)^2$$

$$(?)^2 = 78 + 91$$

$$(?)^2 = 169$$

$$? = 13$$

$$23. \text{ (e): } 27 \times 48 \times \frac{1}{54} + \frac{57}{100} \times 2500 = ?$$

$$24 + 1425 = ?$$

$$? = 1449$$

$$24. \text{ (b): } \frac{\frac{55}{100} \times 2200}{67+54} + (2 \times 12 + 6) = ?$$

$$\frac{1210}{121} + 30 = ?$$

$$? = 10 + 30$$

$$? = 40$$

$$25. \text{ (a): } 514 - 122 + 57 + 221 = ?$$

$$? = 392 + 278$$

$$? = 670$$

$$26. \text{ (d): } \frac{57}{100} \times 4500 - 13 \times 5 \approx (?)^2$$

$$(?)^2 \approx 2565 - 65$$

$$(?)^2 \approx 2500$$

$$(?) \approx 50$$

$$27. \text{ (e): } ? \approx \frac{65 \times 36}{\frac{60}{100} \times 195} + 18$$

$$? \approx 20 + 18$$

$$? \approx 38$$

$$28. \text{ (c): } 1191 - (52 + 1268) \times \frac{1}{55} \approx ?$$

$$1191 - 1320 \times \frac{1}{55} \approx ?$$

$$? \approx 1191 - 24$$

$$\approx 1167$$

$$29. \text{ (a): } 12 \times \frac{1}{484} \times 847 + \left(\frac{16}{100} \times 200\right) \approx ?$$

$$? \approx 21 + 32$$

$$? \approx 53$$

30. (c): $? \approx (12)^3 - (35)^2 + \frac{154}{100} \times 490$

$? \approx 1728 - 1225 + 754.6$

$? \approx 503 + 755$

$? \approx 1258$

31. (b): $(?)^2 \approx \left(\frac{37}{100} \times 4500\right) \times \frac{1}{333} + 19 \times 4$

$(?)^2 \approx 5 + 76$

$(?)^2 \approx 81$

$? \approx 9$

32. (e): $? - 219 + 670 - 1331 \approx 37 \times 7$

$? \approx 259 + 880$

$? \approx 1139$

33. (d): $\{(5)^3 - (9)^2\}$ of 15 $\approx ? - \frac{12}{100} \times 700$

$(125 - 81) \times 15 + 84 \approx ?$

$? \approx 660 + 84$

$? \approx 744$

34. (c): $? \times 24 + \frac{1}{2} \times 420 \approx \frac{3}{4} \times 984$

$? \times 24 \approx 738 - 210$

$? \approx \frac{528}{24}$

$? \approx 22$

35. (c): $\frac{42}{100} \times 2300 - \frac{45}{100} \times 1400 - 12 \approx (?)^2$

$(?)^2 \approx 966 - 630 - 12$

$(?)^2 \approx 324$

$? \approx 18$

36. (d): $\frac{144}{\sqrt[4]{?}} + \frac{24}{100} \times 125 = 64 - 10$

$\frac{144}{\sqrt[4]{?}} + 30 = 54$

$\sqrt[4]{?} = 6$

$? = 1296$

37. (a): $\frac{?}{100} \times 250 + 64 = 216 - 2$

$2.5 \times ? = 150$

$? = 60$

38. (c): $28 \times ? + \frac{13}{100} \times 2000 = 484$

$28 \times ? = 484 - 260$

$28 \times ? = 224$

$? = 8$

39. (b): $648 + ?^4 = 961 - \frac{19}{100} \times 300$

$648 + ?^4 = 904$

$?^4 = 256$

$? = 4$

40. (a): $\frac{32}{100} \times ? + 324 = \frac{76}{100} \times 500$

$\frac{32}{100} \times ? = 380 - 324$

$\frac{32}{100} \times ? = 56$

$? = 175$

41. (d): $\frac{28}{100} \times 225 + 81 = ?^2$

$63 + 81 = ?^2$

$?^2 = 144$

$? = 12$

42. (a): $\frac{?}{18} + 196 = 225 - 5$

$\frac{?}{18} = 24$

$? = 432$

43. (b): $32 \times ? + 324 = \frac{80}{100} \times 1405$

$32 \times ? + 324 = 1124$

$32 \times ? = 800$

$? = 25$

44. (e): $\frac{56}{100} \times ? + 144 = \frac{68}{100} \times 500$

$\frac{56}{100} \times ? = 340 - 144$

$\frac{56}{100} \times ? = 196$

$? = \frac{196 \times 100}{56}$

$? = 350$

45. (d): $?^3 \times 18 + 25 = 2275$

$?^3 \times 18 = 2250$

$?^3 = \frac{2250}{18}$

$?^3 = 125$

$? = 5$

46. (b): $\frac{62.5}{100} \times 1000 + (5)^2 \approx ? \times 26$

$625 + 25 \approx ? \times 26$

$? \approx \frac{650}{26} \approx 25$

47. (d): $\frac{?}{100} \times \{(26)^2 - 19 \times 4\} \approx 1818$

$\frac{?}{100} \times \{676 - 76\} \approx 1818$

$\Rightarrow ? \times 6 \approx 1818$

$? \approx 303$

48. (a): $35 \times 50 \times \frac{1}{175} \approx ? - \frac{20}{100} \times 1700$

$? \approx 10 + 340$

$? \approx 350$

49. (c): $(54)^2 - (12)^3 + (18)^2 \approx ?$

$? \approx 2916 - 1728 + 324$

$? \approx 3240 - 1728$

$? \approx 1512$

50. (b): $\frac{1696}{\left(\frac{?}{100} \times 800\right)} + \sqrt{1024} \approx 58.5$

$\frac{212}{?} + 32 \approx 58.5$

$\frac{212}{?} \approx 26.5$

$? \approx \frac{212}{26.5}$

$? \approx 8$

51. (b): $? \times 25 = (243 + 647) \times 45$

$$? = \frac{890 \times 45}{25}$$

$$? = 1602$$

52. (e): $(?)^3 = (18)^3 \times (35)^2 \times \frac{1}{5400} + (2)^3$

$$(?)^3 = 1323 + 8$$

$$? = \sqrt[3]{1331}$$

$$? = 11$$

53. (b): $\frac{35}{100} \times 2500 - \frac{18}{100} \times 3600 = \frac{(?)^2 + 5}{3}$

$$875 - 648 = \frac{(?)^2 + 5}{3}$$

$$(?)^2 = 227 \times 3 - 5$$

$$(?)^2 = 676$$

$$? = 26$$

54. (a): $\frac{15}{100} \times ? = 1497 - 683 - 778$

$$? = \frac{36 \times 100}{15}$$

$$? = 240$$

55. (a): $\frac{3}{5} \times \frac{9}{19} \times ? \times 65 = (11)^3 + 73$

$$\frac{3}{5} \times \frac{9}{19} \times ? \times 65 = 1404$$

$$? = \frac{1404 \times 5 \times 19}{3 \times 9 \times 65}$$

$$? = 76$$

56. (a): $\frac{72}{100} \times (? + 225) = 196 + 200$

$$? + 225 = \frac{396 \times 100}{72}$$

$$? = 550 - 225$$

$$? = 325$$

57. (b): $\frac{16}{100} \times ? + \frac{64}{100} \times 350 = \frac{65}{100} \times 400$

$$\frac{16}{100} \times ? + 224 = 260$$

$$\frac{16}{100} \times ? = 36$$

$$? = 36 \times \frac{100}{16}$$

$$? = 225$$

58. (e): $\frac{128}{?} + 289 = \frac{20}{100} \times 1525$

$$\frac{128}{?} = 305 - 289$$

$$\frac{128}{?} = 16$$

$$? = 8$$

59. (e): $?^3 + 576 = 625 + \frac{30}{100} \times 50$

$$?^3 = 640 - 576$$

$$?^3 = 64$$

$$? = 4$$

60. (b): $\frac{?}{100} \times 420 + 144 = \frac{24}{100} \times 1650$

$$\frac{?}{100} \times 420 = 396 - 144$$

$$? = 252 \times \frac{100}{420}$$

$$? = 60$$

61. (d): $234 \times \frac{?}{13} - \frac{30}{100} \times 500 = 810 \times \frac{1}{27}$

$$18 \times ? - 150 = 30$$

$$? = \frac{180}{18}$$

$$? = 10$$

62. (e): $\frac{60}{180} \times 9 + \frac{250}{100} \times 160 = ?$

$$3 + 400 = ?$$

$$? = 403$$

63. (b): $5 \times 5 \times 5 \times 24 \times 24 \times \frac{1}{45} \times \frac{1}{45} \times \frac{1}{45} = (?)^2$

$$(?)^2 = \frac{64}{81}$$

$$(?) = \frac{8}{9}$$

64. (b): $(29 + 121) \times \frac{1}{25} + 4 \times (?)^2 = \frac{75}{100} \times 840 + 52$

$$4 \times (?)^2 = 630 - 6 + 52$$

$$(?)^2 = \frac{676}{4}$$

$$(?) = \sqrt{169}$$

$$(?) = 13$$

65. (a): $39 + 12 + 24 + ? = \frac{32}{100} \times 800$

$$? = 256 - 75$$

$$? = 181$$

66. (b): $\Rightarrow \frac{1}{4} \times \frac{296 \times 32}{?} = \frac{37}{\frac{1}{4} \times \frac{1}{4}}$

$$\Rightarrow ? = \frac{1}{4} \times \frac{1}{4} \times \frac{1}{4} \times \frac{296}{37} \times 32$$

$$\Rightarrow ? = 4$$

67. (b): $\frac{\sqrt[3]{405 \times 315 \times 245}}{\sqrt{\frac{1}{3} \times 27}} = ?$

$$\Rightarrow ? = \frac{\sqrt[3]{5 \times 81 \times 5 \times 63 \times 5 \times 49}}{3}$$

$$\Rightarrow ? = \frac{5 \times 7 \times 9}{3}$$

$$\Rightarrow ? = 105$$

68. (d): $\frac{20}{100} \times 145 - \frac{266}{119} \times \frac{17}{19} = ?^3$

$$\Rightarrow ?^3 = 29 - 2$$

$$\Rightarrow ?^3 = 3^3$$

$$\Rightarrow ? = 3$$

69. (e): $\sqrt{81 \times \frac{1}{9} \times \frac{1}{9} \times 4} + \frac{182}{91} \times \frac{474}{237} + 8 = ?^{\frac{1}{2}}$

$$\Rightarrow ?^{\frac{1}{2}} = 2 + 4 + 8$$

$$\Rightarrow ? = 196$$

70. (a): $6739 + 161 \times 5 - 75 \times 12 + \frac{20}{100} \times 120 - \frac{10}{100} \times$

$$110 = ?$$

$$\Rightarrow ? = 6739 + 805 - 900 + 24 - 11$$

$$\Rightarrow ? = 6657$$

Previous Year Question

1. (a): $\approx \left(\frac{90}{100} \times 7000 + 576\right) \div ? = 1719$
 $\approx ? = \frac{6876}{1719} \approx ? = 4$

2. (d): $160 + ? = \frac{64}{100} \times 350$
 $? = 224 - 160$
 $? = 64$

3. (e): $\frac{312}{?} + 169 = \frac{20}{100} \times 910$
 $\frac{312}{?} = 182 - 169$
 $\frac{312}{?} = 13$
 $? = 24$

4. (b): $200 + \frac{12}{100} \times 500 - 4 = ?^2$
 $256 = ?^2$
 $? = 16$

5. (d): $\frac{84}{?} + \frac{26}{100} \times 800 + 2 = 216$
 $\frac{84}{?} = 216 - 210$
 $? = 14$

6. (d): $2^? = 32.01 \div 128.01 \times 1023.99 \div 7.99$
 $2^? \approx \frac{32}{128} \times \frac{1024}{8}$
 $2^? \approx 32$
 $2^? \approx 2^5$
 $? \approx 5$

7. (a): $\frac{339.99}{?} = \sqrt{143.99} + \sqrt{64.01}$
 $\frac{340}{?} \approx \sqrt{144} + \sqrt{64}$
 $\frac{340}{?} \approx 12 + 8$
 $\frac{340}{?} \approx ?$
 $\frac{340}{20} \approx ?$
 $17 \approx ?$

8. (e): $34.02\% \text{ of } 550.09 \div ? = 297.07 \div \sqrt{728.95}$
 $\frac{34 \times 550}{100} \div ? \approx 297 \div \sqrt{729}$
 $\frac{187}{?} \approx \frac{297}{27}$
 $? \approx 17$

9. (a): $(? \div 9.97) \times 12.08 \approx 20.12\% \text{ of } 1319.97$
 $(? \div 10) \times 12 \approx \frac{20 \times 1320}{100}$
 $? \approx \frac{264}{12} \times 10 \approx 220$

10. (d): $? \% \text{ of } 179.99 =$
 $\frac{\sqrt{(24.02)^2 + (17.98)^2} + 60.01\% \text{ of } 659.98}{100} \times 180 \approx \sqrt{576 + 324 + 396}$
 $\frac{?}{100} \times 180 \approx \sqrt{1296}$

$? \approx \frac{36}{180} \times 100 \Rightarrow ? \approx 20$

11. (c); $24 \times 15 \times 10 \approx 3600$

12. (c); $14\sqrt{?} + 53\sqrt{?} = \frac{67}{27} \times ?$
 $67\sqrt{?} = \frac{67}{27} \times ?$
 $\sqrt{?} = 27$
 $? = 729$

13. (e); $10 \times 37 + 7 \times 20 = 17 \times \sqrt{?}$
 $\sqrt{?} = 30$
 $? = 900$

14. (d); $\approx 1900 \div 190 + 10 + ?^2 = 84$
 Or, $?^2 = 84 - 10 - 10$ or, $? = 8$

15. (c); $\approx 40 \times 8 - 250 = ? - 63 \times 8$
 $? = 574$

16. (c); $? = \frac{394 \times 57}{100} - \frac{996 \times 2.5}{100}$
 $= \frac{400 \times 57}{100} - \frac{1000 \times 2.5}{100}$
 $= 228 - 25 = 203$
 \therefore Required answer = 200

17. (d); $? = 97 \times 10 + 1 = 971$
 \therefore Required answer = 965

18. (d); $? = \frac{3}{5} \times \frac{1125}{1228} \times 7 = 4$

19. (b); $? = \frac{\sqrt{339 \times 25}}{30} = 15$

20. (e); $? = \frac{638 + 9709 - 216}{26} = 390$

21. (d); $? = 170 - 35$
 $? = 135$

22. (a); $(12 + 13) \times 3 = \frac{?}{5}$
 $? = 375$

23. (c); $? = (3 \times 5) \times 8$
 $? = 120$

24. (b); $\left(\frac{120}{100} \times 750\right) \div ? = 25$
 $? = 900 \div 25$
 $? = 36$

25. (d); $? = (8 - 4 + 3) + \frac{6 - 10 + 7}{12}$
 $? = 7 \frac{1}{4}$

26. (e); $275 + \frac{64}{100} \times 750 = 750 + ?$
 $275 + 480 = 750 + ?$
 $? = 5$

27. (a): $? = 15 + 9 + 144$

$? = 168$

28. (c): $\frac{510}{?} = 18 + 3.25$

$? = 24$

29. (d): $\frac{12.5}{100} \times (120 + ?) = 45$

$120 + ? = 360$

$? = 240$

30. (c): $44 \times 12 - 16 = (8)^2$

$528 - 16 = (8)^2$

$? = 3$

31. (d): $(? \div 5 \div 7) \times 14 = 308$

$? = 22 \times 35$

$? = 770$

32. (b): $?^3 + 144 = 360$

$?^3 = 216$

$? = 6$

33. (b): $\frac{128}{2} + \frac{4}{2} \times 4 = ? + 10$

$64 + 8 = ? + 10$

$? = 62$

34. (c): $\frac{11}{11} + 9 + ? = 27$

$1 + 9 + ? = 27$

$? = 17$

35. (b): $196 + 179 + 25 = (?)^2$

$(?)^2 = 400$

$? = 20$

36. (e): $28.5 \times 34 + 2320 \div 8 = (36)^2 - ?$

$969 + 290 = 1296 - ?$

$1259 = 1296 - ?$

$? = 1296 - 1259 = 37$

37. (d): $? = 47 \times 27 + 15600 \div 8 + 181$

$= 1269 + 1950 + 181$

$= 3400$

38. (c): $? = 112.5 \times 5 + 4560 \div 6 - 175 \times 7$

$= 562.5 + 760 - 1225$

$= 1322.5 - 1225$

$= 97.5$

39. (c): 80% of $? = \sqrt{250 \times 44 + \frac{40 \times 8500}{100}}$

$\Rightarrow \frac{80}{100} \times ? = \sqrt{11000 + 3400}$

$\Rightarrow ? = \sqrt{14400} \times \frac{10}{8}$

$\Rightarrow ? = 120 \times \frac{10}{8} = 150$

40. (a): $? \times \frac{40}{24} \times 27 = \frac{594}{115} \times \frac{2300}{264}$

$\Rightarrow ? \times 45 = 45$

$\Rightarrow ? = 1$

41. (b): $? + 13 \times 50 = 420 + \frac{45}{100} \times 800 + 220$

$\Rightarrow ? + 650 = 420 + 360 + 220$

$\Rightarrow ? = 1000 - 650 = 350$

42. (d): $\frac{12}{100} \times ? + \frac{1}{8} \times 960 = 192$

$\frac{12}{100} \times ? = 192 - 120$

$\frac{12}{100} \times ? = 72$

$? = 600$

43. (e): $15 \times ? + \frac{20}{100} \times 450 = 360$

$15 \times ? = 360 - 90$

$15 \times ? = 270$

$? = 18$

44. (a): $\frac{3}{4} \times \frac{3}{4} \times \frac{8}{9} \times 1800 = ? + 600$

$? = 900 - 600$

$? = 300$

45. (e): $\frac{?}{100} \times 900 + 500 = 788$

$? = \frac{288 \times 100}{900}$

$? = 32$

46. (e): $\frac{48}{100} \times 625 \times \frac{4}{3} = ? \Rightarrow ? = 400$

47. (c): $\frac{64+324}{97} = ?$

$? = 4$

48. (b): $4^? \times 2 = \frac{256}{2}$

$4^? = 64$

$4^? = (4)^3$

$? = 3$

49. (c): $4 \times ? = 512 - 480$

$? = \frac{32}{4}$

$? = 8$

50. (e): $? + 432 - 206 = 550$

$? = 550 - 226$

$? = 324$

51. (a): $(?)^2 = 196 - 96$

$?^2 = 100 \Rightarrow ? = 10$

52. (d): $\frac{40}{100} \times 400 + \frac{300}{100} \times ? = 250$

$160 + 3 \times ? = 250$

$? = \frac{90}{3} = 30$

53. (b): $\div 7 = ? - 180$

$? = 183$

54. (e): $24 - 12 + 27 = 36 + ?$

$? = 3$

55. (b): $119 + 41 + 9 = ?^2$

$? = 13$

56. (b): $\frac{12}{100} \times (? + 100) = 18$

$? = 150 - 100$

$? = 50$

57. (c): $\frac{11}{11} + 9 + ? = 27$

$1 + 9 + ? = 27$

$? = 17$

58. (b): $?^2 + 20 = 36$

$?^2 = 16 \Rightarrow ? = 4$

59. (d): $? = 9\frac{1}{3} + 7\frac{1}{2} - 5\frac{1}{6} - 6\frac{1}{3}$

$? = 9 + 7 - 5 - 6 \left(\frac{1}{3} + \frac{1}{2} - \frac{1}{6} - \frac{1}{3} \right)$

$? = 5\frac{1}{6}$

60. (c): $\frac{3^4 \times 3^{7 \times 2}}{3^{6 \times 3}} = 3^?$

$3^? = 3^{4+14-18}$

$3^? = 3^0$

$? = 0$



The comparison between two quantities in terms of magnitude is called **ratio**.

For example, Mohit has 5 pens and Amit has 3 pens. It means the ratio of number of pens between Mohit and Amit is 5 is to 3. It can be expressed as 5 : 3.

So the ratio of any two quantities is expressed as $\frac{a}{b}$ or a : b. The numerator 'a' is called the antecedent and denominator 'b' is called as consequent.

Rule of Ratio: The comparison of two quantities is meaningless if they are not of the same kind or in the same units (of length, volume or currency etc.) We do not compare 5 girls and 7 toys or 15 kilometers and 3 cows. Therefore, to find the ratio of two quantities (of the same kind), it is necessary to explain them in same units.

Properties of Ratio:

1. The nature of ratio does not change when the numerator and denominator both are multiplied by same quantities.

i.e. $\frac{a}{b} = \frac{ka}{kb} = \frac{la}{lb}$ etc \Rightarrow e.g. $\frac{3}{4} = \frac{6}{8} = \frac{9}{12}$... etc have the same ratio.

2. The value of a ratio does not change when the numerator and denominator both are divided by same quantities.

i.e. $\frac{a}{b} = \frac{a/k}{b/k} = \frac{a/l}{b/l}$ etc, \Rightarrow e.g. $\frac{3}{4} = \frac{3/2}{4/2} = \frac{3/3}{4/3}$. etc are in same ratio

3. The ratio of two fractions can be expressed in ratio of integers.

e.g. $\Rightarrow \frac{3/4}{5/4} = \frac{3}{4} \times \frac{4}{5} = \frac{3}{5} \Rightarrow \frac{a/b}{c/d} = \frac{a}{b} \times \frac{d}{c}$

4. When two or more than two ratio are multiplied with each other, then it is called compounded ratio e.g.,

$\frac{2}{3} \times \frac{4}{5} \times \frac{6}{7} = \frac{16}{35}$ is compounded ratio of $\frac{2}{3}, \frac{4}{5}, \frac{6}{7}$

So, $\frac{a}{b} \times \frac{c}{d} \times \frac{e}{f} \dots = \frac{k}{m}$ (Compound ratio)

5. When the ratio is compounded with itself, it is called as duplicate, triplicate ratio etc.

$\frac{a}{b} \times \frac{a}{b} \times \frac{a}{b} = \left(\frac{a}{b}\right)^2$ is called duplicate ratio of $\frac{a}{b}$ and $\frac{a}{b} \times \frac{a}{b} \times \frac{a}{b} = \left(\frac{a}{b}\right)^3$ is called triplicate ratio of $\frac{a}{b}$ similarly $\sqrt{\left(\frac{a}{b}\right)} = \left(\frac{a}{b}\right)^{\frac{1}{2}}$

is called as sub-duplicate ratio and $\sqrt[3]{\left(\frac{a}{b}\right)} = \left(\frac{a}{b}\right)^{\frac{1}{3}}$ is called as sub-triplicate ratio of $\frac{a}{b}$.

If four quantities a, b, c and d form a proportion, many other proportions may be deduced by the properties of fraction. The results of these operation are very useful. These operations are

1. Inverterdo: if $\frac{a}{b} = \frac{c}{d}$ then $\frac{b}{a} = \frac{d}{c}$

2. Alternado: if $\frac{a}{b} = \frac{c}{d}$ then $\frac{a}{c} = \frac{b}{d}$

3. Componendo: if $\frac{a}{b} = \frac{c}{d}$, then $\left(\frac{a+b}{b}\right) = \left(\frac{c+d}{d}\right)$

4. Dividendo: if $\frac{a}{b} = \frac{c}{d}$, then $\left(\frac{a-b}{b}\right) = \left(\frac{c-d}{d}\right)$

5. Componendo and Dividendo: if $\frac{a}{b} = \frac{c}{d}$, then $\frac{a+b}{a-b} = \frac{c+d}{c-d}$

Concept 1: If two numbers are in the ratio of a : b and the sum of these number is x, then these numbers will

be $\frac{ax}{a+b}$ and $\frac{bx}{a+b}$ respectively.

Example : Two numbers are in the ratio of 4 : 5. If sum of these two number is 810, find the numbers?

Sol. Ratio of two number = 4 : 5
 Sum = 810
 First number = $\frac{ax}{a+b} = \frac{a \times 810}{4+5} = 360$
 Second number = $\frac{bx}{a+b} = \frac{5 \times 810}{4+5} = 450$

Example: a : b = 3 : 4 and b : c = 2 : 5 Find a : b : c ?

Sol. a : b = 3 : 4
b : c = 2 : 5
 a : b : c = 3 × 2 : 4 × 2 : 4 × 5
 = 6 : 8 : 20
 = 3 : 4 : 10

Example: a : b = 1 : 2, b : c = 3 : 2, and c : d = 1 : 3. Find a : b : c : d?

Sol.

a	b	c	d
1	2 →	2 →	2
3 ←	3	2 →	2
1 ←	1 ←	1	3

a : b : c : d = 1 × 3 × 1 : 2 × 3 × 1 : 2 × 2 × 1 : 2 × 2 × 3
 = 3 : 6 : 4 : 12

Partnership

Concept 1: If a group of n persons invested different amount for different period then their profit is the ratio is
 $At_1 : Bt_2 : Ct_3 : Dt_4 : \dots : Xt_n$

Here first person invested amount A for t_1 period, second persons invested amount B for t_2 period and so on.

Example: A starts a business with Rs 2,000, B joins him after 3 months with Rs 4,000. C puts a sum of Rs 10,000 in the business for 2 months only. At the end of the year the business gave a profit of Rs 5600. How should the profit be divided among them ?

Sol: Ratio of their profits (A's : B's : C's) = $2 \times 12 : 4 \times 9 : 10 \times 2 = 6 : 9 : 5$
 Now, 6 + 9 + 5 = 20
 Then A's share = $\frac{5600}{20} \times 6 = \text{Rs } 1680$
 B's share = $\frac{5600}{20} \times 9 = \text{Rs } 2520$
 C's share = $\frac{5600}{20} \times 5 = \text{Rs } 1400$

Concept 2: If investments are in the ratio of a : b : c and the timing of their investments in the ratio of x : y : z then the ratio of their profits are in the ratio of ax : by : cz.

Example : A, B and C invested capital in the ratio 2 : 3 : 5, the timing of their investments being in the ratio 4 : 5 : 6. In what ratio would their profit be distributed?

Sol. We should know that if the duration for their investments be in the ratio x : y : z, and investment is in ratio a : b : c then the profit would be distributed in the ratio ax : by : cz.
 Thus, following the same rule, the required ratio = $2 \times 4 : 3 \times 5 : 5 \times 6 = 8 : 15 : 30$

Concept 3: If investments are in the ratio a : b : c and profits in the ratio p : q : r, then the ratio of time is $\frac{p}{a} : \frac{q}{b} : \frac{r}{c}$.

Example : A, B and C invested capital in the ratio 5 : 6 : 8. At the end of the business term, they received the profits in the ratio 5 : 3 : 12. Find the ratio of time for which they contributed their capital?

Sol: Using the above formula, we have the required ratio = $\frac{5}{5} : \frac{3}{6} : \frac{12}{8} = 1 : \frac{1}{2} : \frac{3}{2} = 2 : 1 : 3$.

Solved examples

1. A sum of Rs 9000 is to be distributed among A, B and C in the ratio 4 : 5 : 6. What will be the difference between A's and C's shares ?

Sol. Total amount = Rs 9000

A's share = $4x \Rightarrow$ B's share = $5x$
and C's share = $6x$

Then, $4x + 5x + 6x = 9000 \Rightarrow 15x = 9000; \therefore x = 600$

Now, A's share = $4 \times 600 =$ Rs 2400 and

C's share = $6 \times 600 =$ Rs 3600

Difference between A's and C's share
= Rs (3600 - 2400) = Rs 1200

2. Rs 6400 are divided among three workers in the ratio $\frac{3}{5} : 2 : \frac{5}{3}$. The share (in Rs) of the second worker is

Sol. Total amount = 6400

Let first worker's share = $\frac{3}{5}x$

Second worker's share = $2x$

Third worker's share = $\frac{5}{3}x$

Then, $\frac{3}{5}x + 2x + \frac{5}{3}x = 6400$

$$\Rightarrow \frac{9x+30x+25x}{15}$$

$$\Rightarrow 64x = 6400 \times 15 = 1500$$

$$\therefore \text{Second worker's share} = 1500 \times 2 = 3000$$

3. A boy, after giving away 80% of his pocket money to one companion and 6% of the remainder to another, has Rs 47 left with him. How much pocket money did the boy have in the beginning ?

Sol. Let the boy had Rs x .

Money given to first companion = 80% of $x = \frac{4x}{5}$

$$\text{Remaining money} = x - \frac{4x}{5} = \frac{x}{5}$$

Money given to the another companion = $\frac{6}{100} \times \frac{x}{5} = \frac{3x}{250}$

$$\text{Remaining money} = \frac{x}{5} - \frac{3x}{250} = \frac{50x-3x}{250} = \frac{47x}{250}$$

$$\therefore \frac{48x}{250} = 47 \Rightarrow x = \frac{47 \times 252}{47} = \text{Rs. } 250$$

4. Rs 180 contained in a box consists of Rs 1,50 paise and 25 paise coins in the ratio 2 : 3 : 4. What is the number of 50 paise coins ?

Sol. Ratio of the values of the coins

$$= 2 : \frac{3}{2} : \frac{4}{4} = 2 : \frac{3}{2} : 1 = 4 : 3 : 2$$

Sum of the ratios = $4 + 3 + 2 = 9$

$$\therefore \text{Values of 50 paise coins} = \frac{3}{9} \times 180 = \text{Rs. } 60$$

Numbers of 50 paise coins = 120

5. A, B and C enter into a partnership with shares in the ratio $\frac{7}{2} : \frac{4}{3} : \frac{6}{3}$. After 4 months, A increase his share by 50%. If the total profit at the end of the year was Rs 43200. Then, the B's share in the profit is:

Sol. Ratio of initial shares of A, B and C in the partnership

$$A : B : C = \frac{7}{2} : \frac{4}{3} : \frac{6}{3} = \frac{7 \times 15}{2 \times 15} : \frac{4 \times 10}{3 \times 10} : \frac{6 \times 6}{5 \times 6}$$

$$= \frac{105}{30} : \frac{40}{30} : \frac{36}{30}$$

$$(\text{LCM of } 2, 3, 5 = 30) = 105 : 40 : 36$$

Let the respective shares of A, B and C be Rs 105x, Rs 40x and Rs 36x

New shares of A, B and C in the partnership

$$A = \text{Rs } 105x \text{ for 4 months} + 105x \times \frac{150}{100} \text{ for 8 months}$$

$$= (105x \times 4) + \left(105x \times \frac{3}{2} \times 8\right) = 420x + 1260x$$

$$= 1680x$$

$$B = 40x \text{ for 12 months} = 40x \times 12 = 480x$$

$$C = 36x \text{ for 12 months} = 36x \times 12 = 432x$$

$$A : B : C = 1680 : 480 : 432 = 35 : 10 : 9$$

It is a type of simple partnership, so the profit or loss of the business is distributed among the investors in the ratio of their invested money.

\therefore B's share in profit

$$= \frac{B' \text{ investment}}{(A+B+C)' \text{ investment}}$$

$$= \frac{10}{35+10+9} = 43200 = \frac{10}{54} \times 43200 = 8000$$

Hence, B's share in the profit = Rs 8000.

7. In a business partnership among A, B, C and D, the profit is shared as follows

$$\frac{A' \text{ share}}{B' \text{ share}} = \frac{B' \text{ share}}{C' \text{ share}} = \frac{C' \text{ share}}{D' \text{ share}} = \frac{1}{3}$$

If the total profit is Rs 400000, the share of C is:

Sol. Given, A : B = 1 : 3

$$B : C = 1 : 3 = 3 : 9$$

$$C : D = 1 : 3 = 9 : 27$$

Now, by joining the above three ratios, we get

$$A : B : C : D = 1 : 3 : 9 : 27$$

$$\text{Sum of the ratios} = 1 + 3 + 9 + 27 = 40$$

\therefore C's share in profit

$$= \frac{9}{40} \times 400000 = \text{Rs. } 90000$$

8. A started a business with a capital of Rs 100000. 1 yr later, B joined him with a capital of Rs 200000. At the end of 3 yr from the start of the business, the profit earned was Rs 84000. The share of B in the profit exceeded the share of A by

Sol. Ratio of equivalent capitals of A and B

$$= 100000 \times 36 : 200000 \times 24 = 36 : 48 = 3 : 4$$

$$\text{Profit gained by A} = \frac{3}{7} \times 84000 = 36000$$

$$\text{Profit gained by B} = \frac{4}{7} \times 84000 = 48000$$

$$\text{Required difference} = 48000 - 36000 = \text{Rs. } 12000$$

9. The ratio of income of A and B is 3 : 4. If the ratio of expenditure of both is 2 : 3 and each save Rs 200, find the income of both A and B?

Sol. Income – Saving = Expenditure

According to question

Let the income of A and B be 3x and 4x respectively

$$\frac{3x-200}{4x-200} = \frac{2}{3}, \quad x = 200$$

$$\text{Income of A} = 3x = 3 \times 200 = 600$$

$$\text{Income of B} = 4x = 4 \times 200 = 800$$

10. Rs 7800 distributed among A, B, and C. The share of A is $\frac{3}{4}$ th of the share of B, and share of B is $\frac{2}{3}$ th of the share of C. Then, find the difference between share of B and C?

$$\text{Sol. } A = \frac{3}{4}B \Rightarrow A : B = 3 : 4 \quad B = \frac{2}{3}C \Rightarrow B : C = 2 : 3$$

$$A : B : C = 6 : 8 : 12 = 3 : 4 : 6$$

$$\text{Share of B} = \frac{4}{13} \times 7800 = 2400$$

$$\text{Share of C} = \frac{6}{13} \times 7800 = 3600$$

$$\text{Difference of share between B and C} = \text{Rs. } 1200$$

Basic Questions

1. One year ago the ratio of Ramu and Somu age was 6 : 7 respectively. Four years hence their ratio would become 7 : 8. How old is Somu?
(a) 24 years (b) 30 years (c) 32 years
(d) 36 years (e) None of these
2. If 33% of A is equal to 55% of B then find the ratio of A and B?
(a) 3 : 5 (b) 5 : 3 (c) 3 : 4
(d) 5 : 4 (e) None of these
3. If 24 is deducted from 45% of a number result becomes 48. What will be $\frac{3}{8}$ part of that number?
(a) 140 (b) 130 (c) 145
(d) 150 (e) 60
4. What will be 32% of $\frac{3}{8}$ th of 1000?
(a) 115 (b) 125 (c) 120
(d) 129 (e) None of these
5. Two numbers are respectively 20% and 50% more than a third number. The ratio of the two numbers is:
(a) 2 : 5 (b) 3 : 5 (c) 4 : 5
(d) 6 : 7 (e) None of these
6. A sum of money is to be distributed among A, B, C, D in the proportion of 5 : 2 : 4 : 3. If C gets Rs. 1000 more than D, what is B's share?
(a) Rs. 500 (b) Rs. 1500 (c) Rs. 2000
(d) Rs. 2400 (e) None of these
7. If $0.75 : x :: 5 : 8$, then x is equal to:
(a) 1.12 (b) 1.2 (c) 1.25
(d) 1.30 (e) None of these
8. The sum of three numbers is 98. If the ratio of the first to second is 2 : 3 and that of the second to the third is 5 : 8, Then the second number is:
(a) 20 (b) 30 (c) 48
(d) 58 (e) None of these
9. If Rs. 872 is divided into three parts, proportional to $\frac{1}{2} : \frac{2}{3} : \frac{3}{4}$, then the first part is:
(a) Rs. 182 (b) Rs. 190 (c) Rs. 196
(d) Rs. 204 (e) None of these
10. Two numbers are in the ratio 3 : 5. If 9 is subtracted from each, then new numbers are in the ratio 12 : 23. The smaller number is:
(a) 27 (b) 33 (c) 49
(d) 55 (e) None of these
11. If P : Q = 8 : 15 and Q : R = 3 : 2, then find P : Q : R?
(a) 8 : 15 : 7 (b) 7 : 15 : 8 (c) 8 : 15 : 10
(d) 10 : 15 : 8 (e) None of these
12. If P : Q = 8 : 15, Q : R = 5 : 8 and R : S = 4 : 5, then P : S is equal to:
(a) 4 : 15 (b) 2 : 15 (c) 3 : 19
(d) 7 : 15 (e) None of these
13. The salaries of A, B, C are in the ratio 2 : 3 : 5. If the increments of 15%, 10% and 20% are allowed respectively in their salaries, then what will be the new ratio of their salaries?
(a) 3 : 3 : 10 (b) 10 : 11 : 20 (c) 23 : 33 : 60
(d) 25 : 27 : 29 (e) None of these
14. If Rs. 782 be divided into three parts, proportional to $\frac{1}{2} : \frac{2}{3} : \frac{3}{4}$, then the first part is:
(a) Rs. 182 (b) Rs. 190 (c) Rs. 196
(d) Rs. 204 (e) None of these
15. Rahul started a business by investing Rs. 45,000. 6 months later Sanjay joined him with Rs. 30,000. In what ratio should the earned profit be distributed at the end of the year?
(a) 1 : 3 (b) 3 : 1 (c) 2 : 3
(d) 3 : 2 (e) None of these
16. Ram, Karan and Rohan invested capital in the ratio of 2 : 3 : 4 for time period of 6 : 4 : 3. Find the ratio of profit distributed?
(a) 12 : 13 : 14 (b) 13 : 12 : 14 (c) 13 : 14 : 12
(d) 14 : 12 : 13 (e) None of these

Prelims Questions

Level - 1

- If $3A = 6B = 9C$; What is $A : B : C$
 (a) 6 : 3 : 1 (b) 6 : 3 : 2
 (c) 9 : 3 : 6 (d) 9 : 3 : 1
 (e) None of these
- If Rs 25,000 is to be divided between A, B and C in the ratio $1/10 : 1/6 : 1/15$, then how much will C get (in Rs)?
 (a) 5000 (b) 7500
 (c) 10000 (d) 12500
 (e) None of these
- When 50% of one number is added to the second number. The second number increased to its four-thirds. What the ratio between the first and the second number?
 (a) 3 : 2 (b) 3 : 4
 (c) 2 : 3 (d) 2 : 5
 (e) None of these
- There are 50 paisa, 25 paisa and Rs. 1 coins in a bag in the ratio 5 : 8 : 1. If the total value of all the coins is Rs. 55, how many 25 paisa coins are there in the bag?
 (a) 10 (b) 80
 (c) 50 (d) 25
 (e) None of these
- The ratio of two numbers is 4 : 5. If both numbers are increased by 4, the ratio becomes 5 : 6. What is the sum of the two numbers?
 (a) 9 (b) 18
 (c) 27 (d) 36
 (e) None of these
- Rizwan has a box in which he kept red and blue marbles. The red marbles and blue marbles were in the ratio 5 : 4. After he lost 5 red marbles the ratio became 10 : 9. How many marbles does he have now?
 (a) 81 (b) 86
 (c) 76 (d) 91
 (e) None of these
- In an office of 1200 employees, the ratio of urban to rural members of staff is 8 : 7. After joining of some new employees, out of which 20 are rural, the ratio becomes 5 : 4. The number of new urban employees is:
 (a) 100 (b) 85
 (c) 76 (d) 108
 (e) None of these
- Three-fifth of Aman's salary is equal to Bhavesh's salary and Seven-Eleventh of Bhavesh's Salary is equal to Charlie's Salary. The sum of the salary of all of them is Rs 5559. Which of the following is the salary of each?
 (a) 2805, 1683, 1071 (b) 2203, 1792, 1862
 (c) 2612, 3122, 1241 (d) 1782, 1628, 1071
 (e) None of these
- A sum of Rs. 53 is divided among Rohit , Mohit & Shobhit in such a way that Rohit gets Rs.7 more than what Mohit gets and Mohit gets Rs.8 more than what Shobhit gets. The ratio of their shares is:
 (a) 16:9:18 (b) 25:18:10
 (c) 18:25:10 (d) 15:8:30
 (e) None of these
- Rs 600 are divided among A, B and C so that Rs 40 more than $2/5$ of A's share, Rs 20 more than $2/7$ of B's share and Rs 10 more than $9/17$ of C's share are all equal. A's share is
 (a) Rs 180 (b) Rs 160
 (c) Rs 150 (d) Rs 140
 (e) None of these
- A, B & C enters into a partnership with a total capital of Rs. 11800. A's Capital is Rs. 2000 more than B's & Rs. 3000 less than C. At the end of the year, what is B's share in the profit if total profit is Rs. 35400.
 (a) Rs. 14800 (b) Rs. 6600
 (c) Rs. 10800 (d) Rs. 19800
 (e) Rs. 4800
- The ratio of investment of Anurag and Ayush is 2 : 3 and out of total profit of Rs. 76000 shares of Ayush is Rs. 36000. Find the ratio of time period for which Anurag and Ayush invested their capital respectively?
 (a) 3 : 2 (b) 6 : 5
 (c) 4 : 3 (d) None of these
 (e) 7 : 6
- Ram and Shyam invest in the ratio of 3 : 4 in a partnership business and Ram got Rs. 2700 as profit share out of total profit of Rs. 5100, then find the ratio of period of investment of Shyam to that of Ram?
 (a) 3 : 4 (b) 3 : 5
 (c) 2 : 3 (d) 1 : 2
 (e) 3 : 2
- Investment of Sumit is 25% more than that of Maanik and that of Ravi is Rs 8000 in that business. After 8 months, Sumit and Maanik have increased their amount by 20%,25% respectively and at the end of the year, profit share of Sumit and Ravi becomes equal then find the profit share percentage of Maanik?
 (a) $28\frac{8}{9}\%$ (b) $28\frac{1}{3}\%$
 (c) $27\frac{4}{9}\%$ (d) $33\frac{1}{3}\%$
 (e) $26\frac{2}{3}\%$

15. If the ratio of time periods of investment of Ayush and Nikhil is 4:5, profit at the end of the year is Rs. 100000 and Ayush's share in it is Rs. 20000, then what is the ratio of Ayush's and Nikhil's investment?
 (a) 14: 5 (b) 8 :7
 (c) 5: 16 (d) 16:5
 (e) 7: 6
16. Sunil invested Rs.(x+ 2000) and Anil invested Rs.(x+3000) in a partnership. If profit at the end of the year is Rs.48000 and value of Anil 's share in it is Rs.28000, then find the value of x?(in Rs.)
 (a)500 (b) 400
 (c)600 (d) 800
 (e) 1000
17. Veer starts a business with some amount and after six months Ayush joined him with Rs. 30000. If Veer earn an annual profit of Rs. 18000 out of total profit of Rs. 33000, then find amount invested by Veer?
 (a) 12000 Rs. (b) 16000 Rs.
 (c) 24000 Rs. (d) 18000 Rs.
 (e) 20000 Rs.
18. P invested 60% more than Q and R invested 20% more than Q. If ratio of investment time-period (P: Q: R) is 2: 4: 3 and the sum of profit shares of Q and R is Rs. 8550 then find the profit share of P.
 (a) Rs. 3200 (b) Rs. 4000
 (c) Rs. 2400 (d) Rs. 3600
 (e) Rs. 3000
19. Investment of Veer is 25% more than Ayush. If total profit of Ayush is Rs. 7500, out of total profit of Rs. 22500, then find ratio of time period of investment of Ayush & Veer?
 (a) 5 : 7 (b) 5 : 6
 (c) 5 : 8 (d) 5 : 9
 (e) 5 : 11
20. Profit share of A is Rs.1200 out of total profit of Rs.1800 and he had invested Rs.1600 more amount than B for 8 months while B invested his amount for a year. Find how much amount was invested by A (in Rs)?
 (a) 2800 (b) 1600
 (c) 2400 (d) 1800
 (e) 1200
21. If ratio of time periods of investment of P and Q is 4:5, profit at the end of the year is 75000 and P's share is Rs 15000, then what is the ratio of Q's and P's investment?
 (a)5:16 (b) 6:7
 (c) 12:13 (d) 16:5
 (e)8:5
22. A invested 25000 and B invested 75000 in a business and Ratio of time in which they invest is 7: 4. If the difference between their profit is 500 Rs, then what is the total profit?
 (a) 1800 (b) 2000
 (c) 1900 (d) 1700
 (e) 2100
23. Aakash and Vikash invested Rs(x+2000) and Rs(x+3000) respectively in a partnership. If profit at the end of the year is Rs 28000 and value of Vikash's share is Rs 16000, what is the value of x?(in Rs)
 (a) 1500 (b) 1000
 (c) 2000 (d) 500
 (e) 1200
24. Arun, Bhavya & Ashu entered into a partnership, ratio of investment of Arun & Bhavya is 4 : x and ratio of investment of Bhavya & Ashu is 3 : 4. If at the end of two years Ashu receives Rs 1850 as profit out of total profit Rs 3700. Then find the value of x?
 (a) 12 (b) 14
 (c) 16 (d) 8
 (e) 10
25. A invested Rs.2000 and B invested Rs.500 more than A. After 8 months C invested Rs.1500. At the end of the year C got profit of Rs.350. Find total profit.
 (a) Rs.3500 (b) Rs.4200
 (c) Rs.2800 (d) Rs.4900
 (e) Rs.2100
26. A started a business with an investment of Rs 54000 and after some months, B joined him with investing Rs 45000. At the end of the year, total profit was Rs 35700 and share of A in the total profit is Rs 22950. Find after how many months B has joined the business.
 (a) 5 months (b) 6 months
 (c) 4 months (d) 2 months
 (e) 3 months
27. Veer and Manyu entered into a business by investing Rs. 6000 and Rs. 8000 for x and (x + 4) months respectively. At the end, profit share of Veer is 3900 Rs. less than profit share of Manyu. Find the value of x if total profit is Rs. 12900. (in months)
 (a) 12 (b) 8
 (c) 6 (d) 10
 (e) 14
28. Manish starts a business by investing Rs 40000. After 6 months Pawan joined him with Rs 55000. They gained a profit in the ratio 40 : 33 . Find Manish invested for how many months.
 (a) 12 months (b) 9 months
 (c) 6 months (d) 15 months
 (e) 18 months

- 29.** Ankit and Pankaj invested Rs. 3000 and Rs 5000 for 12 months and 8 months respectively. If they donate 71% of their profit and remaining distribute in ratio of their investment. Find profit get by Pankaj out of Rs. 1900?
 (a) Rs. 190 (b) Rs. 290
 (c) Rs. 280 (d) Rs. 211
 (e) Rs. 191
- 30.** A and B invested Rs 5000 and Rs. 9000 for 12 months and 6 months respectively. Find profit share of B is how much percent more or less than profit share of A?
 (a) 10% less (b) 11.11% more
 (c) 11.11% less (d) 10% more
 (e) 12.5 % more
- 31.** Himanshu invested Rs 42000 in a business. After 4 months, Kapil joins him with an investment of Rs P. If at the end of the year the profit is Rs 62000 and Profit share of Himanshu is Rs 42000. Find value of P.
 (a) Rs 25000 (b) Rs 30000
 (c) Rs 28000 (d) Rs 38000
 (e) Rs 42000
- 32.** P, Q and R entered into a business by making investment in the ratio of 3 : 4 : 6 respectively. After eight months Q and R withdrew Rs. 2000 and Rs. 4000 respectively. If after 15 months ratio of profit share of P, Q and R is 45 : 53 : 76, then find initial investment of R?
- (a) 18000 Rs. (b) 12000 Rs.
 (c) 6000 Rs. (d) 24000 Rs.
 (e) 9000 Rs.
- 33.** A,B,C...,F,G invested money in the ratio of 7:6:5:....2:1. The duration for which they invested the money is in the ratio of 1:2:3....6:7. Who will obtain maximum profit at the end of year?
 (a) A (b) G
 (c) B (d) F
 (e) D
- 34.** A, B and C enter into a partnership, A invest $X+8000$, B invest $2X+2000$ and C invest $3X + 4000$ for one year if B share is 4000 from total profit of 16000 then find the difference between investment of A and C.
 (a) 4000 (b) 5000
 (c) 6000 (d) 2000
 (e) 7000
- 35.** Veer starts a business and after four months Ayush joined him. If total investment of Veer & Ayush is Rs. 16000 and at the end of year ratio of profit of Ayush to total profit is 10 : 19, then find investment of Ayush?
 (a) 12000 Rs. (b) 8000 Rs.
 (c) 9000 Rs. (d) 10000 Rs.
 (e) 9600 Rs.

Level - 2

- 1.** Ratio of present age of Veer, Sameer, Divyaraj, Ayush and Sumit is 14 : 15 : 13 : 12 : 16 and sum of age of Veer, Divyaraj & Sumit four years hence will be 44 years more than sum of present age of Sameer & Ayush. Find the ratio of age of Veer, Sameer, Divyaraj, Ayush and Sumit after 10 years?
 (a) 19 : 20 : 18 : 16 : 21 (b) 19 : 20 : 16 : 17 : 21
 (c) 19 : 20 : 22 : 17 : 21 (d) 19 : 20 : 18 : 17 : 21
 (e) None of these
- 2.** Rs. 280 are distributed into a total of 88 boys and girls. The ratio of total amount given to all the boys to that of all the girls is 4 : 3. The ratio of amount given to one boy to amount given to one girl is 8 : 5. Find the number of boys and girls respectively.
 (a) 32 and 56 (b) 36 and 52
 (c) 48 and 40 (d) 40 and 48
 (e) 52 and 36
- 3.** Two types of ornaments are prepared by using gold and copper in two different proportions. In first ornaments, 6-gram gold is mixed with 5 gram copper and in second ornament 5 gram gold is mixed with 3 gram copper. If total quantity of gold and copper is 122 gram and 90 grams respectively then how many ornaments are prepared of second type?(total gold and copper is used)
 (a) 15 (b) 10
 (c) 7 (d) 20
 (e) 9
- 4.** The ratio of daily wage of three workers P, Q & R in 'MANREGA' is 21 : 16 : 18 respectively. If any of workers work on Sunday, then gets Rs. 125 extra on that day. The ratio of wage of P, Q&R for a weekday and Sunday is 26 : 21 : 23, then find the difference between wage of P&R on a weekday & Sunday (in Rs.)?
 (a) 64 (b) 75
 (c) 90 (d) 125
 (e) 100
- 5.** Varun and Kartik purchased the shares in ratio 7:9 for the cost of their basic salaries. The company gave each of them 50 shares as incentive, due to which the ratio changes to 9:11. If each share cost is Rs. 60. Find basic salary of Varun.
 (a) Rs. 13500 (b) Rs. 16500
 (c) Rs. 21000 (d) Rs. 10500
 (e) Rs. 27000

6. The ratio of first class fare to second class fare is 3:1. No. of tickets booked of first class to second class is in ratio 2:3. Total fare collected was Rs. 1800. Find fare collected from passengers of second class.
 (a) Rs. 1200 (b) Rs. 600
 (c) Rs. 900 (d) Rs. 750
 (e) Rs. 450
7. A pizza is cut into two pieces in the ratio of 3 : 7 by weight .The bigger of the two pieces is further cut in the ratio of 4 : 7 by weight. Find the ratio of each of the three pieces.
 (a) 11 : 14 : 7 (b) 33 : 28 : 49
 (c) 35 : 49 : 40 (d) 14 : 19 : 23
 (e) none of these
8. Ratio of milk to water in mixture-A and mixture-B is 3:2 and 5:4 respectively. Mixture-A & mixture-B are mixed to form mixture-C. If quantity of milk is 95 liters more than quantity of water in mixture-C and ratio of total quantity of mixture-A to that of mixture-B is 14 : 9, then find total quantity of water in mixture-C.
 (a) 210 liters (b) 230 liters
 (c) 220 liters (d) 240 liters
 (e) 200 liters
9. When the digits of a two-digit number are reversed, then the new number formed is 63 more than the original number and square of units digit of the original number is 63 more than square of tens digit of the original number. Find the original number.
 (a) 59 (b) 94
 (c) 49 (d) 81
 (e) None of the above.
10. The ratio of students in three class of school is 4 : 5 : 6. If 60 students increased in each class, the ratio becomes 6 : 7 : 8, then what was the total no. of students in the three classes of school initially?
 (a) 630 (b) 450
 (c) 540 (d) 350
 (e) 420
11. Dinesh started a business with investing Rs 12000 and after some months, Sunny joined with investing Rs 9000. At the end of the year, total profit was Rs 8000 and share of Sunny is Rs 1600. Find after how many months did sunny joined in the business?
 (a) 6 months (b) 4 months
 (c) 9 months (d) 3 months
 (e) 8 months
12. A and B entered into a partnership with amount Rs 2500 and Rs 4500 respectively and C joined them after 5 months with amount Rs 2400 and if total profit at the end of the year is Rs 16800, then find the difference between profit amount earned by B and C ?(in Rs)
 (a) 6000 (b) 5800
 (c) 5600 (d) 6200
 (e) 6400
13. Three partners A, B and C invested their amounts in ratio of 3 : 5 : 7. At the end of four months, A invests some amount such that, his total investment will be equal to C's initial investment. If C's share in profit is Rs 3150 then what will be total annual profit?
 (a) Rs 8150 (b) Rs 7950
 (c) Rs 8000 (d) Rs 7500
 (e) Rs 8900
14. Ankit invested twice than that of Ayush, while Charu invested thrice than that of Ankit and ratio between time period of investment of Ayush, Ankit & Charu is 6 : 3 : 8. If difference between profit share of Charu and Ayush is Rs 7980, then find total profit of all three together.
 (a) 11400 Rs. (b) 11800 Rs.
 (c) 11600 Rs. (d) 11200 Rs.
 (e) 11100 Rs.
15. Karthik, Rishabh and Mahender enter into a partnership. In the beginning Rishabh invest some amount. Karthik invest 100% more than Rishabh after 4 months and Mahender invest 350 % more then Rishabh after 8 months. Total profit earned by them at the end of year is Rs 8280. Find the difference between profit share of Mahender and Karthik?
 (a) Rs 1080 (b) Rs 720
 (c) Rs 360 (d) Rs 630
 (e) Rs 450
16. A, B & C entered into a partnership business with capital in the ratio 5 : 8 : 12. After 8 months C withdraws his capital while after 10 months B increased his investment by 25%. If at the end of the year difference between profit share of A and B is Rs.17000, then find profit share of C at the end of the year.
 (a) Rs.40800 (b) Rs.46200
 (c) Rs.32400 (d) Rs.50400
 (e) Rs.38000
17. A, B and C invested Rs.5000, Rs.10000 and Rs.20000 in a partnership business respectively. After 'x' months A doubled his investment and after 'y' months B increased his investment by 50%. If at the end of the year they distributed the profit earned in the ratio 10 : 15 : 24, then find (x+y).
 (a) 18 (b) 12
 (c) 15 (d) 10
 (e) 16

18. A started a business with Rs 10000 and B joined him with Rs 18000 after 4 months. After a year 'A' got 25% of total profit for his office work while remaining profit is divided into A and B according to their investment. If at the end of the year 'A' got Rs 31,200 as his profit share, then find the total profit earned by them?
 (a) Rs 57,200 (b) Rs 49,500
 (c) Rs 44,000 (d) Rs 52,800
 (e) Rs 50,600
19. A, B and C started a business by investing in the ratio of 3 : 4 : 5. After 3 months, A withdrew an amount which is equal to $8\frac{1}{3}\%$ of total amount invested by B and C together. If A got Rs. 702 at end of year, then find the difference between profit share of B and C?
 (a) Rs. 280 (b) None of these
 (c) Rs. 320 (d) Rs. 240
 (e) Rs. 300
20. Anurag invested $33\frac{1}{3}\%$ more than Ayush in a partnership and after one-year Ayush increased his share by 100%. After two years they earned a profit of Rs. 15300 and Ayush got 10% of total profit for managing business and rest profit is divided between both in the ratio of their respective investment. Find the share of profit of Ayush?
 (a) 8820 Rs. (b) 9260 Rs.
 (c) 9280 Rs. (d) 8860 Rs.
 (e) 8800 Rs.
21. Ankit, Bhavya and Chiru together starts a business. Bhavya invested 25% more amount than Ankit as well as $33\frac{1}{3}\%$ less amount than Chiru. If ratio of profit sharing of Ankit, Bhavya and Chiru is 8 : 15 : 25, then find for what time Ankit invested, if Chiru invested for 20 months.
 (a) 6 months (b) 9 months
 (c) 12 months (d) 15 months
 (e) 18 months
22. Sandy invested 50% more than Ayush and the ratio of time period for which Sandy & Ayush invested is 5 : 4 respectively. If profit earned by Sandy is Rs. 840 more than the profit earned by Ayush, then find the total profit earned by Ayush and Sandy both ?
 (a) Rs. 2620 (b) Rs. 2760
 (c) Rs. 2880 (d) Rs. 2780
 (e) Rs. 2460
23. A, B & C starts a newspaper distribution business with total capital of 2400 Rs. and ratio of investment of A to that of C is 4 : 3. If A & B withdrew their respective capital after 15 months & 18 months respectively and after two years profit sharing ratio of A, B & C is 10 : 15 : 12, then find difference between investment of B & C?
 (a) 600 Rs. (b) 480 Rs.
 (c) 440 Rs. (d) 360 Rs.
 (e) 400 Rs.
24. Investment of B is 25% more than that of A. A & B invested for 10 months and 6 months respectively. Another person C invested Rs '2y' in that business for last 8 months. Then find initial investment of B is what percent more or less than that of C if profit of C is twice of profit of B?
 (a) $37\frac{1}{2}\%$ (b) $28\frac{1}{3}\%$
 (c) $44\frac{1}{6}\%$ (d) $33\frac{1}{3}\%$
 (e) $26\frac{1}{4}\%$
25. Investment made by A and C is 40% less and 60% more than that of B respectively and ratio of period of investment of A, B and C are 3: 2: 1. If average of their profit is Rs 21600 then find difference between A's and C's profit share (in Rs.).
 (a) 2400 (b) 2000
 (c) 1800 (d) 2600
 (e) 2800
26. Uday and Amir entered into partnership business. Amir invested Rs. 1600 for whole year and Uday invested Rs. 1200 for first six months and withdraw $\frac{1}{4}$ th of his capital and invested remaining amount for next T month. If Uday and Amir got profit in the ratio of 9 : 16. Find the value of T ?
 (a) 3 months (b) 4 months
 (c) 5 months (d) 6 months
 (e) 2 months
27. Rakesh started a business with some money. After four months Ram and Shyam joined his business with investments of Rs 31500 and Rs 27000 respectively. Total profit earned at the end of year was Rs 19200. If profit received by Rakesh was Rs 7500, then find Rakesh's investment in the business?
 (a) 27000 (b) 24000
 (c) 26000 (d) 25500
 (e) 25000
28. Amit and Deepak started a business with initial investments in the ratio of 3:1 respectively. At the end of 8 months from start of the business, Amit left. If Deepak received Rs 8000 as his share of the annual profit, then find what was annual profit?
 (a) Rs 20000 (b) Rs 28000
 (c) Rs 24000 (d) Rs 32000
 (e) Rs 16000

- total sum of money increase after two years due to this investment pattern (approximately)?
 (a) 10% (b) 20% (c) 24%
 (d) 16% (e) 13%
8. Akhilesh took five papers in an examination, where each paper was of 200 marks. His marks in these papers were in the proportion of 7 : 8 : 9 : 10 : 11. In all papers together, the candidate obtained 60% of the total marks. Then, the number of papers in which he got more than 50% marks is :
 (a) 1 (b) 3 (c) 4
 (d) 5 (e) None of these
10. If ratio of investment A, B and C are in the ratio 3 : 5 : 8 and the time of investment of A, B and C are $\frac{100}{3}\%$, 80% and 25% respectively of their investment, and profit of A is 4800 then what will be the profit of C.
 (a) 25,600 (b) 15,600 (c) 24,800
 (d) 22,500 (e) 26,700
11. A sum of money is divided among Wasim, Chintan, Yash and Zignesh in the ratio of 3 : 7 : 9 : 13, respectively. If the share of Wasim and Yash together is Rs. 11172, then what is the difference between the amounts of Chintan and Zignesh?
 (a) Rs. 7672 (b) Rs. 6834 (c) Rs. 5586
 (d) Rs. 7867 (e) Rs. 5676
12. A, B and C invested in a business in the ratio 6 : 8 : 9. If B invested for a period whose numerical value is 112.5% of B's investment but A and C invested for one year. If profit of B at the end of year is 16750 then what is the share of profit of C.
 (a) 20225 (b) 22125 (c) 25225
 (d) 25125 (e) 23125
13. A and B started a business in partnership with the investment of Rs. 27000 and Rs. 36000 respectively, after 4 month A withdraw 5000 Rs. and B added 6000 Rs. more and C joined with 35000 Rs. if after one year they gets a total profit of Rs. 130500, then find the profit share of C ?
 (a) 36000 Rs. (b) 32000 Rs. (c) 35000 Rs.
 (d) 38000 Rs. (e) 42000 Rs.
14. Ankit gets 6000 Rs. out of total profit of 9000 Rs. and he invested 8000 more amount than his partner for 8 months and his partner Arun invested his amount for whole the year in partnership, then find how much amount invested by Ankit?
 (a) 8000 Rs. (b) 1000 Rs. (c) 9000 Rs.
 (d) 14000 Rs. (e) 12000 Rs.
15. A, B and C started a business with their investment in the ratio 1 : 2 : 4. After 6 months, A invested half amount more as before while C withdrew $\frac{1}{4}$ th of his investment. Find the ratio of their profits at the end of the year.
 (a) 5 : 12 : 13 (b) 5 : 11 : 14 (c) 5 : 12 : 14
 (d) 5 : 12 : 10 (e) None of these
16. Ramesh, Rajan and Ritesh enter into partnership by making investments in the ratio 3 : 5 : 7. After a year, Ritesh invests another Rs. 337600 while Ramesh withdraws Rs. 45600. The ratio of investments then changes to 24 : 59 : 167. How much did Ramesh invest initially?
 (a) Rs. 45600 (b) Rs. 96000 (c) Rs. 141600
 (d) Rs. 156000 (e) None of these
17. A and B started a business in partnership with the investment of Rs. 27000 and Rs. 36000 respectively, after 4 month A withdraw 5000 Rs. and B added 6000 Rs. more and C joined with 35000 Rs. if after one year they get a total profit of Rs. 130500, then find the profit share of C?
 (a) Rs. 36000 (b) Rs. 32000 (c) Rs. 35000
 (d) Rs. 38000 (e) Rs. 42000
18. If ratio of investment of A, B and C are in the ratio 3 : 5 : 8 and the time of investment of A, B and C are $\frac{100}{3}\%$, 80% and 25% respectively of their investment, and profit of A is 4800 then what will be the profit of C. (in Rs.)
 (a) 25,600 (b) 15,600 (c) 24,800
 (d) 22,500 (e) 26,700
19. Divyaraj, Sameer and Ayush started a business each investing 20000 Rs. After 4 month Divyaraj withdraws Rs. 6000, Sameer withdraws 8000 and Ayush invest 6000 more. At the end of year total profit was 65600 Rs. Find the share of Ayush ?
 (a) 19200 Rs. (b) 28800 Rs. (c) 28600 Rs.
 (d) 27600 Rs. (e) 25760 Rs.
20. Divyaraj and Ayush started a business in partnership investing 36000 Rs. and 24000 Rs. and after 6 month they added 4000 Rs. and 6000 Rs. respectively. $33\frac{1}{3}\%$ of total profit after one year they donated and Remaining profit shared in the ratio of invested capital. If Divyaraj gets 8800 Rs. more profit to Ayush, then find the total profit?
 (a) 78000 (b) 75000 (c) 56000
 (d) 91000 (e) 10000
21. X, Y, Z enter into partnership with capital contribution Rs. 50000, 20000 and 30000 respectively. X is a working partner and get 20% of profit for managing the business. The remaining profit is distributed in the respect of capital. If at the end of a year, X gets Rs. 300 more than Y and Z together, then find total profit is ?
 (a) Rs. 1200 (b) Rs. 1700 (c) Rs. 2200
 (d) Rs. 1500 (e) Rs. 1400

22. Bhavya gives 50% of his total saving of Rs. 88000 to his wife and divides the remaining amount between his two sons Uday who is 15 year old and Shikhar who is $15\frac{1}{2}$ year old. When they complete 18 years, Shikhar will get 4000 more amount than Uday on investing their amounts at 5%, annually. Find what amount invested by Shikhar ?
 (a) 20000 Rs. (b) 18000 Rs. (c) 16000 Rs.
 (d) 22000 Rs. (e) 24000 Rs.
23. Ankit, Yogesh and Mahesh enter into a partnership business. Ankit invested 12000 Rs. for the whole year, Yogesh invested 16000 Rs. first and after of 4 month invested 4000 Rs. more and Mahesh invested 15000 for first 9 months withdraw Rs 3000 after 9 months, if at the end of year Yogesh gets total profit of Rs. 11200, then find the sum of total profit of Ankit and Mahesh.(in Rs.)
 (a) 15110 (b) 15250 (c) 15570
 (d) 14750 (e) 15750
24. $\frac{3}{7}$ of monthly income of Neeraj is half the monthly income of Ankur. If Soniya expend 20% of her monthly income on Rent which is Rs. 17500 and Soniya's expenditure on rent is 50% of monthly income of Neeraj. Find ratio between monthly income of Soniya to monthly income of Ankur ?
 (a)35:12 (b)35:14 (c)36:17
 (d)35:13 (e)37:15
25. Raman and Nakul invested in a business. Raman invested Rs 3000 and withdraw Rs 1500 at the end of 8th month. Nakul invested Rs 1000 and Rs 3500 more at the end of 4th month but withdraw Rs 1500 at the end of 7th month. At the year's end, they earned Rs 1800. What should be Raman's share?
 (a) 936 (b) 920 (c) 864
 (d) 850 (e) 795

Previous Year Question

1. A and B entered into business by making investment of Rs. 2400 and 2800 respectively. After six months A left the business and after four more months C joined the business with capital 20% more than A's investment. If at the end of year sum of profit share of A and C is Rs. 4200, then find total profit?
 (a) 10200 Rs. (b) 11200 Rs. (c) 11600 Rs.
 (d) 11800 Rs. (e) 10800 Rs.
SBI Clerk Prelims 2020
2. A & B entered into a business by investing total capital of Rs 17000. B withdraws Rs 1500 after 6 months and gets Rs 8100 as profit out of total profit of Rs 19500 at the end of year. Find capital of B after 6 months from starting.
 (a) Rs 7000 (b) Rs 9500 (c) Rs 7500
 (d) Rs 6000 (e) Rs 6500
IBPS PO Prelims 2020
3. Three partners P, Q and R invested their amounts in ratio of 2 : 5 : 7. At the end of 6 months, 'P' added some more amount such that his investment become equals to half of sum of 'Q' and 'R' initial investment. If at the end of the year, Q's share in profit is Rs 425, then find the total profit
 (a) Rs 1250 (b) Rs 1360 (c) Rs 1840
 (d) Rs 1050 (e) Rs 1450
IBPS CLERK Prelims 2020
4. A invests Rs. X in a business. After four months B joined him with Rs. 2X and A double his investment. If at the end of the years total profit is Rs. 13950, then find the profit share of A?
 (a) 7250 Rs. (b) 7750 Rs. (c) 8750 Rs.
 (d) 8751 Rs. (e) 87502Rs.
RRB PO Prelims 2020
5. 'A' invested Rs.4000 and 'B' invested Rs.1000 more than A. After eight months 'C' invested Rs.3000. If at the end of the year 'C' gets profit of Rs.700, then find the total profit.
 (a) Rs.7000 (b) Rs.8400 (c) Rs.5600
 (d) Rs.8800 (e) Rs.6400
RRB Clerk Prelims 2020
6. A & B invested Rs. X and Rs. (X + 800) for same period of time in a business. If A gets Rs. 3200 as profit share out of total profit of Rs. 6800, then find 'X'
 (a) 7800 (b) 6000
 (c) 8400 (d) 7200 (e) 6400
RBI Assistant Prelims 2020
7. A and B invested in the ratio of 3:2 respectively. They both invested for 6 months. If total profit is 5000 Rs., then find the profit share of B?
 (a) 2000 Rs. (b) 2500 Rs. (c) 2400 Rs.
 (d) 3000 Rs. (e) 1500 Rs.
SBI PO Prelims 2019

8. A invested Rs. X in a scheme. After 6 months, B joined with Rs. 4000 more than that of A. After an year, ratio of profit of B to the total profit was 3: 7. Find the value of X.
 (a) 4000 (b) 8000 (c) 1600
 (d) 6000 (e) 10000

SBI Clerk Prelims 2019

9. Ratio of income of A to that of B is 5:9. If expenditure of A is $\frac{3}{8}$ th of his income and expenditure of B is $\frac{4}{9}$ th of his income and sum of their saving is Rs 1950 then find the difference between their income?
 (a) Rs 900 (b) Rs 1000 (c) Rs 880
 (d) Rs 960 (e) Rs 920

SBI Clerk Mains 2019

10. A, B & C entered into a partnership business. Amount invested by B is 3 times of amount invested by A and ratio of amount invested by C to that of B is 1 : 2. After 11 months, all 3 withdrew Rs.Y. If ratio of C's profit share to total profit at the end of the year is 35 : 129, then find profit sharing ratio of A to that of B at the end of the year.
 (a) 19 : 75 (b) 41 : 53 (c) 67 : 27
 (d) 23 : 71 (e) 31 : 63

IBPS PO Prelims 2019

11. Two friends Pinki and Rinki entered into a partnership by investing an amount of Rs 6000 and Rs 9000 respectively and ratio of their period of investment is 2: 3. Find the profit share of Pinki if profit share of Rinki is Rs 45,000.
 (a) Rs 24,000 (b) Rs 20,000 (c) Rs 18,000
 (d) Rs 28,000 (e) Rs 25,000
12. The prices of a refrigerator and a television set are in the ratio 5 : 3. If the refrigerator costs Rs. 5500 more than the television set. Then, the price of the refrigerator is :
 (a) Rs. 27500 (b) Rs. 82500 (c) Rs. 13750
 (d) Rs. 16500 (e) None of these
13. A milkman makes 20% profit by selling milk mixed with water at Rs. 9 per litre. If the cost price of 1 L pure milk is Rs. 10, then the ratio of milk and water in the given mixture is :
 (a) 3 : 1 (b) 4 : 1 (c) 3 : 2
 (d) 4 : 3 (e) None of these
14. 94 is divided into two parts in such a way that the fifth part of the first and the eight part of the second are in the ratio 3 : 4. The first part is :
 (a) 30 (b) 36 (c) 40
 (d) 28 (e) None of these

15. Annual incomes of Amit and Varun are in the ratio 3 : 2, while the ratio of their expenditures is 5 : 3. If at the end of the year each saves Rs. 1000, the annual income of Amit is :
 (a) Rs. 9000 (b) Rs. 8000 (c) Rs. 7000
 (d) Rs. 6000 (e) None of these

16. The monthly salaries of A, B and C are in the ratio 2 : 3 : 5. If C's monthly salary is Rs. 12000 more than that of A, then B's annual salary is
 (a) Rs. 120000 (b) Rs. 144000 (c) Rs. 180000
 (d) Rs. 240000 (e) None of these

17. The income of A, B and C are in the ratio 7 : 9 : 12 and their spendings are in the ratio 8 : 9 : 15. If A saves $\frac{1}{4}$ th of his income, then the savings of A, B and C are in the ratio of :
 (a) 69 : 56 : 48 (b) 47 : 74 : 99 (c) 37 : 72 : 49
 (d) 56 : 99 : 69 (e) None of these

18. A sum of Rs. 86700 is to be divided among A, B and C in such a manner that for every rupee that A gets, B gets 90 paise and for every rupee that B gets, C gets 110 paise. B's share will be :
 (a) Rs. 26100 (b) Rs. 27000 (c) Rs. 28100
 (d) Rs. 28090 (e) None of these

19. If $a = \frac{2}{9} : \frac{1}{3}$, $b : c = \frac{2}{7} : \frac{5}{14}$ and $d : c = \frac{7}{10} : \frac{3}{5}$. Then, a : b : c : d is :
 (a) 4 : 6 : 7 : 9 (b) 16 : 24 : 30 : 35
 (c) 8 : 12 : 15 : 7 (d) 30 : 35 : 24 : 16
 (e) None of these

20. A man divides his property, so that his son's share to his wife's and wife's share to his daughter's are both as in the ratio 3 : 1. If the daughter gets Rs. 10000 less than son, then the value (in rupees) of the whole property is:
 (a) Rs. 16250 (b) Rs. 16000 (c) Rs. 18250
 (d) Rs. 17000 (e) None of these

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Solutions

Basic Solutions

1. **(d)**; Let present ages of Ramu and Somu be R and S respectively.

$$\begin{array}{ccc} (R-1) : (S-1) \hat{=} 6 : 7 \\ \text{One year ago} \rightarrow \uparrow : \uparrow \\ R : S \\ \downarrow : \downarrow \text{ Four years hence} \\ (R+4) : (S+4) \hat{=} 7 : 8 \end{array}$$

$$\begin{array}{l} \frac{R-1}{S-1} = \frac{6}{7} \quad \left| \quad \frac{R+4}{S+4} = \frac{7}{8} \right. \\ 7R-7=6S-6 \quad \left| \quad 8R+32=7S+28 \right. \\ 7R-6S=1 \quad \left| \quad 8R-7S=-4 \right. \end{array}$$

$$7R - 6S = 1 \quad \dots \text{(i)}$$

$$8R - 7S = -4 \quad \dots \text{(ii)}$$

Multiplying equation (i) by 8 and equation (ii) by 7, we get \rightarrow

$$56R - 48S = 8 \quad \dots \text{(iii)}$$

$$56R - 49S = -28 \quad \dots \text{(iv)}$$

Subtract (iv) from (iii) : $S = 36$ years

Shortcut:

One year ago $\rightarrow R : S \hat{=} 6 : 7 \Rightarrow S = 7$

Only option (d) has a number from which, if we subtract '1', we get a number divisible by 7.

2. **(b)**; 33% of A = $\frac{33 \times A}{100} = \frac{55 \times B}{100} = 55\%$ of B

$$= \frac{33 \times A}{100} = \frac{55 \times B}{100} \Rightarrow \frac{A}{B} = \frac{55}{33}$$

$$A : B \hat{=} 5 : 3$$

3. **(e)**; Let, number is 'n'

$$\left(\frac{45n}{100} \right) - 24 = 48 \Rightarrow \frac{9n}{20} = 48$$

$$9n - 480 = 48 \times 20 \Rightarrow 9n = 960 + 480$$

$$n = \frac{1440}{9} = 160 \Rightarrow \frac{3}{8}n = \frac{3}{8} \times 160 = 60$$

4. **(c)**; $\frac{3}{8} \times 1000 = 375 \Rightarrow 32\%$ of $\left(\frac{3}{8} \text{th of } 1000 \right)$

$$= 32\% \text{ of } 375 = \frac{32 \times 375}{100} = 120$$

5. **(c)**; Let the third number be n.

$$20\% \text{ more than } n = n + \frac{n}{5} = \frac{6n}{5}$$

$$50\% \text{ more than } n = n + \frac{n}{2} = \frac{3n}{2}$$

$$\text{Ratio of } \frac{6n}{5} \text{ and } \frac{3n}{2} \Rightarrow \frac{6n}{5} \times \frac{2}{3n} = 4 : 5$$

Shortcut

Let the third number be 100

Then the two numbers are,

20% more and 50% more

$$\downarrow \quad \downarrow$$

$$120 \quad 150$$

$$\text{Ratio} = 120 : 150 = 4 : 5$$

6. **(c)**; $A : B : C : D \Rightarrow 5 : 2 : 4 : 3$

\Rightarrow C gets 1 unit more than D.

Given, C gets Rs. 1000 more than D.

$\text{P } 1 \text{ unit} = \text{Rs. } 1000$ $\text{P } B\text{'s share} = 2 \text{ units}$

$$= 2 \times 1000 = \text{Rs. } 2000$$

7. **(b)**; $0.75 : x :: 5 : 8$

$$\frac{0.75}{x} = \frac{5}{8} \Rightarrow 5x = 6.00 \text{ P } x = 1.2$$

8. **(b)**; Three numbers = I, II, III

$$I + II + III = 98, I : II \rightarrow 2 : 3, II : III \rightarrow 5 : 8$$

$$10 : 15 \hat{=} (2 : 3) \times 5 \leftarrow (I : II) \times 5$$

$$15 : 24 \hat{=} (5 : 8) \times 3 \leftarrow (II : III) \times 3$$

$$I : II : III, 10 : 15 : 24, 10 + 15 + 24 = 49$$

$$\text{Given } I + II + III = 98, 98 \div 49 = 2$$

$$\Rightarrow 1 \text{ unit} = 2$$

$$\Rightarrow \text{Second number} = 15 \times 2 = 30$$

9. **(e)**; $\frac{1}{2} : \frac{2}{3} : \frac{3}{4}$

L.C.M. of 2, 3 and 4 = 12

On multiplying by a number throughout, the ratio remains same. Here, we multiply by 12.

$$\frac{1}{2} \times 12 : \frac{2}{3} \times 12 : \frac{3}{4} \times 12$$

$$6 : 8 : 9 \Rightarrow 6 + 8 + 9 = 23$$

$$23 \text{ units} = 872 \Rightarrow 1 \text{ unit} = 37.91$$

$$\Rightarrow 1 \text{st part} = 6 \text{ units} = 6 \times 37.91 = 227.46$$

10. **(b)**; Let the two numbers be a and b

$$\frac{a}{b} = \frac{3}{5} \Rightarrow 5a = 3b \quad \dots \text{(i)}$$

$$\frac{a-9}{b-9} = \frac{12}{23} \Rightarrow 23a - 207 = 12b - 108$$

$$\Rightarrow 23a - 12b = 99 \quad \dots \text{(ii)}$$

$$b = \frac{5a}{3} \text{ From (i)} \quad \dots \text{(iii)}$$

Using (ii) and (iii)

$$23a - 12 \times \frac{5a}{3} = 99 \Rightarrow 3a = 99 \Rightarrow a = 33$$

Shortcut

Given = Two numbers are in the ratio
= 3 : 5

↓

Smaller number must be a multiple of 3
Only options (a) and (b) have '3' as a factor.
Given : On subtracting 9 from each, the two numbers are in the ratio 12 : 23
On subtracting 9 from 27 → option (a),
We get 18, but the ratio becomes 12 : 23,
So, option (a) → discarded.
On subtracting 9 from 33 → option (b),
We get 24
↓
multiple of 12.

11. (c); P : Q = 8 : 15

P : Q : R = ?

Q : R = 3 : 2) × 5 ⇒ Q : R = 15 : 10

P : Q = 8 : 15 ⇒ 15 : 10 = Q : R

P : Q : R = 8 : 15 : 10

12. (a); P : Q = 8 : 15

Q : R = 5 : 8) × 3 ⇒ Q : R = 15 : 24

From (i) and (ii)

P : Q : R = 8 : 15 : 24

R : S = 4 : 5) × 6 ⇒ R : S = 24 : 30

P : Q : R = 8 : 15 : 24 ⇒ 24 : 30 = R : S

P : Q : R : S = 8 : 15 : 24 : 30 ⇒ P : S = 8 : 30 = 4 : 15

$\frac{4}{16} = \frac{7}{x} \Rightarrow 4x = 16 \times 7 \Rightarrow x = 4 \times 7 = 28$

13. (c); Ratio of salaries → A : B : C = 2 : 3 : 5

A → 2x, B → 3x, C → 5x

$A + 15\% \text{ of } A = 2x + \frac{15 \times 2x}{100} = \frac{46x}{20}$

$B + 10\% \text{ of } B = 3x + \frac{3x \times 10}{100} = \frac{33x}{10}$

$C + 20\% \text{ of } C = 5x + \frac{5x \times 20}{100} = 6x$

New ratio of their salaries

$A : B : C = \frac{46x}{20} : \frac{33x}{10} : 6x$

↓ Multiply by 20

$46x : 66x : 120x \Rightarrow 23x : 33x : 60x \Rightarrow 23 : 33 : 60$

Shortcut

Ratio of salaries of A, B and C → 2 : 3 : 5

Let the salaries be

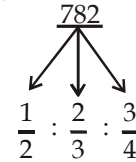
200 300 500

↓ 15% ↑ ↓ 10% ↑ ↓ 20% ↓

230 330 600

New ratio = 230 : 330 : 600 = 23 : 33 : 60

14. (d);



L.C. M. of 2, 3 and 4 = 12

$\left(\frac{1}{2} : \frac{2}{3} : \frac{3}{4}\right) \times 12 \Rightarrow 6 : 8 : 9 \Rightarrow 6 + 8 + 9 = 23$

$23 \text{ units} = 782 \Rightarrow 1 \text{ unit} = \frac{782}{23} = 34$

First part = 6 units = 6 × 34 = 204

15. (b); Rahul invested for one year i.e, 12 months.

6 months later, Sanjay joined him.

So, Sanjay invested for 6 months only.

	Rahul	Sanjay
(I) Investment →	45000	30000
(T) Time period →	12 months	6 months
	↓	↓
Product →	45000×12	30000×6
Ratio of profits =	$45000 \times 12 : 30000 \times 6 = 3 : 1$	

16. (e);

	Ram	Karan	Rohan
Ratio of capitals	2	3	4
Ratio of time	6	4	3
Ratio of profits	Ram	Karan	Rohan
	↓	↓	↓
	2×6	3×4	4×3
	12	12	12
	1	1	1

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12. (d): Let capital investment time period for Anurag and Ayush be 'a' and 'b' years respectively
 And, investment of Anurag and Ayush be 2x and 3x respectively
 Ratio of profit share of Anurag and Ayush = (2xa) : (3xb) = 2a : 3b
 ATQ –

$$\frac{2a}{3b} = \frac{76000-36000}{36000}$$

$$\frac{2a}{3b} = \frac{10}{9}$$
 a : b = 5 : 3

13. (c): Let investment of Ram and Shyam be 3P and 4P respectively
 And also, Ram and Shyam invested for a months and b months respectively
 ATQ –

$$\frac{3P \times a}{4P \times b} = \frac{2700}{5100-2700}$$

$$\frac{3a}{4b} = \frac{9}{8}$$
 b : a = 2 : 3

14. (a): Let initial investment of Maanik be Rs x.
 Investment of Sumit = Rs 1.25x

Sumit	Maanik	Ravi
(1.25x × 8 + 1.25x × 1.2 × 4)	(x × 8 + 1.25x × 4)	8000 × 12
16x	13x	96000

 Let profit share of Sumit, Maanik and Ravi be Rs 16xy, 13xy and 96000y respectively
 ATQ
 16xy = 96000y
 ⇒ x = 6000
 Required profit share % = $\frac{78000}{270000} \times 100 = 28\frac{8}{9}\%$

15. (c): Let the ratio of Ayush's and Nikhli's investment be x:y.
 Given the ratio of time periods of investment of Ayush and Nikhil is 4:5

$$\left(\frac{4x}{4x+5y}\right) \times 100000 = 20000$$

$$\left(\frac{4x}{4x+5y}\right) = \frac{1}{5}$$
 20x = 4x + 5y
 16x = 5y
 x : y = 5 : 16

16. (a): Ratio in which profit is distributed = (x+2000) : (x+3000)
 Total investment = x+2000+x+3000 = 2x+5000
 Then ATQ,

$$\frac{x+3000}{2x+5000} = \frac{28000}{48000} = \frac{7}{12}$$
 12x + 36000 = 14x + 35000
 2x = 1000
 X = Rs. 500

17. (d): Let initial investment of Veer = P Rs.
 Ratio of profit of Veer & Ayush = P × 12 : 30000 × 6

$$\frac{P}{P+15000} = \frac{18000}{33000}$$
 P = 18000 Rs.

18. (d): Let the investment of Q = Rs 100x
 Investment of P = Rs 160x
 Investment of R = Rs 120x
 Ratio of profit:

P	Q	R
160x × 2	100x × 4	120x × 3
8	10	9

 ATQ,
 19 unit = Rs. 8550
 8 unit = 450 × 8 = Rs. 3600

19. (c): Let investment of Ayush = 100x
 So, investment of Veer = 125x
 Ratio of investment of Ayush and Veer = 4 : 5
 Let time period of investment of Ayush & Veer be 'a' & 'b' respectively.
 ATQ –

$$\frac{4a}{(4a+5b)} = \frac{7500}{22500}$$

$$\frac{4a}{4a+5b} = \frac{1}{3}$$
 12a = 4a + 5b
 8a = 5b
 a : b = 5 : 8

20. (c): Profit share ratio (A : B) = 1200 : 600 = 2 : 1
 ATQ,
 Let B invested Rs. X and A invested Rs (X + 1600)

$$\frac{(1600+X)8}{X \times 12} = \frac{2}{1}$$
 12800 + 8X = 24X
 X = Rs 800
 Amount of A = 1600 + 800 = Rs 2400

21. (d): Let ratio of P's investment and Q's investment be x:y
 Therefore, profit will be shared in the ratio 4x:5y
 Given, $\frac{4x}{4x+5y} \times 75000 = 15000$

$$\frac{4x}{4x+5y} = \frac{1}{5}$$
 20x = 4x + 5y
 16x = 5y
 y : x = 16 : 5

22. (c):

A	B
25000	75000

 ∴ Ratio of investment = 1 : 3
 Ratio of time = 7 : 4
 So, ratio of profit = (1 × 7) : (3 × 4) = 7 : 12
 Total profit = $\frac{19}{5} \times 500 = \text{Rs. } 1900$

23. (b): Ratio in which profit is distributed between

Aakash and Vikash = $(x + 2000) : (x + 3000)$

$$\frac{x+2000}{x+3000} = \frac{28000-16000}{16000}$$

$$\Rightarrow \frac{x+2000}{x+3000} = \frac{3}{4}$$

$$4x + 8000 = 3x + 9000$$

$$\Rightarrow x = \text{Rs. } 1000$$

24. (a): Ratio of investment of Arun, bhavya & Ashu

$$4 \times 3 : x \times 3 : 4 \times x$$

Ratio of profit

$$24 \times 12 : 24 \times 3x : 24 \times 4x$$

ATQ -

$$\frac{4x}{7x+12} = \frac{1850}{3700}$$

$$8x = 7x + 12$$

$$x = 12$$

25. (a): Profit sharing ratio of A, B & C = $(2000 \times 12) :$

$$(2500 \times 12) : (1500 \times 4)$$

$$= 24000 : 30000 : 6000$$

$$= 4 : 5 : 1$$

Let total profit be Rs. P

ATQ,

$$\frac{1}{(4+5+1)} \times P = 350$$

$$P = \text{Rs. } 3500$$

26. (c): Let B invested for x months.

$$\text{Ratio of profit share of A and B} = \frac{54000 \times 12}{45000 \times x} = \frac{72}{5x}$$

Let share of A = 72p, B = 5xp

$$\text{Given, } 72p = 22950$$

$$p = \frac{1275}{4}$$

$$\text{And } 72p + 5xp = 35700$$

$$\frac{1275}{4} [72 + 5x] = 35700$$

$$x = 8$$

$$\therefore \text{required time} = 12 - 8 = 4 \text{ months}$$

27. (d): Ratio of profit

Veer : Manyu

$$6000 \times x : 8000(x + 4)$$

$$3x : 4x + 16$$

Let profit of Veer be Rs. y

And profit of Manyu = Rs. $(y+3900)$

ATQ,

$$y + y + 3900 = 12900 \dots(i)$$

$$y = \text{Rs. } 4500$$

profit share of Manyu = Rs. 8400

$$\text{So, } \frac{3x}{4x+16} = \frac{4500}{8400}$$

On solving $x = 10$ months

28. (d): let Manish invested for T months.

ATQ

$$\frac{40000 \times T}{55000 \times (T-6)} = \frac{40}{33}$$

$$3T = 5T - 30$$

$$2T = 30$$

$$T = 15 \text{ months}$$

29. (b): Ratio of profit share of Ankit to Pankaj

$$\Rightarrow 3000 \times 12 : 5000 \times 8$$

$$\Rightarrow 9 : 10$$

Let Profit of Ankit and Ranke is Rs. 9a and 10a Respectively

$$\text{Profit earned by Pankaj} = 1900 \times \frac{29}{100} \times \frac{10}{19} = \text{Rs. } 290$$

30. (a): ratio between profit share of A to B = $5000 \times 12 : 9000 \times 6 = 10 : 9$

Let profit of A and B are Rs. 10x and 9x respectively

$$\text{Required percentage} = \frac{(10x-9x)}{10x} \times 100 = 10\% \text{ less}$$

31. (b): profit ratio of Himanshu and Kapil = $\frac{42000 \times 12}{P \times 8} =$

$$\frac{63000}{P}$$

ATQ

$$\frac{63000}{P} = \frac{42000}{(62000-42000)}$$

$$P = \frac{63000 \times 20}{42} = \text{Rs } 30,000$$

32. (b): Let P, Q and R initial investment be 3x, 4x and 6x respectively

ATQ-

Investment ratio of P, Q & R

$$= (3x \times 15) : [4x \times 8 + (4x - 2000) \times 7] : [6x \times 8 + (6x - 4000) \times 7]$$

$$= 45x : (60x - 14000) : (90x - 28000)$$

ATQ -

$$\frac{45x}{(60x-14000)} = \frac{45}{53}$$

$$7x = 14000$$

$$x = 2000$$

Initial investment of R = $2000 \times 6 = 12000 \text{ Rs.}$

33. (e): Let the money invested by A,B,C.....,F,G be Rs. 7x,6x,5x,...,x respectively and the duration for which they invested the money be y,2y,3y.....,6y,7y months respectively.

So ATQ

Profit of A = $(7xy)$

Profit of B = $(12xy)$

Profit of C = $(15xy)$

Profit of D = $(16xy)$

Profit of E = $(15xy)$

Profit of F = $(12xy)$

Profit of G = $(7xy)$

So, the maximum profit will be obtained by 'D' at the end of year.

34. (d): ATQ,

$$\frac{2x+2000}{2x+2000+x+8000+3x+4000} = \frac{4000}{16000}$$

$$X = 3000$$

$$\text{Required difference} \rightarrow 3x + 4000 \sim x + 8000$$

$$\rightarrow 2000$$

35. (d): Let investment of Veer be 'x' Rs,

So, investment of Ayush will be $(16000 - x)$ Rs.

ATQ -

$$\frac{(16000-x) \times 8}{(16000-x) \times 8 + x \times 12} = \frac{10}{19}$$

$$x = 6000 \text{ Rs.}$$

Investment of Ayush = 10000 Rs.

Level - 2

1. (d): Let present age of Veer, Sameer, Divyaraj, Ayush and Sumit be 14a, 15a, 13a, 12a & 16a respectively

ATQ -

$$(14a + 13a + 16a + 4 \times 3) = (15a + 12a + 44)$$

$$16a = 32$$

$$a = 2 \text{ years}$$

Ratio of age of Veer, Sameer, Divyaraj, Ayush and Sumit after 10 years

$$= (14 \times 2 + 10) : (15 \times 2 + 10) : (13 \times 2 + 10) : (12 \times 2 + 10) : (16 \times 2 + 10)$$

$$= 38 : 40 : 36 : 34 : 42$$

$$= 19 : 20 : 18 : 17 : 21$$

2. (d): Total amount given to boys $= \frac{4}{7} \times 280 = \text{Rs. } 160$

$$\text{Total amount given to girls} = \frac{3}{7} \times 280 = \text{Rs. } 120$$

Let amount given to one boy and one girl be Rs 8x and Rs 5x respectively.

ATQ

$$\frac{160}{8x} + \frac{120}{5x} = 88$$

$$x = \frac{1}{2}$$

$$\text{So, no. of boys} = 40$$

$$\& \text{ no. of girls} = 48$$

3. (b): Let total no. of first type of ornament and second type of ornaments be a and b respectively

So, total gold and copper used in first ornament be 6a and 5a respectively.

And gold and copper used in second ornament be 5b and 3b respectively.

$$\Rightarrow 6a + 5b = 122 \dots(i)$$

$$5a + 3b = 90 \dots(ii)$$

Solving equation (i) and (ii) we get

$$a = 12$$

$$b = 10$$

Total no. of second type of ornaments prepared are 10.

4. (b): Let daily wage of P, Q&R be Rs. 21w, Rs. 16w & Rs. 18w respectively

And, Wages of P, Q&R for a weekday & Sunday be Rs. $(21w + 125)$, Rs. $(16w + 125)$ & Rs. $(18w + 125)$ respectively

ATQ -

$$\frac{(21w + 125)}{(16w + 125)} = \frac{26}{21}$$

$$441w + 2625 = 416w + 3250$$

$$25w = 625$$

$$w = 25$$

$$\text{Wage of P on a Weekday \& Sunday} = 21 \times 25 + 125 = \text{Rs. } 650$$

$$\text{Wage of R on a Weekday \& Sunday} = 18 \times 25 + 125 = \text{Rs. } 575$$

$$\text{Required difference} = 650 - 575 = \text{Rs. } 75$$

5. (d):

$$\begin{matrix} 7 & 9 \\ 9 & 11 \end{matrix} \left. \vphantom{\begin{matrix} 7 & 9 \\ 9 & 11 \end{matrix}} \right\} 2 \text{ ratio} = 50 \text{ shares}$$

$$1 \text{ ratio} = 25 \text{ shares}$$

$$\text{Actual shares of Varun} = 7 \times 25 = 175 \text{ shares}$$

$$\text{Kartik} = 9 \times 25 = 225 \text{ shares}$$

$$\text{Basic salary of Varun} = 175 \times 60 = \text{Rs. } 10500$$

6. (b): let first class & second class fare be Rs. 3a & Rs. a respectively

Tickets booked of first & second class be 2b & 3b respectively

Total fare

$$\text{First class} = 3a \times 2b = 6ab$$

$$\text{Second class} = a \times 3b = 3ab$$

$$\text{Fare collected from second class} = \frac{3ab}{9ab} \times 1800 = \text{Rs. } 600$$

7. (b): Required ratio $= 3 : \frac{7 \times 4}{11} : \frac{7 \times 7}{11}$

$$\Rightarrow 33 : 28 : 49$$

8. (d): Let total quantity of mixture-A and mixture-B be '140x liters' & '90x liters' respectively.

ATQ,

$$\left[140x \times \frac{3}{5} + 90x \times \frac{5}{9} \right] - \left[140x \times \frac{2}{5} + 90x \times \frac{4}{9} \right] = 95$$

$$84x + 50x - 56x - 40x = 95$$

$$38x = 95$$

$$x = 2.5$$

$$\begin{aligned} \text{Required quantity of water} &= \left[140x \times \frac{2}{5} + 90x \times \frac{4}{9} \right] \\ &= 56x + 40x \\ &= 96x \\ &= 240 \text{ liters} \end{aligned}$$

9. (e): Let the tens digit & units digit of the original number be 'x' & 'y' respectively.

So, original number = $10x + y$.

And number formed when digits are interchanged = $10y + x$

ATQ,

$$(10y + x) - (10x + y) = 63$$

$$\Rightarrow 9y - 9x = 63$$

$$y - x = 7 \quad \text{--- (i)}$$

And,

$$(y)^2 - (x)^2 = 63$$

$$(y + x)(y - x) = 63 \quad \text{--- (ii)}$$

Put value of (i) in (ii):

$$(y + x) \times 7 = 63$$

$$y + x = 9 \quad \text{--- (iii)}$$

On solving (i) & (iii), we get:

$$y = 8, x = 1$$

$$\begin{aligned} \text{So, required number} &= 10x + y \\ &= 18 \end{aligned}$$

10. (b): let no. of students in three classes of the school be $4x$, $5x$ and $6x$ respectively.

ATQ

$$\frac{4x+60}{5x+60} = \frac{6}{7}$$

$$28x + 420 = 30x + 360$$

$$x = 30$$

$$\begin{aligned} \therefore \text{Required no. of students} &= 4x + 5x + 6x = 15x \\ &= 15 \times 30 = 450 \end{aligned}$$

11. (e): Let Sunny invested for T months.

$$\text{Ratio of profit share of Dinesh and Sunny} = \frac{12000 \times 12}{9000 \times T} = \frac{16}{T}$$

Let profit share of Dinesh and Sunny be Rs $16x$ and Rs Tx respectively.

ATQ

$$16x + Tx = 8000$$

$$\text{And } Tx = 1600$$

$$\text{So, } 16x = 6400$$

$$x = 400$$

$$T = 4$$

Sunny invested for 4 months.

\therefore after 8 months sunny joined the business.

12. (d):

	A	:	B	:	C
Amount	2500		4500		2400
Time period	12		12		7
Reqd. ratio	25	:	45	:	14
Required difference in profit share of B and C = $(45-14) \times \frac{16800}{84}$					
= Rs 6200					

13. (b):

	A	B	C	
Amounts	3	5	7	
for 4 months	4×3	4×5	4×7	Time \times Amount
for rest 8 months	$8 \times (3+4)$	8×5	8×7	
Profit \Rightarrow	17	15	21	
			3150	

1 unit = 150 Rs.

$$\text{Total profit} = 150 \times (17+15+21) = \text{Rs } 7950$$

14. (a): Let investment of Ayush = P

So, investment of Ankit = $2P$

And, investment of Charu = $6P$

Profit ratio between Ayush, Ankit & Charu = $(P \times 6) : (2P \times 3) : (6P \times 8) = 1 : 1 : 8$

ATQ -

$$\text{Given, } (8 - 1) = 7980$$

$$1 = 1140$$

$$\begin{aligned} \text{Total profit of all the three together} &= 1140 \\ &\times 10 = 11400 \text{ Rs.} \end{aligned}$$

15. (c): Let money invest by Rishabh, Karthik and Mahender be x , $2x$ and $4.5x$ respectively.

$$\text{Ratio of profit share} = x \times 12 : 2x \times 8 : 4.5x \times 4$$

$$= 6 : 8 : 9$$

ATQ

$$23 \text{ unit} = 8280$$

$$1 \text{ unit} = 360$$

$$\therefore \text{Required difference} = 1 \text{ unit} = \text{Rs. } 360$$

16. (a): Let amount invested by A, B and C initially be Rs. $5x$, Rs. $8x$ & Rs. $12x$ respectively.

Then, profit sharing ratio of A, B & C = $(5x \times 12) : (8x \times 10) + (10x \times 2) : (12x \times 8)$

$$= 60x : 100x : 96x$$

$$= 15 : 25 : 24$$

Let total profit at the end of year be Rs. P

ATQ,

$$\frac{(25-15)}{(25+15+24)} \times P = 17000$$

$$\frac{10P}{64} = 17000$$

$$P = 1700 \times 64 = \text{Rs. } 108800$$

$$\text{Now, required amount} = 108800 \times \frac{24}{64} = \text{Rs. } 40800$$

17. (d): Profit sharing ratio of A, B & C

$$= \left[\frac{(5000 \times x)}{[10000 \times (12 - x)]} : \frac{(10000 \times y)}{[15000 \times (12 - y)]} : \frac{20000}{12} \right]$$

$$= [(5000x + 120000 - 10000x) : (10000y + 180000 - 15000y) : 240000]$$

$$= [(5x + 120 - 10x) : (10y + 180 - 15y) : 240]$$

$$= [(120 - 5x) : (180 - 5y) : 240]$$

ATQ,

$$\frac{120-5x}{240} = \frac{10}{24}$$

$$\Rightarrow 120 - 5x = 100$$

$$\Rightarrow x = 4$$

Now,

$$\frac{180-5y}{240} = \frac{15}{24}$$

$$\Rightarrow 180 - 5y = 150$$

$$\Rightarrow y = 6$$

$$\text{So, } (x + y) = 10$$

18. (d): Let total profit be Rs x

Ratio of A's to B's profit share according to their investment = $10000 \times 12 : 18000 \times 8$
= 5 : 6

ATQ,

$$\frac{25x}{100} + \frac{5}{11} \times \frac{75x}{100} = 31,200$$

$$x = \text{Rs } 52,800$$

19. (b): Let A, B, C's investment be 3x, 4x and 5x respectively

ATQ,

$$A - \frac{3x \times 3 + \frac{9x}{4} \times 9}{4}$$

$$B - \frac{4x \times 12}{4}$$

$$C - \frac{5x \times 12}{4}$$

$$= 117 : 192 : 240$$

Let profit share of A, B and C be 117y, 192y and 240y

$$117y = 702$$

$$y = 6$$

$$\text{Required difference} = 48y = \text{Rs } 288$$

20. (a): Let the investment of Ayush = 3x

So, investment of Anurag = 4x

Ratio of profit share of Ayush and Anurag = $(3x \times 1 + 3x \times 2 \times 1) : (4x \times 2)$

$$= 9x : 8x$$

$$= 9 : 8$$

Share of profit of Ayush for managing business = $15300 \times \frac{10}{100} = 1530 \text{ Rs.}$

$$\text{Total profit Share of Ayush} = (15300 - 1530) \times \frac{9}{17} + 1530 = 8820$$

21. (c): Let Amount invested by Ankit = Rs. 8x

\Rightarrow Amount invested by Bhavya = Rs. 10x

And Amount invested by Chiru = $10x \times \frac{3}{2} = \text{Rs. } 15x$

Ratio of investment of Ankit, Bhavya and Chiru is = 8 : 10 : 15

Let Ankit, Bhavya and Chiru invested for 'a', 'b' and 'c' months respectively, then

$$8a : 10b : 15c = 8 : 15 : 25$$

$$\frac{8a}{15c} = \frac{8}{25}$$

$$\Rightarrow \frac{a}{c} = \frac{3}{5}$$

If c = 20 months, then a = 12 months

22. (b): Let Ayush's investment = Rs. 2x

So, investment of Sandy = Rs. 3x

And, let Ayush invested for 4t years

So, Sandy invested for 5t years

Ratio of profit of Ayush & Sandy

$$= 2x \times 4t : 3x \times 5t$$

$$= 8xt : 15xt = 8 : 15$$

Let profit of Ayush be Rs. 8p and Sandy be Rs. 15p.

ATQ,

$$15p - 8p = 840$$

$$7p = 840$$

$$p = 120$$

$$\text{Required total profit} = 120 \times 23 = \text{Rs. } 2760$$

23. (e): Let investment of A & C be 4x & 3x respectively

And investment of B = $(2400 - 7x)$

Profit sharing ratio of A, B & C

$$= 4x \times 15 : (2400 - 7x) \times 18 : 3x \times 24$$

$$= 20x : (14400 - 42x) : 24x$$

ATQ -

$$\frac{20x}{(14400-42x)} = \frac{10}{15}$$

$$30x = 14400 - 42x$$

$$72x = 14400$$

$$x = 200 \text{ Rs.}$$

$$\text{Investment of B} = 2400 - 7 \times 200 = \text{Rs. } 1000$$

$$\text{Investment of C} = 3 \times 200 = 600 \text{ Rs.}$$

$$\text{Required difference} = 1000 - 600 = 400 \text{ Rs.}$$

24. (d): Let initial investment of B be Rs 5x.

Investment of A = Rs 4x

Profit sharing ratio of A, B & C =

$$A : B : C$$

$$4x \times 10 : 5x \times 6 : 2y \times 8$$

$$40x : 30x : 16y$$

ATQ

$$16y = 2 \times 30x$$

$$\Rightarrow y = \frac{60x}{16} = \frac{15x}{4}$$

$$\text{Required \%} = \frac{\frac{15x}{4} - 5x}{\frac{15x}{2}} \times 100 = 33\frac{1}{3}\%$$

25. (a): Let the amount invested by B be Rs 5x
Then amount invested by A and C will be Rs 3x and Rs 8x respectively
Ratio of profit
A B C
 $3x \times 3 : 5x \times 2 : 8x \times 1 = 9 : 10 : 8$
Let profit share of A, B and C be Rs 9y, Rs 10y and Rs 8y respectively.
ATQ
 $9y = 21600$
Required difference = y = Rs 2400

26. (b): Ratio of profit share of Uday and Amir
 $= \left[(1200 \times 6) + \left(1200 \times \frac{3}{4} \times T \right) \right] : 1600 \times 12$
 $= (7200 + 900T) : 19200$
ATQ—
 $\frac{(7200 + 900T)}{19200} = \frac{9}{16}$
 $7200 + 900T = 10800$
 $900T = 3600$
 $T = 4$ months

27. (e): Let Rakesh's investment = Rs. x
Ram investment = Rs. 31500
Shyam investment = Rs. 27000
Profit ratio
Rakesh Ram Shyam
 $x \times 12 : 31500 \times 8 : 27000 \times 8$
 $3x : 63000 : 54000$
Total profit \Rightarrow Rs. 19200
Rakesh's profit = Rs. 7500
ATQ

$$\frac{3x}{63000 + 54000} = \frac{7500}{19200 - 7500}$$

$$\frac{3x}{117000} = \frac{7500}{11700}$$

$$x = \text{Rs. } 25000$$

28. (c):

	Amit	:	Deepak
Initial investment	3	:	1
	3×8	:	1×12
	24	:	12
	2	:	1

Now, 1 unit = Rs 8000
So, (2+1) units = 3 units = $3 \times 8000 = \text{Rs } 24000$

29. (e): Let x = Amount invested by 'A' and y = amount invested by 'B'
Ratio of profit of A, B & C = $(x \times 12) : (y \times 9) : (12000 \times 3)$
 $= 4x : 3y : 12000$

ATQ,
 $\frac{4x}{12,000} = \frac{48}{24} \Rightarrow x = 6,000$
and $\frac{3y}{12,000} = \frac{48}{24} \Rightarrow y = 8,000$
Required sum = $6,000 + 8,000 = \text{Rs. } 14,000$

30. (b): let total time of investment = 60t months
Ratio of profit of A, B and C
 $5 \times 60t \times \frac{1}{12} : 3 \times 60t \times \frac{1}{5} : 7 \times 60t \times \frac{1}{15}$
 $\Rightarrow 25 : 36 : 28$
ATQ
 $(36 - 28) \text{ units} = \text{Rs. } 800$
Then, 25 units = Rs. 2500

Mains Solutions

1. (a): Let, the income, expenditures and saving of P, Q and R:

	P	Q	R
Income	$\frac{3}{4}x + 8000$	x	$\frac{3}{4}x$
Expenditure on Rent	y	y	y
Expenditure on Food	z	$z + 1000$	$z + 2000$
Savings	6t	7t	4t

Now,

$$\text{Savings of Q} = 62 \frac{1}{2} \% \text{ of income of Q} = \frac{5}{8}x$$

Savings of Q and R are in the ratio 7 : 4.

$$\therefore \text{Savings of R} = \frac{4}{7} \times \frac{5}{8}x = \frac{5}{14}x$$

Percent of R's savings out of his monthly income

$$= \frac{\frac{5}{14}x}{\frac{3}{4}x} \times 100 = 47 \frac{13}{21} \%$$

2. (d): Let, the income, expenditures and saving of P, Q and R:

	P	Q	R
Income	$\frac{3}{4}x + 8000$	x	$\frac{3}{4}x$
Expenditure on Rent	y	y	y
Expenditure on Food	z	$z + 1000$	$z + 2000$
Savings	6t	7t	4t

Now,

Total amount spent by all the three on food = 27000

$$\Rightarrow z + z + 1000 + z + 2000 = 27000$$

$$\Rightarrow z = 8000$$

Monthly income of Q = Monthly income of P + 6000

$$\Rightarrow x = \frac{3}{4}x + 8000 + 6000$$

$$\Rightarrow x = 56000$$

$$\frac{\text{Savings of P}}{\text{Savings of Q}} = \frac{6}{7}$$

$$\Rightarrow \frac{\frac{3}{4}x + 8000 - y - z}{x - y - z - 1000} = \frac{6}{7}$$

Putting the values of x and z

$$\Rightarrow \frac{42000 - y}{47000 - y} = \frac{6}{7}$$

$$\Rightarrow y = 12000$$

Monthly rent of the apartment = $3y = \text{Rs.}36000$

3. **(b):** Clearly, at the beginning of a year and at the end of first quarter, the investment made by B is half of the total investment made by all the three till the end of first quarter

If they invest additional amount at the end of each quarter in the same ratio as they invested at the end of the first quarter, then the total investment made by B will be half of the total investment made by all the three for the whole year.

$$\therefore \text{Profit of B} = \frac{1}{2} \times 17500 = \text{Rs.}8750$$

4. **(c):** Let, the amounts invested by A, B and C:

	A	B	C
beginning of the year			
end of first quarter			
end of second quarter			
end of third quarter			

Now,

$$9x = 4x + 500$$

$$\Rightarrow x = 100$$

$$\frac{z + z + 2z}{3} = 1200$$

$$\Rightarrow z = 900$$

$$5x = 5y$$

$$\Rightarrow x = y = 100$$

So, the actual investments:

	A	B	C
beginning year	0	0	0
end of first quarter	0	0	0
end of second quarter	0	0	0
At the end of third quarter	0	0	0

Ratio of profit sharing among A, B and C

$$\begin{aligned} &= (400 \times 12 + 500 \times 9 + 500 \times 6 + 900 \times 3) : (900 \times 12 + 900 \times 9 + 400 \times 6 + 900 \times 3) : (500 \times 12 + 400 \times 9 + 1000 \times 6 + 1800 \times 3) \\ &= 15000 : 24000 : 21000 \\ &= 5 : 8 : 7 \end{aligned}$$

5. **(d):** Let, the amounts invested by A, B and C:

	A	B	C
At the start of a year	4x	6x	9x
At the end of four months	2y	3y	Y
At the end of eight months	3z	2z	5z

Now, the amounts invested by A:

$$4x : 2y : 3z = 8 : 6 : 9$$

$$\Rightarrow x : y : z = 2 : 3 : 3$$

So, the investments in terms of x:

	A	B	C
At the start of a year	4x	6x	
At the end of four months	3x	$\frac{9}{2}x$	
At the end of eight months	$\frac{9}{2}x$	3x	

Ratio of profit sharing among A, B and C

$$\begin{aligned} &= (4x \times 12 + 3x \times 8 + \frac{9}{2}x \times 4) : (6x \times 12 + \frac{9}{2}x \times 8 + 3x \times 4) : (9x \times 12 + \frac{3}{2}x \times 8 + \frac{15}{2}x \times 4) \\ &= 90x : 120x : 150x \\ &= 3 : 4 : 5 \end{aligned}$$

$$\text{Profit of C} = \frac{5}{12} \times 150000 = \text{Rs.}62500$$

6. **(b):** Let, the amounts invested by A, B and C:

	A	B	C
At the start of a year	4x	6x	9x
At the end of four months	2y	3y	Y
At the end of eight months	3z	2z	5z

Now, total amount invested by A and B, B and C, and; C and A in the year

$$10x + 5y + 5z = 50000$$

$$15x + 4y + 7z = 63000$$

$$13x + 3y + 8z = 59000$$

By solving these equations,

$$x = 2000, y = 3000, z = 3000$$

Total amount invested by A, B and C at the start of the year

$$= 4x + 6x + 9x = 19x$$

$$= 19 \times 2000 = \text{Rs.}38000$$

7. **(b):** Let, the sum of Rs.300

$$\text{A's part} = \text{Rs.} 100$$

$$\text{B's part} = \text{Rs.} 200$$

Value of A's share after two years

$$= 100 \times \frac{6}{7} \times \frac{6}{7} = \frac{3600}{49}$$

Value of B's share after two years

$$= 200 \times \frac{12}{10} \times \frac{12}{10} = 288$$

$$\text{Total} = 288 + \frac{3600}{49} \approx 361$$

$$\text{Req. Percentage} = \frac{361-300}{300} \times 100 = 20\%$$

8. (c): $7x + 8x + 9x + 10x + 11x = \frac{60}{100} (200 \times 5)$

$$\Rightarrow 45x = 600$$

$$\Rightarrow x = \frac{600}{45}$$

Marks obtained in 4 papers are more than 50%

9. (a): Ratio of profit = $3 \times 3 \times \frac{1}{3} : 5 \times 5 \times \frac{4}{5} : 8 \times 8 \times \frac{1}{4}$

$$= 3 : 20 : 16$$

$$\text{Profit of C} = \frac{4800}{3} \times 16 = 25600$$

10. (c): Wasim : Chintan : Yash : Zignesh = 3 : 7 : 9 : 13

$$3x + 9x = 11172$$

$$12x = 11172$$

$$x = \frac{11172}{12} = 931$$

Required Difference

$$= (13 - 7)x = 6x = 6 \times 931 = 5586$$

11. (d): Profit will be shared in ratio

$$= 12 \times 6 : 8 \times \left(\frac{9}{8} \times 8\right) : 9 \times 12$$

$$= 12 \times 6 : 8 \times 9 : 9 \times 12 = 2 : 2 : 3$$

$$C's \text{ profit} = \frac{16750}{2} \times 3 = 25125$$

12. (c): A : B : C = $(27000 \times 4 + 22000 \times 8) : (36000 \times 4 + 42000 \times 8) : (35000 \times 8)$

$$= 71 : 120 : 70$$

$$= 71 : 120 : 70$$

$$C's \text{ share} = 130500 \times \frac{70}{261}$$

$$= 500 \times 70 = 35000 \text{ Rs.}$$

13. (e): Ankit : Arun = 6000 : (9000 - 6000)

$$= 2 : 1$$

ATQ,

Let Arun invested X Rs. and Ankit invested X + 8000 Rs.

$$\frac{(8000+X) \times 8}{X \times 12} = \frac{2}{1}$$

$$64000 + 8X = 24X$$

$$X = \frac{64000}{16}$$

$$X = 4000 \text{ Rs.}$$

$$\text{Ankit's Capital} = 4000 + 8000 = 12000$$

14. (e): Let their initial investments be $x, 2x$ and $4x$ respectively.

∴ Required ratio

$$= \left[6x + 6\left(x + \frac{x}{2}\right)\right] : [2x \times 12] : \left[6 \times 4x + 6\left(4x - \frac{4x}{4}\right)\right]$$

$$= \left[6 + 6 \times \frac{3}{2}\right] : 2 \times 12 : \left[24 + 6 \times \frac{12}{4}\right]$$

$$= 15 : 2 \times 12 : 42$$

$$= 5 : 8 : 14$$

15. (c): Let the initial investments of Ramesh, Rajan, Ritesh be Rs. $3x, 5x$ and $7x$ respectively. Then,

$$(3x - 45600) : 5x : (7x + 337600) = 24 : 59 : 167$$

$$\Rightarrow \frac{3x-45600}{5x} = \frac{24}{59} \Rightarrow x = 47200.$$

∴ Ramesh initially invested Rs. $(47200 \times 3) = \text{Rs. } 141600$

16. (c): Ratio of profit

$$A : B : C = (27000 \times 4 + 22000 \times 8) : (36000 \times 4 + 42000 \times 8) : (35000 \times 8)$$

$$= 71 : 120 : 70$$

$$C's \text{ share in profit} = 130500 \times \frac{70}{261}$$

$$= 500 \times 70 = 35000 \text{ Rs.}$$

17. (a): Ratio of profit = $3 \times 3 \times \frac{1}{3} : 5 \times 5 \times \frac{4}{5} : 8 \times 8 \times \frac{1}{4}$

$$= 3 : 20 : 16$$

$$\text{Profit of C} = \frac{4800}{3} \times 16 = 25600$$

18. (b): Ratio capital of Divyaraj, Sameer and Ayush

$$= (20000 \times 4 + 14000 \times 8) : (20000 \times 4 + 12000 \times 8) : (20000 \times 4 + 26000 \times 8)$$

$$= 192000 : 176000 : 288000$$

$$\text{Ayush Share} = 65600 \times \frac{288}{656} = 28800 \text{ Rs.}$$

19. (a): Divyaraj : Ayush = $(36000 \times 6 + 40000 \times 6) : (24000 \times 6 + 30000 \times 6)$

$$= 38 : 27$$

Let total profit = 100%

$$\text{Remaining profit} = \frac{200}{3} \%$$

ATQ,

$$= \frac{200}{3} \times \frac{1}{100} \times \frac{38}{65} - \frac{200}{3} \times \frac{1}{100} \times \frac{27}{65} = 8800$$

$$= \frac{76-54}{195} = 8800 = \text{Rs } 78000$$

20. (c): Milk = $240 \times \frac{5}{8} = 150 \ell$

$$\text{Water} = 240 \times \frac{3}{8} = 90 \ell$$

Milk and water in 64ℓ

$$\text{Milk} = 64 \times \frac{5}{8} = 40 \ell$$

$$\text{Water} = 64 \times \frac{3}{8} = 24 \ell$$

Remaining amount of milk and water after selling 64ℓ of mixture and 14ℓ water added

$$\text{Milk} = (150 - 40) = 110 \ell$$

$$\text{Water} = (90 - 24) + 14 = 80 \ell$$

Milk and water in 76ℓ

$$\text{Milk} = 76 \times \frac{11}{19} = 44$$

$$\text{water} = 76 \times \frac{8}{19} = 32$$

Remaining amount of milk and water in final mixture

$$\text{Milk} = (110 - 44) = 66$$

$$\text{Water} = (80 - 32) = 48$$

$$\text{Required\%} = \frac{66}{114} \times 100 = 57 \frac{17}{19} \%$$

21. (d): Ratio of investment of X, Y and Z.

$$= 50 : 20 : 30 = 10 : 4 : 6$$

Let total profit be 100%

after 20% given to X

$$\text{Value of 1 unit} = \frac{80\%}{20} = 4\%$$

$$(20 + 10 \times 4 - (6+4) \times 4)\% = 300$$

∴ total profit = Rs. 1500

22. (e): Wife gets = $\frac{88000}{2} = 44000$

ATQ

Let Uday gets Rs. x and Shikhar gets Rs. (44000 - x)

$$(44000 - x) + \frac{(44000 - x) \times 2.5 \times 5}{100} - x - \frac{15x}{100} = 4000$$

$$4400000 - 100x + 5500000 - 12.5x - 115x = 400000$$

$$227.5x = 4550000$$

$$X = 20000$$

$$\Rightarrow \text{Shikhar invested} = 44000 - 20000 = 24000$$

23. (e): Ratio of Capital invested

$$\begin{array}{l} \text{Ankit} \quad : \quad \text{Yogesh} \quad : \quad \text{Mahesh} \\ = (12000 \times 12) : (16000 \times 4 + 20000 \times 8) : (15000 \times 9 + 12000 \times 3) \\ = 144 \quad : \quad 224 \quad : \quad 171 \end{array}$$

(Ankit + Mahesh) Profit share

$$= \frac{11200}{224} \times (144 + 171) = \text{Rs. } 15750$$

24. (a): Monthly income of Neeraj

$$= 17500 \times 2 = 35000$$

Let Monthly income of Ankur is Rs. x

$$= 35000 \times \frac{3}{7} = \frac{x}{2}$$

$$x = \text{Rs. } 30000$$

$$\text{Required Ratio} = \frac{\frac{17500}{20} \times 100}{30000} = \frac{87500}{30000} = 35 : 12$$

25. (c): Raman's investment = first 8 months + last 4 months

$$= 3000 \times 8 + 1500 \times 4 = 30,000$$

Nakul's investment = first 4 months + next 3 months + remaining five months

$$= 1000 \times 4 + 4500 \times 3 + 3000 \times 5 = 32,500$$

$$\text{Therefore, } \frac{\text{Raman}}{\text{Nakul}} = \frac{30000}{32500} = \frac{12}{13}$$

Raman's share in profit

$$= \frac{12}{(12+13)} \times 1800 = \text{Rs } 864$$

Previous Year Question

1. (b): Profit ratio of A, B & C respectively = $2400 \times 6 :$

$$2800 \times 12 : 2400 \times 1.2 \times 2$$

$$= 14400 : 33600 : 5760$$

$$= 15 : 35 : 6$$

Let total profit = 56x Rs.

$$\text{Given, } 15x + 6x = 4200$$

$$x = 200 \text{ Rs.}$$

$$\text{So, total profit} = 56 \times 200 = 11200 \text{ Rs.}$$

2. (d); let amount invested by A be Rs x

$$\text{Profit ratio; A : B} = (x \times 12) : (17000 - x) \times 6 + (15500 - x) \times 6$$

$$= 2x : (32500 - 2x)$$

$$\text{ATQ, } \frac{19500}{32500 - 2x + 2x} \times (32500 - 2x) = 8100$$

$$32500 - 2x = 13500$$

$$x = \text{Rs } 9500$$

$$\text{required capital of B after 6 months} = 15500 - x = \text{Rs } 6000$$

3. (b): Let investment of P, Q, R be 2x, 5x and 7x respectively.

Let extra amount added by 'P' after six months be Rs. y

ATQ,

$$2x + y = \frac{1}{2} [5x + 7x]$$

$$2x + y = 6x$$

$$y = 4x$$

Ratio of profit share

$$P : Q : R = 2x \times 6 + (4x + 2x) \times 6 : 5x \times 12 : 7x \times 12$$

$$Q's \text{ share of profit} = \text{Rs } 425$$

$$\Rightarrow 5 \rightarrow 425$$

$$\Rightarrow 1 \rightarrow 85$$

$$\Rightarrow (4 + 5 + 7) = 16 \rightarrow 16 \times 85 = 1360$$

4. (b): Profit ratio of A to B = $(X \times 4 + 2X \times 8) :$

$$(2X \times 8) = 20X : 16x = 5 : 4$$

$$\text{So, profit of A} = 13950 \times \frac{5}{9} = 7750 \text{ Rs.}$$

5. (a): Profit sharing ratio of A, B & C = $(4000 \times 12) :$

$$(4000 + 1000) \times 12 : (3000 \times 4)$$

$$= 48000 : 60000 : 12000$$

$$= 4 : 5 : 1$$

Let total profit be Rs. P

ATQ,

$$\frac{1}{(4+5+1)} \times P = 700$$

$$P = \text{Rs. } 7000$$

6. (e): ATQ -

$$\frac{X}{(X+800)} = \frac{3200}{(6800-3200)}$$

$$X = 6400$$

7. (a); Let amount invested by A & B be Rs.3x & Rs.2x respectively.

Profit sharing ratio of A to B

$$= (3x \times 6) : (2x \times 6) = 3:2$$

$$\text{Profit share of B} = \frac{2}{5} \times 5000 = 2000 \text{ Rs.}$$

8. (b); A/q, $\frac{\text{Profit of B}}{\text{Total Profit}} = \frac{3}{7} = \frac{(X+4000) \times 6}{X \times 12 + (X+4000) \times 6}$

$$7X + 28000 = 9X + 12000$$

$$2X = 16000$$

$$X = 8000$$

9. (d); Let income of A and B be Rs 5x and Rs 9x respectively

$$\text{Expenditure of A} = \text{Rs } \frac{15}{8}x$$

$$\text{Saving of A} = \text{Rs } \frac{25}{8}x$$

$$\text{Expenditure of B} = \text{Rs } 4x$$

$$\text{Saving of B} = \text{Rs } 5x$$

ATQ

$$\frac{65}{8}x = 1950 \Rightarrow x = 240$$

$$\text{Required difference} = \text{Rs } 960$$

10. (d); Let amount invested by A be Rs.x

So, amount invested by B = $3 \times x$

$$= \text{Rs. } 3x$$

And, amount invested by C = $3x \times \frac{1}{2} = \text{Rs. } 1.5x$

Now, profit sharing ratio of A : B : C

$$= ((x \times 11) + ((x - Y) \times 1)) : ((3x \times 11) +$$

$$((3x - Y) \times 1)) : ((1.5x \times 11) + ((1.5x - Y) \times 1))$$

$$= (12x - Y) : (36x - Y) : (18x - Y)$$

ATQ,

$$\frac{18x - Y}{12x - Y + 36x - Y + 18x - Y} = \frac{35}{129}$$

$$\Rightarrow \frac{18x - Y}{66x - 3Y} = \frac{35}{129}$$

$$\Rightarrow 774x - 43Y = 770x - 35Y$$

$$\Rightarrow x = 2Y$$

$$\text{Required profit sharing ratio} = \frac{12x - Y}{36x - Y}$$

$$= \frac{24Y - Y}{72Y - Y} \Rightarrow 23 : 71$$

11. (b); Let period of investment of Pinki and Rinki be 2x and 3x units respectively

Ratio of profit share

Pinki Rinki

$$6000 \times 2x : 9000 \times 3x \Rightarrow 4 : 9$$

$$\text{Profit share of Pinki} = \text{Rs } 20,000$$

12. (c); Let the price of refrigerator and television set be 5x and 3x respectively.

According to question

$$5x - 3x = 5500, \quad 2x = 5500, \quad x = 2750$$

$$\text{Price of refrigerator} = 5 \times 2750 = \text{Rs. } 13750$$

13. (a); Let, Milk : Water = K : 1

Selling price of mixture = (K + 1) 9

Cost price of mixture = 10K

$$\text{Gain} = 9K + 9 - 10K = 9 - K$$

$$\text{Gain}\% = \frac{\text{Gain} \times 100}{\text{CP}} \Rightarrow 20 = \frac{9 - K}{10K} \times 100$$

$$2K = 9 - K \Rightarrow 3K = 9, \quad K : 1 = 3 : 1$$

14. (a); Let the first part be x

Second part = 94 - x

$$\frac{\frac{x}{5}}{\frac{94-x}{8}} \Rightarrow \frac{x}{94-x} = \frac{3 \times 5}{4 \times 8} = 32x = 15(94 - x)$$

$$47x = 15 \times 94, \quad x = \frac{15 \times 94}{47} = 30$$

15. (d); Income of Amit and Varun be 3x and 2x respectively

Expenditure of Amit and Varun be 5y and 3y respectively

$$3x - 5y = 2x - 3y \Rightarrow x = 2y$$

$$3x - 5y = 1000, \quad y = 1000 \Rightarrow x = 2000$$

$$\text{Income of amit} = 3 \times 2000 = \text{Rs. } 6000$$

16. (b); Let monthly Salaries of A, B and C are 2x, 3x & 5x respectively.

$$5x - 2x = 12000$$

$$x = 4000$$

$$\text{B's monthly salary} = 3 \times 4000 = 12000$$

$$\text{Annual salary of B} = 12 \times 12000 = 144000$$

17. (d); According to question;

$$7x - 8y = \frac{7x}{4} \Rightarrow 28x - 32y = 7x$$

$$21x = 32y, \quad y = \frac{21x}{32}, \quad \text{A's saving} = \frac{7x}{4}$$

$$\text{B's saving} = 9x - 9y = 9x - 9 \left(\frac{21x}{32} \right) = \frac{99x}{32}$$

$$C's \text{ saving} = 12x - 15y = 12x - 15\left(\frac{21x}{32}\right) = \frac{69x}{32}$$

$$\text{Ratio of savings} = \frac{7x}{4} : \frac{99x}{32} : \frac{69x}{32} = 56 : 99 : 69$$

18. (b); The ratio for A : B : C = 100 : 90 : 99

$$\text{Sum of ratio} = 100 + 90 + 99 = 289$$

$$B's \text{ share} = \frac{90}{289} \times 86700 = 27000$$

19. (b); $a : b = \frac{2}{9} : \frac{1}{3} = 2 : 3 \Rightarrow b : c = \frac{2}{7} : \frac{5}{14} = 4 : 5$

$$c : d = \frac{3}{5} : \frac{7}{10} = 6 : 7$$

$$a : b : c : d = 2 \times 4 \times 6 : 3 \times 4 \times 6 : 3 \times 5 \times 6 : 3 \times 5 \times 7$$

$$= 48 : 72 : 90 : 105 = 16 : 24 : 30 : 35$$

20. (a); Ratio of son's share : wife's share : daughter's share

$$= 3 \times 3 : 3 \times 1 : 1 \times 1 = 9 : 3 : 1$$

According to question

$$9x - x = 10000 \Rightarrow 8x = 10000, x = 1250$$

$$\text{The value of whole property} = 13 \times 1250$$

$$= \text{Rs. } 16250$$



Percentage

Percent: The term 'percent' is derived from the Latin word 'Per centum'. It implies "out of every hundred". The symbol '%' is used to denote percentage. For example, 15% means 15 out of 100. Each ratio can be expressed as a percentage.

For example, $\frac{1}{2}$ can be expressed as a percentage by multiplying by 100; $\frac{1}{2} \times 100 = 50\%$

A given percentage value can be converted to corresponding fraction by dividing by 100.

Example: $75\% = 75$ out of hundred $\frac{75}{100} = \frac{3}{4}$

Percentage fraction conversion chart:

$\frac{1}{2} = 50\%$	$\frac{5}{6} = 83\frac{1}{3}\%$	$\frac{2}{9} = 22\frac{2}{9}\%$
$\frac{1}{3} = 33\frac{1}{3}\%$	$\frac{1}{7} = 14\frac{2}{7}\%$	$\frac{1}{10} = 10\%$
$\frac{2}{3} = 66\frac{2}{3}\%$	$\frac{2}{7} = 28\frac{4}{7}\%$	$\frac{1}{11} = 9\frac{1}{11}\%$
$\frac{1}{4} = 25\%$	$\frac{3}{7} = 42\frac{6}{7}\%$	$\frac{2}{11} = 18\frac{2}{11}\%$
$\frac{3}{4} = 75\%$	$\frac{1}{8} = 12\frac{1}{2}\%$	$\frac{1}{12} = 8\frac{1}{3}\%$
$\frac{1}{5} = 20\%$	$\frac{3}{8} = 37\frac{1}{2}\%$	$\frac{5}{12} = 41\frac{2}{3}\%$
$\frac{2}{5} = 40\%$	$\frac{5}{8} = 62\frac{1}{2}\%$	$\frac{1}{15} = 6\frac{2}{3}\%$
$\frac{3}{5} = 60\%$	$\frac{7}{8} = 87\frac{1}{2}\%$	$\frac{1}{20} = 5\%$
$\frac{4}{5} = 80\%$	$\frac{1}{9} = 11\frac{1}{9}\%$	$\frac{1}{25} = 4\%$
$\frac{1}{6} = 16\frac{2}{3}\%$		

Formula to calculate percentage value: $y\%$ of $x = \left(\frac{y}{100}\right) \times x$

From the above formula, we have the following result: $x\%$ of $y = y\%$ of x .

whenever we have two numbers a and b , one number can be expressed as a percentage of the other as follows:

x as a percent of $y = \frac{x}{y} \times 100$, y as a percent of $x = \frac{y}{x} \times 100$.

Percentage increase or decrease:

Percentage increase = $\frac{\text{increase in the quantity}}{\text{original quantity}} \times 100$

Percentage decrease = $\frac{\text{decrease in the quantity}}{\text{original quantity}} \times 100$

For example, if the net profit of a company grew from 50 crore in 2003 to 75 crore in 2004, then the percentage increase in the net profit from 2003 to 2004 is calculated as follows:

increase in the net profit = $(75 - 50)$ crore = 25 crore

This increase is on Rs. 50 crore.

So, Percentage increase = $\frac{\text{increase in profit from 2003 to 2004}}{\text{Net profit in 2003}} \times 100 = \frac{25}{50} \times 100 = 50\%$

When a quantity increases or decreases by some percent, the new value of the quantity can be directly calculated as follows:

If the original quantity is 120 and it increases by 25% , then the new quantity is: $1.25 \times 120 = 150$

(Here, $1.25 = 1 + 0.25$, where 0.25 is equivalent to 25%)

Similarly, if there is a decrease by 25% on 120, then the new quantity is: $0.75 \times 120 = 90$

(Here, $0.75 = 1 - 0.25$, where 0.25 is equivalent to 25%)

Some important conclusions:

(i) If x is a% more than y, then y is $\left(\frac{a}{100+a} \times 100\right)$ % less than x.

(ii) If x is a% less than y, then y is $\left(\frac{a}{100-a} \times 100\right)$ % more than x.

Example: If in an examination, the marks secured by Prerna are 20% less than that of Vinita, then marks secured by Vinita are how much percent more than prerna's marks?

Solution: $a = 20\%$

According to the above formula; Required percentage = $\left(\frac{a}{100-a} \times 100\right) \% = \frac{20}{80} \times 100 = 25\%$

(iii) If a number is first increased by a% and then decreased by a% then the net effect is always a decrease which is equal to 'a% of a' i.e., $\frac{a^2}{100}$ %

Example: The salary of a worker is first increased by 5% and then it is decreased by 5%. What is the change in his salary?

Solution: Here $a = 5\%$

There will be a net decrease; Percent decrease = $\frac{a^2}{100} \% = \frac{5^2}{100} \% = 0.25\%$

(iv) If a quantity is first changed (increased or decreased) by a% and then changed (increased or decreased) by b%, then

$$\text{Net change} = \left[\pm a \pm b + \frac{(\pm a)(\pm b)}{100} \right] \%$$

Net change is an increase or a decrease according to the positive or negative sign, respectively of the final result.

Example: The price of an article is first increased by 20% and then decreased by 25% due to reduction in sales. Find the net percent change in the final price of the article.

Solution: $a = 20\%$, $b = 25\%$

$$\text{Required percentage change} = \left(20 - 25 + \frac{20 \times (-25)}{100} \right) \% = (-5 - 5) \% = -10\%$$

So, there is a net decrease of 10% in the final price of the article as the final result is negative.

(v) If the price of a commodity increases or decreases by a%, then the decrease or increase in consumption, so as not to increase or decrease the expenditure is equal to $\left(\frac{a}{100 \pm a}\right) \times 100\%$

(vi) If the population of a town is P and it increases (or decreases) at the rate of R% per annum, then

(i) Population after n years = $P \left(1 \pm \frac{R}{100} \right)^n$

(ii) Population n years ago = $\frac{P}{\left(1 \pm \frac{R}{100} \right)^n}$

('+' sign for increment; '-' sign for decrement).

Some tricks to calculate faster:

(i) Splitting the percentage into parts

Example: Find 51% of 128.

Solution: 51% of 128 = $(50 + 1)\%$ of 128 = 50% of 128 + 1% of 128 = 64 + 1.28 = 65.28

(ii) Interchanging the percentage value and the number

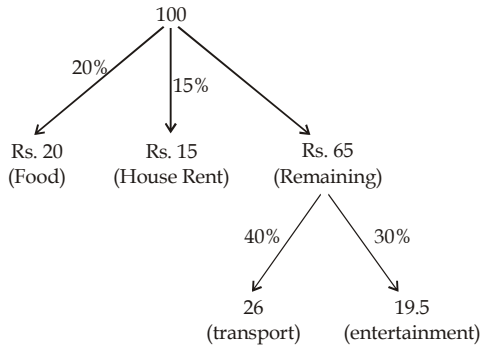
Example: Find 39% of 12.5

Solution: 39% of 12.5 = 12.5% of 39 = 4.875

Solved Examples

1. Nikhil spent 20% of his monthly income on food and 15% on house rent. 40% of the remaining he spent on transport and 30% on entertainment. He is left with an amount of Rs. 8775 after all the expenditures. What is Nikhil's monthly income?

Sol. Let the income be Rs. 100



Final Saving = $100 - 20 - 15 - 26 - 19.5 = \text{Rs. } 19.5$; But his final saving is Rs. 8775

$$19.5 \xrightarrow{(\times 450)} 8775$$

So, Income = Rs. $100 \times 450 = \text{Rs. } 45000$.

2. If the price of a Commodity be raised by 40%, by how much percent must a householder reduce his consumption of that commodity, so as not to increase his expenditure?

Sol. Here, $a = 40\%$; According to the formula,

Reduction in Consumption

$$= \left(\frac{40}{(100+40)} \times 100 \right) \% = \frac{40}{140} \times 100$$

$$= \frac{200}{7} \% = 28\frac{4}{7} \%$$

3. The population of a town is 352800. If it increases at the rate of 5% per annum, then what will be its population 2 years hence. Also, find the population 2 years ago.

Sol. $P = 352800$, $R = 5\%$, $n = 2$

Population after 2 years

$$= P \left(1 + \frac{R}{100} \right)^n = 352800 \times \left(1 + \frac{5}{100} \right)^2$$

$$= 352800 \times \frac{21}{20} \times \frac{21}{20} = 388962$$

Population 2 years ago

$$= \frac{P}{\left(1 + \frac{R}{100} \right)^n} = \frac{352800}{\left(1 + \frac{5}{100} \right)^2}$$

$$= 352800 \times \frac{20}{21} \times \frac{20}{21} = 320000$$

4. There are 3 contestants P, Q and R in an election. P secured 20% of the votes and Q secured 70% of the remaining votes. If R secured 4800 votes, by how many votes has the winner won the election?

Sol. Let the total number of votes be 100.

P secured 20% = 20 votes.

Remaining votes = $100 - 20 = 80$

Q secured 70% of 80 = 56 votes.

R secured $(80 - 56) = 24$ votes.

But R secured 4800 votes.

$$24 \xrightarrow{(\times 200)} 4800$$

So, winner Q won the election by $56 - 24 = 32$ votes

$$32 \xrightarrow{(\times 200)} 6400 \Rightarrow 6400 \text{ votes}$$

5. Rahul answered 40% of the first 75 questions correctly in an examination consisting of 150 questions. Find the percentage of the remaining 75 questions that he needs to answer correctly in order to answer 60% of the total number of questions correctly?

Sol. 60% of total number of question = 60% of 150 = 90 questions

Number of questions that Rahul answered correctly in

$$\text{the first 75 questions} = \frac{40 \times 75}{100} = 30$$

Number of questions from the remaining 75 questions that he should answer correctly = $90 - 30 = 60$

$$\text{Required percentage} = \frac{60}{75} \times 100 = 60 \times \frac{4}{3} = 80\%$$

Basic Questions

1. What is 15 percent of Rs. 34.?
 (a) Rs. 3.40 (b) Rs. 3.75 (c) Rs. 4.50
 (d) Rs. 5.10 (e) None of these
2. 88% of 370 + 24% of 210 - ? = 118
 (a) 256 (b) 258 (c) 268
 (d) 358 (e) None of these
3. 60% of 264 is the same as:
 (a) 10% of 44 (b) 15% of 1056 (c) 30% of 132
 (d) 17% of 544 (e) None of these
4. 270 candidates appeared for an examination, of which 252 passed. The pass percentage is?
 (a) 80% (b) $83\frac{1}{2}\%$ (c) $90\frac{1}{3}\%$
 (d) $90\frac{1}{3}\%$ (e) None of these
5. How many litres of pure acid are there in 8 litres of a 20% solution?
 (a) 1.4 (b) 1.5 (c) 1.6
 (d) 2.4 (e) None of these
6. If 35% of a number is 12 less than 50% of that number, then the number is:
 (a) 40 (b) 50 (c) 60
 (d) 80 (e) None of these
7. The sum of two numbers is 2490. If 6.5% of one number is equal to 8.5% of the other, then the numbers are:
 (a) 989, 1501 (b) 1011, 1479 (c) 1401, 1089
 (d) 1411, 1079 (e) None of these
8. If one number is 80% of the other and the sum of their square is 656, then the numbers are:
 (a) 4, 5 (b) 8, 10 (c) 16, 20
 (d) 14, 12 (e) None of these
9. A person's salary has increased from Rs. 7200 to Rs. 8100. What is the percentage increase in his salary?
 (a) 25% (b) 18% (c) $16\frac{1}{3}\%$
 (d) $12\frac{1}{2}\%$ (e) None of these
10. If the price of petrol is increased by 20% , by what percentage should the consumption be decreased by the consumer, if the expenditure on petrol remains unchanged?
 (a) $16\frac{2}{3}\%$ (b) $6\frac{2}{3}\%$ (c) 8%
 (d) 15% (e) None of these
11. The price of an article of Rs. 100 Its price is increased by 10% , then again its price is increased by 10% . How much is increased in total price?
 (a) 20 (b) 21 (c) 110
 (d) 121 (e) None of these
12. The monthly income of a person is Rs. 5000. If his income is increased by 30% , then what is his monthly income now?
 (a) Rs. 7000 (b) Rs. 5500 (c) Rs. 4500
 (d) Rs. 6500 (e) None of the above
13. A man losses 20% of his money. After spending 25% of the remainder, he has Rs. 480 left. What is the amount of money he originally had?
 (a) Rs. 600 (b) Rs. 720 (c) Rs. 720
 (d) Rs. 840 (e) None of these
14. If the numerator of a fraction is increased by 120% and denominator is also increased by 350% then the fraction become $\frac{11}{27}$ what was fraction ?
 (a) $\frac{4}{5}$ (b) $\frac{5}{6}$ (c) $\frac{6}{5}$
 (d) $\frac{5}{4}$ (e) None of these
15. Difference of two numbers is 1600. If 7.5% of one number is 12.5% of the other number, find the two numbers?
 (a) 2490, 4000 (b) 2400, 4150 (c) 2490, 4150
 (d) 2500, 4200 (e) None of these

Prelims Questions

Level - 1

1. 45% of first number is equal to 60% of second number. If average of both the numbers is 10 less than the first number, then find 80% of second number?
 (a) 64 (b) 40 (c) 48
 (d) 56 (e) 80
2. In a juice, guava is 85% and rest is sugar. In another juice, pomegranate is 90% while rest is sugar. Both the juices are mixed in the ratio of 3 : 2. Find concentration of sugar in final mixture. (in %)
 (a) 10 (b) 11 (c) 12
 (d) 13 (e) 14

3. ABC news channel uses advertisement for earning. In a news show of 30 min, they telecasted 20 advertisements of 10 sec while 10 of 15 sec. what percent of time is devoted to advertisements?
 (a) $77\frac{7}{9}\%$ (b) $80\frac{5}{9}\%$ (c) $22\frac{2}{9}\%$
 (d) $19\frac{4}{9}\%$ (e) 20%
4. A two -digit number get reversed when $(\frac{1}{5})$ th of it is added to it. Find the 40% of that no.
 (a) 32 (b)36 (c) 20
 (d)28 (e)18
5. A salesman earns a commission of 4% on the value of sales he makes. If he sells a tv at 80% of Marked price, then the commission earned by him is Rs.114.4. Find the M.P of that tv?(in Rs.)
 (a)2550 (b)2575 (c)5550
 (d)4575 (e)3575
6. Maanik saves 15% of his total income, next year he increases his expenditure by $33\frac{1}{3}\%$ but his percentage saving remains the same. Find the % increase in his income next year?
 (a) $66\frac{2}{3}\%$ (b) 15% (c) $44\frac{4}{9}\%$
 (d) $33\frac{1}{3}\%$ (e)50%
7. In class A, total students are 50% more than total students in class B while both classes have same no. of girls. In class A, there are 70% boys. Find percentage of girls in class B.
 (a) 20% (b) 30% (c) 50%
 (d) 45% (e) 35%
8. When digits of the two digits number are reversed, number obtained is 9 less than twice of the original number. Also the new number obtained is 175% of the original number. Find the sum of the digits of the number?
 (a) 13 (b) 10 (c) 9
 (d) 12 (e) 15
9. 30% of a is 40% of 720 & 15% of b is 25% of 1080. If 40% of (a + b) is equal to 80% of c, then find 20% of (a + c - b)?
 (a) 54 (b) 216 (c) 108
 (d) 224 (e) 112
10. Marks scored by Sumit is 12.5% more than Sahil's marks. Ajay got $6\frac{2}{3}\%$ more marks then Sumit's. If difference between marks scored by Ajay and Sahil is 40, then find the total marks scored by all three.
 (a) 665 (b) 450 (c) 555
 (d) 745 (e) 625
11. An amount is divided among X, Y and Z. Amount of Y is average of other two and when amount of Y is reduced by 20% of that of X, it becomes equal to that of Z. Find amount of Z is what percent of total amount?
 (a) 20% (b) 22.5% (c) 25%
 (d) 27.5% (e) 30%
12. 12.5% of a number is 62.5% of the other. If the sum of squares of both numbers is 416. Smallest number is what percent of sum of both the numbers? (a,b>0)
 (a) 20% (b) $83\frac{1}{3}\%$ (c) $12\frac{2}{3}\%$
 (d) $16\frac{2}{3}\%$ (e) 25%
13. In an examination, Karan got 25% more marks than Sanjay who got 20% less marks than Mahesh who got 30% more marks than Anurag. Marks obtained by Karan are what percent more than marks obtained by Anurag?
 (a) 20% (b) 26% (c) 40%
 (d) 30% (e) 25%
14. Difference between 50% of y and 10% of x is 170 whereas difference between 40% of x and 30% of y is zero. Find the sum of 'x' and 'y' ?
 (a) 770 (b) 630 (c) 600
 (d) 700 (e) 560
15. Sanjay scored 56% marks and passed an exam by 10 marks while Rohit scored 48% marks but failed by 6 marks. What is the pass percentage?
 (a) 52.5% (b) 51.5% (c) 52%
 (d) 51% (e) None of these
16. When a 2 digit number(x) is reversed, the number so formed is 63 more than the original number. If the sum of digits of original number is 11, then find the value of x+15?
 (a) 48 (b) 44 (c) 36
 (d) 56 (e) None of these
17. Jai scores 20% higher than Raj in an exam who scores 30% more than Ronit who scores 10% less than Ravi. What percent of marks are scored by Jai as compared to Ravi?
 (a) 117% (b) 140.4% (c) 90%
 (d) 127.8% (e) None of these
18. What is the difference between 40% of P and 40% of (P+5000)?
 (a) 2400 (b) 3000 (c) 3500
 (d) 2000 (e) None of these
19. A is 20% more than B which is 30% more than C which is 10% more than D. by what percent is A more than D?
 (a) 71.6% (b) 6% (c) 90.67%
 (d) 82.5% (e) 62.5%

- 20.** Difference between 40% of y and 20% of x is 270 whereas difference between 40% of x and 20% of y is zero. Find the sum of 'x' and 'y' ?
 (a) 1250 (b) 1400 (c) 1200
 (d) 1350 (e) 1500
- 21.** $\frac{2}{3}$ rd of first number is equal to the cube of the second number. If the second number is equal to 12% of 100, what is sum of the first & 2nd number?
 (a) 2408 (b) 2640 (c) 2426
 (d) 2604 (e) 2804
- 22.** In an examination, a candidate obtains 20% marks and fails by 75 marks while another candidate obtains 55% marks and passed by 20% of the maximum marks. What are the passing marks?
 (a) 275 (b) 175 (c) 225
 (d) 500 (e) 125
- 23.** When 30% of a no. y is subtracted from x it become 310 and when 50% of y is added to x it becomes 550. Find ratio of x to y .
 (a) 5 : 3 (b) 4 : 3 (c) 2 : 1
 (d) 7 : 6 (e) 6 : 5
- 24.** Shivam's expense is 25% more than Dharam's expense and Dharam's expense is 15% less than Harish's expense. If the sum of the their expense is Rs 4660, then what would be the Shivam's expense?
 (a) Rs 1360 (b) Rs 1700 (c) Rs 1600
 (d) Rs 1156 (e) Rs 1165
- 25.** A number is divided in such a way that 80% of the first part exceeds 70% of the second part by 3 and 50% of the second part exceeds the 40% of the first part by 15. Find the number.
 (a) 110 (b) 180 (c) 210
 (d) 100 (e) 230
- 26.** A candidate who gets 30% marks in an examination fails by 45 marks but another candidate who gets 40% marks gets 30 marks more than the passing mark, Then find the percentage of pass marks out of total marks.
 (a) 42% (b) 32% (c) 38%
 (d) 36% (e) 35%
- 27.** A company earns 4% profit up to sales of Rs 20000 and for sales above Rs 20000 company earn profit of 6%. Find total sale of company if total profit earned is Rs 3800.
 (a) Rs 45000 (b) Rs 50000 (c) Rs 60000
 (d) Rs 65000 (e) Rs 70000
- 28.** Population of a city increases 20% every year, find population of city after 2 years if present population of city is 15000?
 (a) 20600 (b) 21600 (c) 22600
 (d) 19600 (e) 25600
- 29.** Aakash bought a mobile worth Rs 12000 and paid a rent of Rs 9000 from his salary. If he used 70% of the monthly salary for buying mobile and paying rent then find his monthly salary.
 (a) Rs 20000 (b) Rs 21000 (c) Rs 79000
 (d) Rs 35000 (e) Rs 30000

Level - 2

- 1.** Anurag and Ayush get 48% & 33% marks in an exam. If Anurag got 60 marks more than passing marks and Ayush got 15 marks less than passing marks and Veer got 54% marks, then find Veer got how much more marks than passing marks?
 (a) 90 (b) 55 (c) 45
 (d) 70 (e) 65
- 2.** A man invested Rs 40,000 in mutual fund for 3 years. In first year, his amount is increased by 10%, in 2nd year his amount is decreased by X% and in 3rd year, his amount is again increased by 20% and he got Rs 4880 more at the end. Find value of X?
 (a) 15 (b) 12.5 (c) 20
 (d) $13\frac{1}{3}$ (e) $17\frac{1}{2}$
- 3.** In a university election of two candidates, 80% of the students cast their votes out of which 120 votes are invalid. The winner gets 37.5% of the total students votes and won by only 30 votes. Then find the number of students who don't cast their votes?
 (a) 360 (b) 320 (c) 340
 (d) 300 (e) 380
- 4.** There is a certain sum of money from which Anmol takes 20%, Golu takes 50% of the remaining, Yash takes Rs.1200 less than the amount taken by Golu and Shivam takes rest amount. If Anmol got Rs.400 less than Yash, then find amount taken by Golu is how much more than amount taken by Shivam.
 (a) Rs.2700 (b) Rs.2400 (c) Rs.1500
 (d) Rs.2000 (e) Rs.1800

5. In an election, there were two candidates-A & B from the same constituency. The total no. of votes in their constituency was 60,000 & 70% of the total votes were polled. If 40% of the total number of votes casted in favor of B, then find difference between total votes received by A & B.
 (a) 11000 (b) 12000 (c) 5000
 (d) 6000 (e) 8000
6. The expenditure and income of Manoj are in the ratio of 5:8. After some time income of Manoj is increased by 20% but at the same time his saving is also increased by $3\frac{1}{3}\%$. Find increased or decreased percent in his expenditure.
 (a) 24% (b) 30% (c) 20%
 (d) 15% (e) 25%
7. Monthly income of Veer is $11\frac{1}{9}\%$ more than that of Anurag. Anurag saves 40% of his income. Veer expend $3\frac{19}{27}\%$ less than that of Anurag. If difference between both saving is Rs. 2400, then find difference between expenditure of Veer and Anurag?
 (a) 200 Rs. (b) 600 Rs. (c) 400 Rs.
 (d) 800 Rs. (e) 500 Rs.
8. A wooden seller has some number of tables which are 25% more than number of chairs. 60% of tables and 50% of chairs are sold, each table is at Rs. 250 and each chair is at Rs. 240. If number of sold tables are 30 more than that of sold chair, then find difference between total selling price of sold tables and sold chairs (in Rs.)?
 (a) 8200 (b) 8100 (c) 9100
 (d) 8400 (e) 8500
9. If we add 4 to the numerator of the fraction and increases denominator by 50% then both become equal. And when the numerator is increased by 5 and denominator is doubled then it becomes equal to the original fraction. What will be two times of that fraction?
 (a) $\frac{4}{5}$ (b) $\frac{3}{2}$ (c) $\frac{8}{5}$
 (d) $\frac{5}{2}$ (e) $\frac{5}{3}$
10. The salary of Sumit is Rs. 50000 per month from which he spends 20% on rent, 10% of remaining on bills, 20% of further remaining on miscellaneous expenses. From the remaining amount, he gives some money to his wife and rest he invests in mutual funds in the ratio of 5 : 4. Amount spent on rent is how much less/more than amount invested in mutual funds.
 (a) 2800 Rs. (b) 2400 Rs. (c) 2600 Rs.
 (d) 3200 Rs. (e) 3000 Rs.
11. Due to new rules of TRAI, Rs. 154 is fixed as FTA upto 100 SD channels and additional Rs. 10 per 3 HD or 6 SD channels. A person paying Rs. 400 earlier, has now subscribed for 80 SD channel pack worth Rs. 250 and 9 HD channels pack at Rs. 4 per channel. What is his percent increase in bill amount?
 (a) 32.5% (b) 13.25% (c) 20%
 (d) 17.5% (e) None of these
12. In a stockpile of products produced by two machines M1 & M2, 40% was manufactured by M1. 10% of the products of M1 are defective & 95% of products of M2 are not defective. What is the % of defective products in the stockpile?
 (a) 14% (b) 12% (c) 7%
 (d) 9% (e) 5%
13. There are 40 boys in a class A and 60 girls in class B. if girls in class A are 80% of girls in class B. total students in class B are 50% more than total students in class A. find number of boys in class B. (total students = no. of boys + no. of girls)
 (a) 72 (b) 75 (c) 80
 (d) 62 (e) 78
14. In a village-X, a total of 6000 registered voters (male + female) had cast their votes in which 70% of total registered male voters and 45% of total registered female voters had voted. If total registered male voters are 2000 more than total registered female voters, then find the total number of registered voters in village-X.
 (a) 20000 (b) 15000 (c) 10000
 (d) 5000 (e) 25000
15. Shivam spent 20% & 32% of his total monthly salary on children's education & food respectively. He spent $(\frac{5}{8})^{\text{th}}$ of his remaining monthly salary on medical facilities. If difference between amount spent by him on medical facilities and food is Rs.1080, then find amount spent by Shivam on children's education.
 (a) Rs.15000 (b) Rs.10800 (c) Rs.16200
 (d) Rs.21000 (e) Rs.14600
16. The original cost of TV is three time the cost of raw material used . The cost of raw material increases in the ratio of 5 : 12 and manufacturing expenses in the ratio 4 : 5. Find the percentage increase in the cost of TV, if its original cost was Rs 6000.
 (Original cost = manufacturing cost + raw material cost)
 (a) $55\frac{2}{3}\%$ (b) 65% (c) $63\frac{1}{3}\%$
 (d) 70% (e) $72\frac{1}{3}\%$

17. Rakesh's monthly income is 2.5 times Gagan's monthly income. Gagan's monthly income is 15% less than Prabhat's monthly income. If difference between 20% of Rakesh monthly income and 5% of Prabhat's monthly income is 7500Rs. then, find the monthly income of Gagan.
 (a) 18000 Rs (b) 19000 Rs (c) 20000 Rs
 (d) 15000 Rs (e) 17000 Rs
18. Four friends Arun, Amit, Ankur and Ajay went a shop. Arun's total money was found to be 1/9 times the sum of the rest. Amit's total money was found to be 1/4 times the sum of the rest while Ajay's total money was found to be 2/3 times the sum of the rest. What percentage of the total money belonged to Ankur?
 (a) 36% (b) 40% (c) 25%
 (d) 30% (e) $33\frac{1}{3}\%$
19. Mohit invested 28% of his monthly salary of Rs 25000 in share markets. He spends the remaining salary in the ratio 2:4:3 in house rent, grocery and entertainment expenses respectively. What was the difference between amount invested in share markets and that spent on entertainment?
 (a) Rs 1500 (b) Rs 2000 (c) Rs 2500
 (d) Rs 3000 (e) Rs 1000
20. Average expenditure of Manoj & Nawaz is Rs 4500 which is 10% less than that of Sanjay & Irfan. If Sanjay spends Rs 500 more than Nawaz & average expenditure of Nawaz & Sanjay is Rs 4250. Find average expenditure of Manoj & Irfan. (in Rs)
 (a) 4250 (b) 5000 (c) 4750
 (d) 5250 (e) 4500
21. Present population of two town A and B is in ratio 8 : 7. Present population of town B is 7000 and it increased by 20% and $14\frac{2}{7}\%$ in next two year. Now ratio of population of town B to A is 24 : 25. Find increment in population of town A.
 (a) 2500 (b) 2000 (c) 3500
 (d) 3000 (e) 4500
22. In a society $16\frac{2}{3}\%$ people were interested in music only, $33\frac{1}{3}\%$ were interested in Yoga only, 25% were interested in cycling only and rest were interested in other activities. If no. of people who are interested in other activities is 450 then what is the no. of people who are interested in music.
 (a) 400 (b) 300 (c) 250
 (d) 350 (e) 450
23. The population of a city in 2017 increased by 12.5% from 2016 and in 2018 it decreased by 8% with respect to previous year and in 2019 it again increased by 15% with respect to previous year. If in 2019, the population of the city is 1190250, then what was the population of city in 2016?
 (a) 900000 (b) 1000000 (c) 850000
 (d) 950000 (e) 1050000
24. A shopkeeper has 70 buckets and each bucket contain 25 packet of biscuit and each packet has 10 biscuits. If shopkeeper reduces no. of buckets by 20 and increase no. of packet by 10. Find percentage change in no. of biscuits in each packet. Assume total no. of biscuits are same?
 (a) 4% (b) 5% (c) 15%
 (d) 10% (e) 0%

Mains Questions

1. A is 50% more than B, C is $\frac{2}{3}$ rd of A and D is 60% more than C. Now if each of A, B, C and D is increased by 10%. Then find D is what percent of B after the increase.
 (a) 150% (b) 160% (c) 175%
 (d) 180% (e) 170%
2. Annually income of Arun is 6.24 lakh, he spend $38\frac{6}{13}\%$ of monthly income on Food and Rent, $12\frac{1}{2}\%$ of remaining on Gym, $14\frac{2}{7}\%$ of remaining on clothing and 75% of remaining invested in mutual fund. if he kept remaining amount after all expense as cash with him then find how much cash Arun have after one year?
 (a) 72000 Rs. (b) 74000 Rs. (c) 75000 Rs.
 (d) 78000 Rs. (e) 80000 Rs.
3. Mr. Shah's monthly income is Rs 54,550. In an entire year, he spends 32% of his annual salary on groceries, 12% on equipment repairs, 10% on servant, and the half of remaining amount is invested in fixed deposit, what is the amount invested by him in fixed deposit?
 (a) Rs 1,50,558 (b) Rs 1,55,240 (c) Rs 1,52,610
 (d) Rs 1,58,789 (e) Rs 1,54,336

4. Bhavya spend 25% of his monthly salary on rent, 20% of remaining on food, $16\frac{2}{3}\%$ of remaining on clothes and 50% of the remaining on mutual funds. He gave 10% of his salary to his friend. If Bhavya monthly salary is 20,000 then find his savings.
 (a) 2000 (b) 3000 (c) 5000
 (d) 4000 (e) 1500
5. A mixture of milk and water contains 80% milk. x litre of mixture is taken out and replaced with water. Find the value of x if final concentration of milk in mixture is 50% and initial quantity of mixture is 80 ℓ.
 (a) 35ℓ (b) 40ℓ (c) 30 ℓ
 (d) 18ℓ (e) 24 ℓ
6. Manu invested 13% of his monthly salary in the FD and 12% in PPF. $\frac{3}{25}$ th of the remaining amount spent on clothing. $\frac{3}{11}$ th remaining amount spent on food. $\frac{5}{12}$ th of remaining spent of education. Half of remaining amount is invested in a scheme which offer 10% SI from which after 5 year he get 16800 amounts. Find the amount invested in FD and PPF together?
 (a) 25000 (b) 20,000 (c) 18,000
 (d) 21,000 (e) None of these
7. A shopkeeper has 12 kg of pure rice and 4 kg of impure rice. He mixes both type of rice but 4 kg of the mixture gets spoiled. If he again mixes 4 kg of impure rice to the remaining mixture and professes to sell rice at a profit of 20% on cost of pure rice. Then what is actual profit or loss percentage if cost of impure rice is 40% of cost of pure rice.
 (a) $\frac{400}{19}\%$ (b) $\frac{250}{21}\%$ (c) $\frac{250}{19}\%$
 (d) $\frac{250}{17}\%$ (e) $\frac{500}{19}\%$
8. Annually income of Sameer is 8.4 lakh Rs. he spend $14\frac{2}{7}\%$ on Rent, $16\frac{2}{3}\%$ of remaining on Food and $\frac{11}{20}$ of remaining spend on Cloth and travel together monthly. then find the difference between total saving and amount spend on travel annually, if given ratio between amount spend on Cloth to travel is 17 : 8 ?
 (a) 164400 Rs. (b) 165400 Rs. (c) 160400 Rs.
 (d) 175400 Rs. (e) 150400 Rs.
9. Aman started a shoes manufacturing company, manufacturing cost of each shoes is Rs. 500, Raw material cost is Rs 300 and transport cost of Rs 100 If company manufactured 150 Shoes in first order and sold 50% of shoes on half of its cost price. , then find on how much percent above of cost price should be remaining shoes sold to gets 50% profit on total cost?
 (a) 100% (b) 150% (c) 75%
 (d) 125% (e) 120%
10. In a party Sameer mixed two type of liquid in a glass, type A liquid contains 35% of Rum and type B liquid contains 40% of Rum. Sameer takes 6 ml from type A liquid and 4ml from type B liquid, then find percentage of Rum in the glass?
 (a) 27% (b) 37% (c) 35%
 (d) 32% (e) 31%
11. Bankersadda started its publication with the 1500 DI books. Printing cost per book is 125 Rs, packing cost per book is 15 Rs and shipping cost per book is 40 Rs. if 50% of books sold on half of total cost price, then find on how much percent above should be remaining book sold to gets 20% profit on total outlay?
 (a) 50% (b) 60% (c) 80%
 (d) 90% (e) 70%
12. Adda247 publication sold a puzzle book in Rs. 475 and made profit of 25% on CP and sold a DI book in Rs. 575 and made a profit of 15% on CP. If publication sold puzzle book in Rs. 360, then find what price should DI book will be sold to made a profit of 30% on both the books?
 (a) Rs.784 (b) Rs.874 (c) Rs.847
 (d) Rs.748 (e) Rs.478
13. A shopkeeper has 2 types of Rice. Type 1 of Rice is 20% costlier than type 2. He mixed these two types of Rice in some ratio and mark the price of mixture 10% above the cost price of type 2. On selling the whole mixture he earns a profit of $\frac{100}{43}\%$. Find out the ratio in which type 1 and type 2 Rice are mixed?
 (a) 3 : 5 (b) 2 : 5 (c) 5 : 7
 (d) 3 : 4 (e) 5 : 3
14. Abhishek got 432 marks in a test which were 112 more than that of Arun marks, If Sonakshi got 60% marks out of total mark of the test which were 64 mark more than the Arun marks. What percent of marks did Arun got ?
 (a) 65% (b) 60% (c) 45%
 (d) 50% (e) 55%
15. A, B, C and D purchased a restaurant for Rs. 56 lakhs. The contribution of B, C and D together is 460% of A alone, The contribution of A, C and D together is 366.66% that of B's contribution and the contribution of C is 40% that of A, B and D together. The amount contributed by D is
 (a) 10 lakhs (b) 12 lakhs (c) 16 lakhs
 (d) 18 lakhs (e) None of these

Previous Year Question

1. Manoj gave 60% of his salary to his wife and invested rest amount in mutual funds. His wife spends 30% amount on grocery and 20% on rent. From remaining amount, she purchased gold worth Rs. 18000. Find salary of Manoj.
 (a) Rs 60000 (b) Rs 54000 (c) Rs 64000
 (d) Rs 58000 (e) Rs 66000

IBPS PO Prelims 2019

2. In a class percentage of students who passed the exam is 60% and number of boys & girls who passed the exam is same. If boys who failed the exam are 200% more than girls who failed in exam then find the percentage of girls who failed out of total students
 (a) 9% (b) 13% (c) 10%
 (d) 12% (e) 15%

IBPS Clerk Prelims 2019

3. In year 2016, ratio of boys to girls in a school is 36:19. And in year 2017, number of boys is increased by 1440 and number of girls is increased by 15%. If in 2017, there were total increase in the number of students is 1725 then find the increased number of boys in the school.
 (a) 7240 (b) 5440 (c) 6040
 (d) 4440 (e) 5040

RRB Clerk Prelims 2019

4. If ratio of salary of A to that of B is 1:3 and each spends 15% of his salary on house rent. Find the house rent paid by A if remaining amount with A and B together is Rs 42500.
 (a) Rs 1800 (b) Rs 1845 (c) Rs 1785
 (d) Rs 1760 (e) Rs 1875

RRB Clerk Prelims 2019

5. If we add 4 to the numerator of the fraction and increases denominator by 50% then both become equal. And when the numerator is increased by 5 and denominator is doubled then it becomes equal to the original fraction. What will be two times of that fraction?
 (a) $\frac{4}{5}$ (b) $\frac{3}{2}$ (c) $\frac{8}{5}$
 (d) $\frac{5}{2}$ (e) $\frac{5}{3}$

RRB Clerk Mains 2019

6. In a village-X, a total of 6000 registered voters (male + female) had cast their votes in which 70% of total registered male voters and 45% of total registered female voters had voted. If total registered male voters are 2000 more than total registered female voters, then find the total number of registered voters in village-X.
 (a) 20000 (b) 15000 (c) 10000
 (d) 5000 (e) 25000

RBI Grade B Phase I 2019

7. When digits of the two digits number are reversed, number obtained is 9 less than twice of the original number. Also, the new number obtained is 175% of the original number. Find the sum of the digits of the number?
 (a) 13 (b) 10 (c) 9
 (d) 12 (e) 15

SBI PO Prelims 2020

8. The population of a village is decreased by 10% in the first year and then increased by 20% in the second year. Find the population of the village at the end of the second year if two years ago it was 15,000?
 (a) 16180 (b) 16200 (c) 16320
 (d) 16360 (e) 16480

IBPS Clerk Prelims 2020

9. There are 75% boys out of total students (boys + girls) in a school and 39% of the total students of the school went on a picnic. If 32% of the total boys went on a picnic, then find what percent of total girls went on a picnic?
 (a) 60% (b) 90% (c) 75%
 (d) 80% (e) 50%

IBPS RRB PO Prelims 2020

10. A and B both spend 30% of their income together which is equal to Rs. 26400. If income of A is 20% more than that of B, then find the income of B (in Rs.)?
 (a) 52000 (b) 48000 (c) 40000
 (d) 36000 (e) 30000

RRB Clerk Prelims 2020

11. A spend 30% of his monthly salary on house rent, 40% of the remaining salary on clothing and he distributes his remaining monthly salary among his two daughters and a son in the ratio 5 : 5 : 4. If difference of A's monthly expenditure on Clothing and monthly amount given by A to his son is Rs.24000, then find A's annual expenditure on house rent.
 (a) Rs.500000 (b) Rs.540000 (c) Rs.550000
 (d) Rs.560000 (e) Rs.600000

SBI Clerk Mains 2019

12. Sonal spent Rs. 45760 on the interior decoration for her home, Rs. 27896 on buying air conditioner and the remaining 28% of the total amount she had as cash with her. What was the total amount?
 (a) Rs. 98540 (b) Rs. 102300 (c) Rs. 134560
 (d) Cannot be determined (e) None of these

13. Rajesh spent Rs. 44620 on Deepawali shopping, Rs. 32764 on buying computer and the remaining 32% of the total amount he had as cash with him. What was the total amount?
 (a) Rs. 36416 (b) Rs. 113800 (c) Rs. 77384
 (d) Cannot be determined (e) None of these

14. Harjeet spends 50% of his monthly income on household items, 20% of his monthly income on buying clothes, 5% of his monthly income on medicines and the remaining amount of Rs. 11250 he saves. What is Harjeet's monthly income?
 (a) Rs. 38200 (b) Rs. 34000 (c) Rs. 41600
 (d) Rs. 45000 (e) None of these
15. Mr. Giridhar spends 50% of his monthly income on household items and out of the remaining he spends 50% on transport, 25% on entertainment, 10% on sports and remaining amount of Rs. 900 is saved. What is Mr. Giridhar's monthly income?
 (a) Rs. 6000 (b) Rs. 12000 (c) Rs. 9000
 (d) Cannot be determined (e) None of these
16. Shruti decided to donate 12% of her salary to an orphanage. On the day of donation, she changed her mind and donated Rs. 3150 which was 75% of what she had decided earlier. How much is Shruti's salary?
 (a) Rs. 35000 (b) Rs. 42500 (c) Rs. 39100
 (d) Cannot be determined (e) None of these
17. Asha's monthly income is 60% of Deepak's monthly income, 120% of Maya's monthly income. What is Maya's monthly income, if Deepak's monthly income is Rs. 78000?
 (a) Rs. 39000 (b) Rs. 42000 (c) Rs. 36000
 (d) Cannot be determined (e) None of these
18. A sum of Rs. 2236 is divided among A, B and C such that A receives 25% more than C and C receives 25% less than B. What is A's share in the amount?
 (a) Rs. 460 (b) Rs. 890 (c) Rs. 780
 (d) Rs. 1280 (e) None of these
19. Pooja invests 13% of her monthly salary, i.e., Rs. 8554 in Mediclaim Policies. Later she invest 23% of her monthly salary on Child Education Policies, she also invests another 8% of her monthly salary on Mutual Funds. What is the total annual amount invested by Pooja?
 (a) Rs. 28952 (b) Rs. 43428 (c) Rs. 347424
 (d) Rs. 173712 (e) None of these
20. Mr. Sarang invests 6% of his monthly salary, i.e., Rs. 2,100 on insurance policies. He also invests 8% of his monthly salary on Family Mediclaim Policies and another 9% of his salary on NSCs. What is the total annual amount invested by Mr. Sarang?
 (a) Rs. 11400 (b) Rs. 96600 (c) Rs. 8050
 (d) Rs. 9500 (e) None of these
21. Mrs. Jain invests 14% of her monthly salary, i.e., Rs. 7014 in Insurance Policies. Later she invests 21% of her monthly salary on Family Mediclaim Policies; also she invests another 6.5% of her salary on Mutual Funds. What is the total annual amount invested by Mrs. Jain?
 (a) Rs. 25050 (b) Rs. 50100 (c) Rs. 242550
 (d) Rs. 249498 (e) None of these
22. In an examination, it is required to get 256 of the total maximum aggregate marks to pass. A student gets 192 marks and is declared failed. The difference of marks obtained by the student and that required to pass is 10%. What are the maximum aggregate marks a student can get?
 (a) 690 (b) 670 (c) 640
 (d) 680 (e) None of these
23. In an election between two candidates, 60% of the voters cast their vote out of which 4% of the votes were declared invalid. A candidate got 7344 votes which were 75% of the total valid votes. Find the total no. of votes enrolled in the election?
 (a) 1700 (b) 17659 (c) 17000
 (d) 15000 (e) None of these
24. Samar spends 52% of his monthly salary on household expenditure and 23% on miscellaneous expenditure. If he is left with Rs. 4500, what is his monthly salary?
 (a) Rs. 16000 (b) Rs. 17500 (c) Rs. 17000
 (d) Rs. 18500 (e) None of these
25. In a class of 60 students, 40% can speak only Hindi, 25% can speak only English and rest of the students can speak both the languages. How many students can speak English?
 (a) 32 (b) 28 (c) 36
 (d) 15 (e) None of these
26. A, B and C invested in a business in the ratio of 3 : 2 : 5 respectively. If A earns 100% more profit than B and C earns 40% more profit than B, then what is the share of B in the profit?
 (a) Rs. 2420 (b) Rs. 1560 (c) Rs. 1135
 (d) Cannot be determined (e) None of these

Solutions

Basic Questions

1. **(d)**; $\frac{15}{100} \times 34 = 5.10$ Rs.
2. **(b)**; $\frac{88}{100} \times 370 + \frac{24}{100} \times 210 - x = 118$
 $x = 325.6 + 50.4 - 118 = 376 - 118 = 258$
3. **(b)**; $\frac{60}{100} \times 264 = 158.40 \Rightarrow \frac{15}{100} \times 1056 = 158.40$
4. **(d)**; Passing percentage = $\frac{252}{270} \times 100 = 93\frac{1}{3}\%$
5. **(c)**; Litres of pure acid = $\frac{20}{100} \times 8 = 1.6$ litres
6. **(d)**; Let the number is x
 $\frac{50}{100}x - \frac{35}{100}x = 12 \Rightarrow \frac{15x}{100} = 12$
 $x = \frac{12 \times 100}{15} \Rightarrow x = 80$
7. **(d)**; Let the two numbers be x and y.
 $x + y = 2490 \Rightarrow \frac{65}{1000}x = \frac{85}{1000}y$
 $x = \frac{17}{13}y \Rightarrow \frac{17}{13}y + y = 2490$
 $\frac{30y}{13} = 2490 \Rightarrow y = \frac{2490 \times 13}{30}$
 $y = 1079 \Rightarrow x = 2490 - 1079 \Rightarrow x = 1411$
8. **(c)**; Let the Numbers be x and y.
 $x \times \frac{80}{100} = y \Rightarrow \frac{4x}{5} = y$
 $\frac{x}{y} = \frac{5}{4} \quad \begin{cases} x = 5k \\ y = 4k \end{cases}$
 $x^2 + y^2 = 656 \Rightarrow 25k^2 + 16k^2 = 656$
 $k^2 = \frac{656}{41} \Rightarrow k = 4 \Rightarrow x = 4 \times 5 = 20$
 $y = 4 \times 4 = 16$
 Numbers are 16 and 20
9. **(d)**; Percentage increase in salary = $\frac{900}{7200} \times 100$
 $= \frac{100}{8} = 12\frac{1}{2}\%$
10. **(a)**; Let the price of petrol be 100
 Increase Price = 120
 Required percentage = $\frac{20}{80} \times 100$
 $= \frac{100}{6} = 16\frac{2}{3}\%$
11. **(d)**; Increase Price = $\frac{110}{100} \times \frac{110}{100} \times 100 = 121$
12. **(d)**; Increase Monthly income = $5000 \times \frac{130}{100} = 6500$ Rs.
13. **(e)**; Money left = $100\% - 20\% - [100\% - 20\%] \frac{25}{100}\%$
 $= 100\% - 20\% - 20\% = 60\%$
 $\therefore 60\% = 480 \Rightarrow 100\% = \frac{480}{60} \times 100 = \text{Rs. } 800$
14. **(b)**; Let the number will be
 Increased number = $\frac{x + \frac{120}{100}x}{y + \frac{100}{100}y} = \frac{11}{27} \Rightarrow \frac{220x}{450y} = \frac{11}{27}$
 $\frac{x}{y} = \frac{11}{27} \times \frac{45}{22}$
 Original Fraction $\Rightarrow \frac{x}{y} = \frac{5}{6}$
15. **(e)**; Let the number be x and y
 $x - y = 1600 \Rightarrow \frac{75}{1000}x = \frac{125}{1000}y$
 $x = \frac{5}{3}y \Rightarrow \frac{5}{3}y - y = 1600$
 $\frac{2y}{3} = 1600 \Rightarrow y = 2400$
 $x = 1600 + 2400 = 4000$

Prelims Solutions

Level - 1

1. (c): Let first number and second number be x and y respectively

$$\text{Then, } 45 \times \frac{x}{100} = 60 \times \frac{y}{100}$$

$$3x=4y \dots\dots\dots (i)$$

$$\text{And } \frac{x+y}{2} = x - 10$$

$$x - y = 20 \dots\dots\dots (ii)$$

From (i) and (ii)

$$y=60$$

$$80\% \text{ of second number}=48$$

2. (d): Juice I 17 : 3

Juice II 9 : 1 or 18 : 2 (making total quantity of both juices same)

Both the juices are mixed in the ratio of 3:2

Juice I	17	3	3 =	Guava	51	Sugar	9	Pomegranate	
Juice II	18	2	2 =			4	36		
				51	13	36	=	100	

3. (d): total advertisement time = $20 \times 10 + 10 \times 15 = 350$ sec

$$\text{Required \%} = \frac{350}{30 \times 60} \times 100 = 19\frac{4}{9}\%$$

4. (e): Let the two -digit no. be $(10a + b)$, where a is tens digit and b is unit digit.

ATQ

$$(10a + b) + 0.2(10a + b) = (10b + a)$$

$$11a = 8.8b$$

$$\left(\frac{a}{b} = \frac{4}{5}\right)$$

Since the no. is two- digit number. So the only possible no. is 45 and reverse of it is 54.

$$\text{So } 40\% \text{ of no.}=18$$

5. (e): Let the marked price of the T.V be Rs. 'x'

Then ATQ

$$x \times 0.04 \times 0.8 = 114.4$$

$$x = \text{Rs. } 3575$$

6. (d): Let the income of Maanik be Rs.100x

$$\text{Then expenditure} = 100x - 15x = \text{Rs. } 85x$$

$$\text{Next year expenditure} = 85x \times \frac{4}{3} = \text{Rs. } \frac{340x}{3}$$

Since saving % remains same for the next year

$$\text{So next year income} = \frac{340x}{3} \times \frac{100}{85} = \text{Rs. } \frac{400x}{3}$$

$$\text{So \% increment in income} = \frac{\frac{400x}{3} - 100x}{100x} \times 100 =$$

$$33\frac{1}{3}\%$$

7. (d): let students in class B = x

$$\text{Students in class A} = x + \frac{50}{100} \times x = 1.5x$$

$$\text{Boys in class A} = \frac{70}{100} \times 1.5x = 1.05x$$

$$\text{Girls in class A} = 1.5x - 1.05x = 0.45x = \text{girls in class B}$$

$$\text{Required \%} = \frac{0.45x}{x} \times 100 = 45\%$$

8. (c): Let the unit digit and tens digit of the number be y and x respectively.

$$\text{Original number} = (10x+y)$$

ATQ

$$1.75(10x+y) = 10y+x$$

$$x: y=1:2$$

let the unit and tens digits be $1a$ and $2a$ respectively

$$\text{Now, } (21a) + 9 = 2(12a)$$

$$a=3$$

$$\text{unit digit}=6$$

$$\text{and tens digit}=3$$

$$\text{Sum of both the digits}=9$$

9. (c): $\frac{30a}{100} = 720 \times \frac{40}{100}$

$$a = 960$$

$$\frac{15b}{100} = 1080 \times \frac{25}{100}$$

$$b = 1800$$

$$(960 + 1800) \times \frac{40}{100} = \frac{4c}{5}$$

$$c = 1380$$

$$20\% \text{ of } (a + c - b) = (960 + 1380 - 1800)$$

$$\times \frac{20}{100} = 108$$

10. (a): Let Sahil's marks = $80x$

$$\text{So, Sumit's marks} = \frac{80x \times 112.5}{100} = 90x$$

$$\text{So, Ajay's marks} = \frac{90x \times 106\frac{2}{3}}{100} = 96x$$

ATQ,

$$\text{Ajay's marks is 40 more than the Sahil's marks}$$

$$\Rightarrow 96x - 80x = 40$$

$$\Rightarrow x = 2.5$$

$$\text{Total marks scored by all three} = (80 + 90 + 96) \times 2.5 = 266 \times 2.5 = 665$$

11. (c): Let the amount of X and Z be Rs a and b respectively

$$\text{Amount of Y} = \frac{a+b}{2}$$

ATQ

$$\frac{a+b}{2} - \frac{a}{5} = b$$

$$5b=3a$$

$$\text{Amount of X} = \text{Rs } 5p$$

Amount of Z=Rs 3p
Amount of Y= Rs 4p
Required %=25%

12. (d): let numbers be a and b respectively

ATQ, 12.5% of a = 62.5% of b

$$\frac{a}{b} = \frac{5}{1} \text{ or } a = 5x, b = x$$

$$a^2 + b^2 = 416$$

$$25x^2 + x^2 = 416$$

$$x^2 = 16$$

x=4 (neglecting negative value since numbers are positive)

Smallest number = x = 4

Sum of numbers = 5x + x = 6x = 24

$$\text{Required \%} = \frac{4}{24} \times 100 = 16\frac{2}{3}\%$$

13. (d): let Anurag got x marks

$$\text{Marks obtained by Mahesh} = \frac{130}{100} \times x = 1.3x$$

$$\text{Marks obtained by Sanjay} = \frac{80}{100} \times 1.3x = 1.04x$$

$$\text{Marks obtained by Karan} = \frac{125}{100} \times 1.04x = 1.3x$$

$$\text{Required \%} = \frac{1.3x-x}{x} \times 100 = 30\%$$

14. (d): ATQ, $\frac{50}{100}y - \frac{10}{100}x = 170$

$$\frac{40}{100}x = \frac{30}{100}y \Rightarrow \frac{x}{y} = \frac{3}{4}$$

$$\frac{50}{100} \times \frac{4}{3}x - \frac{10}{100}x = 170$$

$$x = 300 \Rightarrow y = 400$$

$$\text{Required answer} = x + y = 300 + 400 = 700$$

15. (d): let maximum marks be x

$$\frac{56}{100}x - 10 = \frac{48}{100}x + 6$$

$$x = 200$$

$$\text{Marks of Sanjay} = \frac{56}{100}x = 112$$

$$\text{Passing marks} = 112 - 10 = 102$$

$$\text{Pass \%} = \frac{102}{200} \times 100 = 51\%$$

16. (b): Let 2 digit number be 10a + b = x

Now, reversing of the 2 digit number becomes 10b+a

According to the question,

$$10b+a = 10a+b+63$$

$$9b - 9a = 63$$

$$b - a = 7 \dots\dots (1)$$

$$a + b = 11 \dots\dots (\text{Given}) \quad (2)$$

Solving equation (1) & (2), we get a=2, b=9

$$\text{Original number} = 10a + b = 29$$

$$\text{Required number} = x + 15 = 44$$

17. (b): let marks scored by Ravi = x

$$\text{Marks of Ronit} = \frac{90}{100}x = 0.9x$$

$$\text{Marks of Raj} = \frac{130}{100} \times 0.9x = 1.17x$$

$$\text{Marks of Jai} = \frac{120}{100} \times 1.17x = 1.404x$$

$$\text{Required \%} = \frac{1.404x}{x} \times 100 = 140.4\%$$

18. (d): Difference = 40% of (P+5000) - 40% of P
= 40% of 5000
= 2000

19. (a): let D be 100x

$$C = \frac{110}{100} \times 100x = 110x$$

$$B = \frac{130}{100} \times 110x = 143x$$

$$A = \frac{120}{100} \times 143x = 171.6x$$

$$\text{Required \%} = \frac{171.6x - 100x}{100x} \times 100 = 71.6\%$$

20. (d): $\frac{40}{100}y - \frac{20}{100}x = 270$

$$\Rightarrow 2y - x = 1350 \dots(i)$$

$$\text{and } \frac{40}{100}x - \frac{20}{100}y = 0$$

$$2x - y = 0 \dots(ii)$$

On solving (i) & (ii)

$$x = 450$$

$$y = 900$$

$$\text{Required sum} = 1350$$

21. (d): Second no. = $\frac{100 \times 12}{100} = 12$

$$\therefore \text{first no.} = 12^3 \times \frac{3}{2} = 1728 \times \frac{3}{2}$$

$$= 2592$$

$$\therefore \text{Required sum} = 12 + 2592 = 2604$$

22. (b): let total marks = 100x

ATQ

$$20x + 75 = 55x - 20x$$

$$15x = 75$$

$$x = 5$$

$$\text{Passing marks} = 20x + 75 = 175$$

23. (b): Atq,

$$x - 0.3y = 310 \dots(i)$$

$$x + 0.5y = 550 \dots(ii)$$

Dividing (i) by (ii)

$$\frac{x - 0.3y}{x + 0.5y} = \frac{310}{550}$$

$$x + 0.5y = 550$$

$$\Rightarrow 55(x - 0.3y) = 31(x + 0.5y)$$

$$= 55x - 16.5y = 31x + 15.5y$$

$$\Rightarrow 24x = 32y$$

$$\frac{x}{y} = \frac{32}{24}$$

$$x : y = 4 : 3$$

24. (b): Let expenses of Shivam, Dharam and Harish be Rs S, Rs D and Rs H respectively.

ATQ

$$S + D + H = 4660$$

$$\frac{125}{100} \times D + D + \frac{100}{85} \times D = 4660$$

$$D \left(\frac{5}{4} + 1 + \frac{20}{17} \right) = 4660$$

$$D = \text{Rs } 1360$$

$$\text{So, expense of Shivam} = \frac{125}{100} \times 1360 = \text{Rs } 1700$$

25. (c): Let first part and second part be x and y respectively.

ATQ

$$\frac{80}{100} \times x = \frac{70}{100} \times y + 3 \quad \dots \dots (i)$$

$$\frac{50}{100} \times y = \frac{40}{100} \times x + 15 \quad \dots \dots (ii)$$

From (i) and (ii)

$$x = 100 \text{ and } y = 110$$

$$\therefore \text{The required number} = 100 + 110 = 210$$

26. (d): let total marks be P .

ATQ

$$\frac{30}{100} \times P + 45 = \frac{40}{100} \times P - 30$$

$$0.1P = 75$$

$$P = 750$$

$$\text{Passing marks} = \frac{40}{100} \times 750 - 30 = 270$$

$$\therefore \text{passing percentage} = \frac{270}{750} \times 100 = 36\%$$

27. (e): let total sale of company be Rs. x

ATQ,

$$20000 \times \frac{4}{100} + (x - 20000) \times \frac{6}{100} = 3800$$

$$800 + (x - 20000) \times \frac{6}{100} = 3800$$

$$(x - 20000) = \frac{3000 \times 100}{6}$$

$$x = \text{Rs } 70000$$

28. (b): Population after 2 years

$$= 15000 \times \frac{120}{100} \times \frac{120}{100} = 21600$$

29. (e): Required amount = $(12000 + 9000) \times \frac{100}{70}$

$$= 21000 \times \frac{100}{70} = \text{RS } 30000$$

Level - 2

1. (a): Let total marks be 'X'

ATQ -

$$48\% \text{ of } X - 60 = 33\% \text{ of } X + 15$$

$$0.48X - 0.33X = 75$$

$$0.15X = 75$$

$$X = 500$$

$$\text{Passing marks} = 500 \times \frac{48}{100} - 60 = 180$$

$$\text{Marks obtained by Veer} = 500 \times \frac{54}{100} = 270$$

$$\text{Required marks} = 270 - 180 = 90$$

2. (a): ATQ, $40,000 \times \frac{110}{100} \times \frac{(100-X)}{100} \times \frac{120}{100} = 44880$

$$x = 15$$

3. (a): Let the total number of students in the university be x

$$\text{Valid votes} = \frac{x \times 80}{100} - 120 = \frac{4x}{5} - 120$$

Atq,

$$\frac{3x}{8} + \left(\frac{3x}{8} - 30\right) = \frac{4x}{5} - 120$$

$$\Rightarrow \frac{3x}{4} - 30 = \frac{4x}{5} - 120$$

$$x = 1800$$

No. of students who do not cast their votes =

$$1800 \times \frac{20}{100} = 360$$

4. (d): Let the total sum of money be Rs. $100x$

Then,

$$\text{Anmol's share} = \frac{20}{100} \times 100x = \text{Rs. } 20x$$

$$\text{Golu's share} = \frac{50}{100} \times (100x - 20x) = \text{Rs. } 40x$$

$$\text{Yash's share} = \text{Rs. } (40x - 1200)$$

$$\text{Shivam's share} = 100x - [20x + 40x + 40x - 1200]$$

$$= \text{Rs. } 1200$$

ATQ,

$$40x - 1200 - 20x = 400$$

$$20x = 1600$$

$$x = 80$$

$$\text{Required difference} = 40x - 1200 = \text{Rs. } 2000$$

5. (d): Total votes = 60,000

Total Polled votes = 42,000

$$\text{Votes cast in favor of B} = 60000 \times \frac{40}{100} = 24000$$

$$\text{Votes Cost in Favor of A} = 42000 - 24000 = 18000$$

$$\text{Required difference} = 24000 - 18000$$

$$= 6000$$

6. (b): let income and expenditure of Manoj be Rs $8x$ and $5x$ respectively

$$\text{Saving of Manoj} = 8x - 5x = 3x$$

$$\text{Income of Manoj after } 20\% \text{ increase} = 8x \times \frac{120}{100} = 9.60x$$

$$\text{New saving of Manoj} = 3x \times \frac{310}{300} = 3.1x$$

$$\text{New expenditure} = 9.60x - 3.1x = 6.5x$$

$$\text{Required percentage} = \frac{6.5x - 5x}{5x} \times 100 = 30\%$$

7. (c): Let income of Anurag = $9P$ Rs.

So, income of Veer will = $10P$ Rs.

$$\text{Expenditure of Anurag} = 9P \times \frac{60}{100} = 5.4P \text{ Rs.}$$

$$\text{Expenditure of Veer} = 5.4P \times \frac{26}{27} = 5.2P \text{ Rs.}$$

ATQ -

$$(10P - 5.2P) - (9P - 5.4P) = 2400$$

$$4.8P - 3.6P = 2400$$

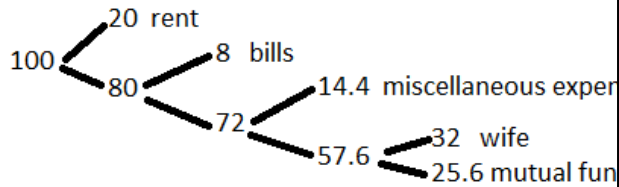
$$P = 2000$$

$$\text{Required difference} = 5.4 \times 2000 - 5.2 \times 2000 = 400 \text{ Rs.}$$

8. (b): Let total number of tables and chairs be $50x$ & $40x$ respectively
 Sold tables = 60% of $50x = 30x$
 Sold chairs = 50% of $40x = 20x$
 $30x - 20x = 30$
 $x = 3$
 Required difference = $250 \times 30 \times 3 - 240 \times 20 \times 3$
 $= 22500 - 14400$
 $= 8100$ Rs.

9. (e): Let the numerator and denominator of a fraction be x and y respectively
 ATQ
 $x + 4 = 1.5y \dots\dots (i)$
 And $\frac{x+5}{2y} = \frac{x}{y}$
 $x=5$
 and $y=6$
 Original fraction = $\frac{5}{6}$
 Required fraction = $\frac{5}{6} \times 2 = \frac{5}{3}$

10. (a): Let salary of Sumit be Rs. 100 (%)



Amount spent on rent = $\frac{20}{100} \times 50000 =$
 Rs. 10000
 Amount invested in mutual funds =
 $\frac{25.6}{100} \times 50000 =$ Rs. 12800
 Required difference = $12800 - 10000 = 2800$ Rs

11. (d): New charges = $250 + 154 + 9 \times 4 + 10 \times 3 =$
 Rs. 470
 Required % = $\frac{470 - 400}{400} \times 100 \approx 17.5\%$

12. (c): Let the total product produced by these two machine (M1 & M2) = 100 units
 The defective product produced by machine M1 =
 $40 \times .10 = 4$ units
 The defective product produced by machine M2 =
 $60 \times .05 = 3$ units
 Required defective products % = $\frac{7}{100} \times 100 = 7\%$

13. (a): girls in class A = $\frac{80}{100} \times 60 = 48$
 Total students in class A = $40 + 48 = 88$
 Total students in class B = $88 + \frac{50}{100} \times 88 = 132$
 Boys in class B = $132 - 60 = 72$

14. (c): Let total male & female registered voters in village - X be $10a$ & $10b$ respectively.
 ATQ,
 $10a - 10b = 2000$
 $a - b = 200 \dots (i)$
 And,
 $7a + 4.5b = 6000 \dots (ii)$
 On solving (i) & (ii), we get:
 $a = 600, b = 400$
 So, total registered voters in village - X = $10a + 10b = 10 \times (600 + 400) = 10000$

15. (b): Let total monthly salary of Shivam be Rs. $100x$.
 So, amount spent by him on children's education = $100x \times \frac{20}{100}$
 $=$ Rs. $20x$
 And amount spent by him on food = $100x \times \frac{32}{100} =$
 Rs. $32x$
 Now,
 Amount spent by him on medical facilities = $\frac{5}{8} \times$
 $(100x - 32x - 20x)$
 $=$ Rs. $30x$
 ATQ,
 $32x - 30x = 1080$
 $x =$ Rs. 540
 So, required amount = $20x$
 $=$ Rs. 10800

16. (c): The original cost of TV = Rs 6000
 Then, original raw material cost = Rs 2000
 New cost of raw material = $2000 \times \frac{12}{5} =$ Rs 4800
 Original manufacturing exp. = Rs 6000 - 2000 =
 Rs 4000
 New manufacturing exp. = $4000 \times \frac{5}{4} =$ Rs 5000
 New cost of TV = $4800 + 5000 = 9800$
 Required % = $\frac{3800}{6000} \times 100 = \frac{380}{6} = \frac{190}{3} = 63\frac{1}{3}\%$

17. (e): Let parbhat's monthly income = Rs. $200x$
 So, Gagan's monthly income = $\frac{200x \times 85}{100} =$ Rs. $170x$
 \Rightarrow Rakesh's monthly income = $170x \times \frac{5}{2} =$ Rs. $425x$
 x
 20% of Rakesh's monthly income $\rightarrow 425x \times \frac{1}{5} =$
 Rs. $85x$
 5% of Prabhat's monthly income $\rightarrow 5 \times \frac{200x}{100} =$
 Rs. $10x$
 Difference
 $85x - 10x = 7500$
 $x = 100$
 income of Gagan $\rightarrow 170 \times 100 =$ Rs. 17000

18. (d): Let the amount of money with Arun, Amit, Ankur, and Ajay be Rs. w, Rs. x, Rs. y and Rs. z respectively.

We have

$$9w = x + y + z \dots\dots\dots(i)$$

$$4x = w + y + z \dots\dots\dots(ii)$$

$$3z = 2(x + y + w) \dots\dots\dots(iii)$$

Adding all the above three equations, we get:

$$6w + x + z = 4y$$

Adding 'y' to both sides, we have

$$6w + (x + y + z) = 5y$$

using eq (i)

$$\text{we have } 15w = 5y$$

$$\text{or } 3w = y \dots\dots\dots(iv)$$

Thus, from eq(i)

$$10w = (x + y + z + w)$$

$$\frac{10y}{3} = (x + y + z + w)$$

$$y = \frac{3}{10}(x + y + z + w)$$

$$\text{Required \%} = 30\%$$

OR

Let total money four together have = Rs.10x

Part of money Arun have = Rs. x

Part of money Amit have = Rs. 2x

Part of money Ajay have = Rs. 4x

So, percentage of total money belonged to Ankur

$$= \frac{10x - x - 2x - 4x}{10x} \times 100$$

$$= 30\%$$

19. (e): Mohit invested 28% salary in share markets

$$28\% \text{ of } 25000 = 28 \times 250 = 7000 \text{ rs}$$

Remaining amount invested in rent, grocery and entertainment in the ratio 2:4:3 respectively

ATQ,

$$9 \text{ units} = (100 - 28)\% = 72\%$$

$$\text{So, } 3 \text{ units} = \frac{72}{9} \times 3 = 24\%$$

$$\text{Required difference} = (28 - 24)\%$$

$$= 4\% = 4 \times 250$$

$$= 1000 \text{ rs}$$

20. (d): let Sanjay spends Rs x.

$$\text{Expenditure of Nawaz} = x - 500 \text{ Rs}$$

$$\text{ATQ, } x + x - 500 = 8500$$

$$x = \text{Rs } 4500$$

$$\text{Expenditure of Manoj} = 9000 - (4500 - 500) = \text{Rs } 5000$$

Average expenditure of Sanjay & Irfan =

$$\frac{100}{90} \times 4500 = \text{Rs } 5000$$

$$\text{Expenditure of Irfan} = 10000 - 4500 = \text{Rs } 5500$$

$$\text{Required average} = \frac{5000 + 5500}{2} = \text{Rs } 5250$$

21. (b): Population of town A = $\frac{7000}{7} \times 8$

$$= 8000$$

After two - year population of town B =

$$7000 \times \frac{6}{5} \times \frac{8}{7}$$

$$= 9600$$

$$\text{After two years population of town A} = \frac{9600}{24} \times 25$$

$$= 10000$$

$$\text{Increment in population} = 10000 - 8000$$

$$= 2000$$

22. (b): Percentage of people in other activities

$$= 100 - \left(\frac{50}{3} + \frac{100}{3} + 25 \right)$$

$$= 25\%$$

$$\therefore 25\% \rightarrow 450$$

$$\therefore 100\% \rightarrow \frac{450}{25} \times 100$$

$$\rightarrow 1800$$

$$\therefore \text{Required answer} = \frac{50}{300} \times 1800$$

$$= 300$$

23. (b): population of city in 2016 = $1190250 \times \frac{100}{112.5} \times$

$$\frac{100}{92} \times \frac{100}{115}$$

$$= 1190250 \times \frac{8}{9} \times \frac{25}{23} \times \frac{20}{23}$$

$$= 1000000$$

24. (e): Let no. of biscuits in each packet in 50 buckets are y.

ATQ,

$$70 \times 25 \times 10 = 50 \times 35 \times y$$

$$y = 10$$

$$\text{Required percentage change} = \frac{10 - 10}{10} \times 100 = 0\%$$

Mains Solutions

1. (b); Let B = 100

$$\therefore A = 150$$

$$C = \frac{2}{3} \times 150 = 100$$

$$D = 160$$

If we increase all values by 10% then there is no change in relative percentages values.

$$\therefore \text{Percentage required} = \frac{160}{100} \times 100 = 160\%$$

2. (a); Monthly income of Arun

$$= \frac{6.24}{12} = 52000$$

Expense on Food and Rent

$$= 52000 \times \frac{500}{13} \times \frac{1}{100} = 20000$$

Expense on gym

$$= (52000 - 20000) \times \frac{12.5}{100} = 4000$$

Expense on Clothing

$$= (32000 - 4000) \times \frac{1}{7}$$

$$= 4000$$

Invested in mutual fund

$$= 24000 \times \frac{3}{4}$$

$$= 18000$$

Cash after one year

$$= (24000 - 18000) \times 12 = 72000 \text{ Rs.}$$

3. (a); Annual income = 54550 × 12 = Rs 6,54,600

Annual expenditure on groceries, repairs and servant = (32% + 12% + 10%) of Rs 6,54,600

$$= 54\% \text{ of Rs } 6,54,600$$

Remaining part of annual income = 46% of Rs 6,54,600

Now, half of this remaining amount is invested in fixed deposit.

Therefore, annual investment in fixed deposit

$$= 23\% \text{ of Rs } 6,54,600 = \text{Rs } 1,50,558$$

4. (b); Total salary = 20000

Rent = 5000

$$\text{Food} = 15000 \times \frac{20}{100} = 3000$$

$$\text{Clothes} = \frac{12000}{100} \times \frac{50}{3} = 2000$$

$$\text{Mutual fund} = \frac{10000}{100} \times 50 = 5000$$

$$\text{To his friend} = \frac{20000 \times 10}{100} = 2000$$

$$\text{Saving} \rightarrow 5000 - 2000 = 3000$$

5. (c); According to question

$$\frac{4}{5} \times 80 - \frac{4}{5}x = \frac{1}{5} \times 80 - \frac{1}{5}x + x$$

$$64 - \frac{4}{5}x = 16 - \frac{1}{5}x + x$$

$$48 = \frac{4}{5}x - \frac{1}{5}x + x$$

$$48 = \frac{3x}{5} + x$$

$$x = 30\ell$$

Or

$$\frac{4}{5} \times 80 - \frac{4}{5}x$$

$$= 40 \text{ (because final concentration is 50\%)}$$

$$x = 30\ell$$

6. (b); Let total salary → 100

13% in FD

12% in PPF

Remaining = 75

$$\text{In clothes} \rightarrow \frac{75 \times 3}{25} \rightarrow 9$$

$$\text{In food} = 66 \times \frac{3}{11} \rightarrow 18$$

$$\text{In education} \rightarrow 48 \times \frac{5}{12} \rightarrow 20$$

$$\text{Remaining} \rightarrow 48 - 20 \rightarrow 28$$

Half in scheme → 14

$$\text{Amount} \rightarrow 14 + \frac{14 \times 10 \times 5}{100} = 16800$$

$$1 \rightarrow 800$$

$$100 \rightarrow 80000$$

Amount in FD and PPF → 20,000

7. (e); Let cost of pure rice per kg is 10 Rs.

So cost of impure rice per kg is 4 Rs.

Total cost for the shopkeeper

$$= 12 \times 10 + (4 + 4) \times 4$$

$$= 120 + 32 \Rightarrow = 152 \text{ Rs.}$$

Total selling price

$$= \text{Total quantity sold} \times \frac{120}{100} \times 10$$

$$= (12 + 4 - 4 + 4) \times \frac{120}{100} \times 10 = 16 \times 12$$

$$= 192$$

$$\text{Required percentage} = \frac{192 - 152}{152} \times 100$$

$$= \frac{50}{19} \%$$

8. (a); Monthly income of Sameer

$$= \frac{8.4}{12} \text{ lakh}$$

$$= 70000 \text{ Rs.}$$

$$\text{Spend on Rent} = 70000 \times \frac{1}{7}$$

$$= 10000$$

$$\text{Spend on Food} = (70000 - 10000) \times \frac{1}{6}$$

$$= 10000$$

Spend on (Coth + travel)

$$= (70000 - 20000) \times \frac{11}{20}$$

$$= 27500 \text{ Rs.}$$

Saving = 22500 Rs.

$$\text{Expend on travel} = 27500 \times \frac{8}{25}$$

$$= 8800$$

$$\text{Required difference} = (22500 \times 12 - 8800 \times 12) \text{ Rs.}$$

$$= (270000 - 105600) \text{ Rs.}$$

$$= 164400 \text{ Rs.}$$

9. (b); Total CP of one shoes = $(500 + 300 + 100)$
 $= 900$
 CP of 150 shoes = 900×150
 CP of 75 shoes = $\frac{900 \times 75}{2}$
 Let's required percentage = x
 $\therefore \frac{900 \times 75}{2} + \left(\frac{100 + x}{100}\right) \times (900 \times 75)$
 $= \frac{150}{100} \times 900 \times 150$
 $= 33750 + 67500 + 675x = 202500$
 $= 675x = 202500 - 101250$
 $675x = 101250$
 $x = \frac{101250}{675}$
 $x = 150\%$

10. (b); Let's total quantity of glass = 10 ml
 So, ram from type A ligure = $6\text{ml} \times \frac{35}{100}$
 $= 2.1 \text{ ml}$
 Ram from type B ligure = $4\text{ml} \times \frac{40}{100}$
 $= 1.6 \text{ ml}$
 Total Rum = $(2.1 + 1.6) \text{ ml}$
 $= 3.7 \text{ ml}$
 Required % = $\frac{3.7 \text{ ml}}{10} \times 100 = 37\%$

11. (d); Total CP of one DI book = $125 + 15 + 40$
 $= 180 \text{ Rs.}$
 C.P. of 1500 books = 1500×180
 SP of 750 book = $\frac{750 \times 180}{2}$
 Let required percent = $x\%$
 $\therefore \frac{750 \times 180}{2} + \left(\frac{100 + x}{100}\right) \times (750 \times 180)$
 $= \frac{120}{100} \times 180 \times 1500$
 $67500 + 135000 + 1350x = 324000$
 $1350x = 324000 - 202500$
 $x = \frac{121500}{1350} = 90\%$

12. (a); CP of puzzle book = $\frac{475}{125} \times 100$
 $= 380 \text{ Rs.}$
 CP of DI book = $\frac{575}{115} \times 100$
 $= 500 \text{ Rs.}$
 For 30% profit on both
 $= (380 + 500) \times \frac{130}{100}$
 $= 1144$
 DI book should be sold
 $= 1144 - 360$
 $= 784 \text{ Rs.}$

13. (a); Let x kg is quantity of type 1 Rice
 y kg is quantity of type 2 Rice
 Let cost of type 2 Rice = $5a$ per kg
 So cost of type 1 Rice = $6a$ per kg
 Now cost price of mixture = $6ax + 5ay$
 Selling price of mixture = $5.5a$ per kg
 $= 5.5ax + 5.5ay$
 Profit = $\frac{0.5ay - 0.5ax}{5ay + 6ax} \times 100 = \frac{100}{43}$
 $x : y = 3 : 5$

14. (d); Arun Mark = $432 - 112 = 320$
 Lets total Mark = x
 ATQ
 Sonakshi = $\frac{60x}{100} = (320 + 64)$
 $x = \frac{384 \times 100}{60} = 640$
 Required % = $\frac{320}{640} \times 100 = 50\%$

15. (d); We can conclude
 $A : (B + C + D) = 100 : 460 = 10 : 46$
 $\Rightarrow A$'s contribution = 10 lakhs
 $\& B : (A + C + D) = 100 : 366.66$
 $= 3 : 11 = 12 : 44$
 $\Rightarrow B$'s contribution = 12 lakh
 $\& C : (A + B + D) = 40 : 100$
 $= 2 : 5 = 16 : 40$
 $\Rightarrow C$'s Contribution = 16 lakh
 Hence, the contribution of D
 $= 56 - (10 + 12 + 16) = 18 \text{ lakhs}$

Previous Year Question

1. (a); let salary of Manoj be Rs $100x$
 Amount given to wife = $\frac{60}{100} \times 100x = \text{Rs.} 60x$
 ATQ, $60x \times \frac{50}{100} = 18000$
 $x = 600$
 Salary of Manoj = $100x = \text{Rs } 60000$

2. (c); Let total students be $100x$
 Then passed students be $60x$
 Passed boys & girls are $30x$ each.
 Let failed girls = y
 Now

$y + 3y = 40x$
 $4y = 40x$
 $y = 10x$
 Required percentage = 10%

3. (e); Let the number of students in the exam be $55x$
 Then number of boys = $36x$
 Number of girls = $19x$
 ATQ
 $55x + 1725 = (36x + 1440) + 19x \times 1.15$
 $x = 100$
 Increased number of boys = $3600 + 1440 = 5040$

4. (e); Let the salary of A and B be Rs 100x and Rs 300x respectively
 ATQ
 $85x + 255x = 42500$
 $x = 125$
 House rent paid by A = Rs 1875
5. (e); Let the numerator and denominator of a fraction be x and y respectively
 ATQ
 $x + 4 = 1.5y$ (i)
 And $\frac{x+5}{2y} = \frac{x}{y} \Rightarrow x = 5$
 and $y = 6$
 Original fraction = $\frac{5}{6}$
 Required fraction = $\frac{5}{6} \times 2 = \frac{5}{3}$
6. (c); Let total male & female registered voters in village - X be 10a & 10b respectively.
 ATQ,
 $10a - 10b = 2000$
 $a - b = 200$... (i)
 And,
 $7a + 4.5b = 6000$... (ii)
 On solving (i) & (ii), we get:
 $a = 600, b = 400$
 So, total registered voters in village - X = $10a + 10b = 10 \times (600 + 400) = 10000$
7. (c); Let the unit digit and tens digit of the number be y and x respectively.
 Original number = $(10x + y)$
 ATQ
 $1.75(10x + y) = 10y + x$
 $x : y = 1 : 2$
 let the unit and tens digits be 2a and 1a respectively
 Now, $(21a) + 9 = 2(12a)$
 $a = 3$
 unit digit = 6
 and tens digit = 3
 Sum of both the digits = 9
8. (b); required population = $15000 \times 0.9 \times 1.2 = 16200$
9. (a); Let total students in the school be 100x.
 So, number of students went on the picnic = 39x
 And, number of boys went on the picnic = $75x \times \frac{32}{100} = 24x$
 So, number of girls went on the picnic = $39x - 24x = 15x$
 Required percentage = $\frac{15x}{25x} \times 100 = 60\%$
10. (c); Let total income of B = 100x Rs.
 So, total income of A
 $= 100x \times \left(1 + \frac{20}{100}\right) = 120x$ Rs.

ATQ -

$$(100x + 120x) \times \frac{30}{100} = 26400$$

$$66x = 26400$$

$$x = 400 \text{ Rs.}$$

So, income of B = $400 \times 100 = 40000$ Rs.

11. (b); Let A's monthly salary be Rs. 100x
 So, A's expenditure on house rent = 30x
 And, A's expenditure on clothing
 $= (100x - 30x) \times \frac{40}{100} = 28x$
 Monthly amount given by A to his son = $(100x - 30x - 28x) \times \frac{4}{14} = 12x$
ATQ,
 $28x - 12x = 24000$
 $x = 1500$
 A's annual expenditure on house rent = $30 \times 1500 \times 12 = \text{Rs. } 540000$
12. (b); Sonal's total spent = $45760 + 27896 = \text{Rs. } 73656$
 $\therefore 72\% = \text{Rs. } 73656$
 $100\% = \frac{73656}{72} \times 100 = \text{Rs. } 102300$
13. (b); Rajesh's total spent = $44620 + 32764 = 77384$
 $\therefore 68\% = 77384$
 $100\% = \frac{77384}{68} \times 100 \text{ Rs.} = 113800$
14. (d); Harjeet total monthly, expenditure = $50 + 20 + 5 = 75\%$
 $\therefore 25\% = 11250 \Rightarrow 100\% = \frac{11250}{25} \times 100 = 45000$
 Harjeet total monthly income = 45000
15. (b); Mr. Giridhar's total expenditure
 $= 50\% + 50 \times \frac{(50 + 25 + 10)}{100} \% = 50\% + 50 \times \frac{85}{100} \% = 50 + 42.5\% = 92.5\%$
 Saving = $100 - 92.5\% = 7.5\%$ p 7.5% = 900
 $100\% = \frac{900}{7.5} \times 100 = 12000$
16. (a); Shruti's donation = $\left(12 \times \frac{75}{100}\right) \% = 9\%$
 $\therefore 9\% = 3150 \Rightarrow 100\% = \frac{3150}{9} \times 100 = 35,000$
17. (a); Asha's monthly income = $78000 \times \frac{60}{100} = \text{Rs. } 46800$
 Maya's monthly income = $\frac{46800 \times 100}{120} = \text{Rs. } 39000$
18. (c); Let the share of B be x Rs.
 According to the question
 $\therefore \text{share of C} = x \left(\frac{100 - 25}{100}\right) = \frac{3}{4}x$

$$\text{share of A} = \frac{3}{4}x \left(\frac{125}{100} \right) = \frac{3}{4}x \times \frac{5}{4} = \frac{15}{16}x$$

$$\therefore \frac{15}{16}x + x + \frac{3}{4}x = 2236$$

$$x = \frac{15}{16} \times 832 = 780 = 832$$

$$\therefore \text{Share of A} = 15 \times \frac{832}{16} = \text{Rs. } 780$$

19. (c); Pooja's total investment = 13 + 23 + 8 = 44%
 $\therefore 13\% = 8554$

$$\text{Then } 44\% = \frac{8554}{13} \times 44 = \text{Rs. } 28952$$

$$\text{Annual investment} = 28952 \times 12 = 347424$$

20. (b); Total investment by Mr Sanang = (6 + 8 + 9)%
 = 23%

$$\therefore 6\% = 2100 \Rightarrow 23\% = \frac{2100}{6} \times 23 = 8050$$

$$\therefore \text{Annual investment by Mr. Sanang} = 8050 \times 12 = 96600$$

21. (d); Total investment by Mr. Jain = (14 + 21 + 6.5)%
 = 41.5%

$$\therefore 14\% = 7014 \Rightarrow 41.5\% = \frac{7014}{14} \times 41.5 = 20791.5$$

$$\therefore \text{Annual investment by Mr. Jain} = 20791.5 \times 12 = 249498$$

22. (c); Let maximum marks be x.

According to the question

$$10\% \text{ of } x = 256 - 192 = \frac{10}{100} \Rightarrow x = 64 \text{ } \bar{P} \text{ } x = 640$$

23. (c); Let the total votes = 100 x.

Given, Total votes cast = 60x

$$\text{Total valid votes} = 60x - \frac{60 \times 4}{100} = 57.6x$$

According to the question

$$57.6x \times \frac{75}{100} = 7344 \Rightarrow x = 170$$

$$\therefore \text{Total votes} = 100x = 170 \times 100 = 17000$$

24. (e); Total % of money left = 100 - (52 + 23)% = 25%

$$\therefore 25\% = 4500$$

$$100\% = \frac{4500 \times 100}{25} = \text{Rs. } 18000$$

25. (c); No. of students speak only Hindi

$$= 60 \times \frac{40}{100} = 24$$

No. of students speak only English

$$= 60 \times \frac{25}{100} = 15$$

No. of students speak both languages

$$= 60 - (24 + 15) = 21$$

No. of students speak English = 15 + 21 = 36

26 (d); In this question profit is not given.

\therefore The answer is cannot be determined

adda247

Profit and Loss

Theory:

Cost Price (CP): The money paid by the shopkeeper to the manufacturer or whole -seller to buy goods is called the cost price (cp) of the goods purchased by the shopkeeper.

Selling Price (SP): The price at which the shopkeeper sells the goods is called selling price (s.p) of the goods sold by the shopkeeper to the customer.

Profit: If the selling price of an article is more than its cost price, then the dealer (or shopkeeper) makes a profit (or gain)

$$\text{i.e., Profit} = \text{SP} - \text{CP}; \text{SP} > \text{CP}$$

Loss: If the selling price of an article is less than its cost price, the dealer suffers a loss

$$\text{i.e., Loss} = \text{CP} - \text{SP}; \text{CP} > \text{SP}$$

Some Important Formulae:

(i) Profit = SP - CP

(ii) Loss = CP - SP

(iii) Profit percentage = $\left(\frac{\text{Profit}}{\text{CP}} \times 100\right)\%$

(iv) Loss percentage = $\left(\frac{\text{Loss}}{\text{CP}} \times 100\right)\%$

(v) $\text{S.P} = \left(\frac{(100 + \text{Profit}\%) \times \text{CP}}{100}\right) = \left(\frac{(100 - \text{Loss}\%) \times \text{CP}}{100}\right)$

(vi) $\text{C.P} = \left(\frac{100 \times \text{SP}}{100 + \text{Profit}\%}\right) = \left(\frac{100 \times \text{SP}}{100 - \text{Loss}\%}\right)$

(vii) SP = (100 + x)% of CP; when Profit = x% of CP

(viii) SP = (100 - x)% of CP; when Loss = x% of CP

Example 1: A man purchases an item for Rs. 120 and he sells it at a 20 percent profit, find his selling price

Sol. $\text{SP} = \left(\frac{100 + \text{Profit}\%}{100}\right) \times \text{CP} = \frac{100 + 20}{100} \times 120 = \frac{120}{100} \times 120 = \text{Rs. } 144$

Note: Profit /Loss percentage is always calculated on C.P. unless otherwise stated.

Example 2: Find the cost price of an article which is sold for Rs. 200 at a loss of 20%

Sol. $\text{CP} = \frac{100}{100 - \text{Loss}\%} \times \text{SP} = \frac{100}{100 - 20} \times 200 = \text{Rs. } 250$

Concept 1:**MARK UP AND DISCOUNT**

Marked Price: To avoid loss due to bargaining by the customer and to get profit over the cost price, the trader increases the cost price. This increase is known as markup and the increased price (i.e., cp+markup) is called the marked price or printed price or list price of the goods.

$$\text{Marked Price} = \text{CP} + \text{markup}$$

$$\text{Marked Price} = \text{CP} + \frac{(\% \text{marked}) \times \text{CP}}{100}$$

Generally goods are sold at marked price, if there is no further discount, then in this case selling price equals marked price.

Discount: Discount means reduction of marked price to sell at a lower rate or literally discount means concession. Basically, it is calculated on the basis of marked price.

$$\text{Selling price} = \text{Marked price} - \text{Discount}$$

$$\text{Selling price} = \text{MP} - \frac{(\% \text{Discount}) \times \text{MP}}{100}$$

Example: If the cost price of an article is Rs. 300 and the percent markup is 30%. What is the marked price?

Sol. $MP = CP + (\% \text{markup on CP}) = 300 + \frac{30}{100} \times 300 = \text{Rs. } 390$

Concept 2:

Dishonest Dealer Case: If a trader professes to sell his goods at cost price, but uses false weights, then

$$\% \text{ gain} = \frac{\text{Error}}{\text{True value} - \text{Error}} \times 100 \quad \Rightarrow \quad \% \text{ gain} = \frac{\text{True weight} - \text{False weight}}{\text{False weight}} \times 100$$

Example: A shopkeeper sold an article at cost price but use the weight of 960 gm in place of 1 kg weight. Find his profit%?

Sol. $\text{Profit}\% = \frac{\text{True weight} - \text{False weight}}{\text{False weight}} \times 100 = \frac{1000 - 960}{960} \times 100 = \frac{40}{960} \times 100 = \frac{25}{6} = 4\frac{1}{6}\%$

Concept 3:

Where two articles are sold at same price but one of them at a profit and another at a loss and the percentage profit is the same as the percentage loss, In this case there is always a loss.

$$\text{Loss}\% = \left(\frac{\text{Common Profit or Loss}\%}{10} \right)^2 = \left(\frac{\% \text{value}}{10} \right)^2$$

Example: Each of two car is sold for Rs. 1000. The first one is sold at 25% profit and the other one at 25% loss. What is the percentage loss or gain in the deal?

Sol. Total s.p =

$$\begin{aligned} \text{CP of 1st car} &= \frac{100 \times 1000}{125} \quad [\because \text{Profit} = 25\%] \\ &= \text{Rs. } 800 \end{aligned}$$

$$\begin{aligned} \text{CP of 2nd car} &= \frac{100 \times 1000}{75} \quad [\because \text{Loss} = 25\%] \\ &= \text{Rs. } 1333\frac{1}{3} \end{aligned}$$

$$\text{Total CP} = \text{Rs. } 2133\frac{1}{3} \Rightarrow \text{Loss}\% = \frac{\text{CP} - \text{SP}}{\text{CP}} \times 100 = \frac{2133\frac{1}{3} - 2000}{2133\frac{1}{3}} \times 100 = 6.25\%$$

or, Using Shortcut Formula

$$\text{Loss}\% = \left(\frac{\% \text{value}}{10} \right)^2 = \left(\frac{25}{10} \right)^2 = 6.25\%$$

Concept 4:

When two successive discounts on an article are x% and y% resp. then net discount: $\left(x + y - \frac{xy}{100} \right)\%$

Example: A shopkeeper given two successive discount of 50% and 50% find the real (equivalent) discount?

Sol. Let MP = Rs. 100

Cost after 1st discount of 50% = 100 - 50% of 100 = Rs. 50

Cost after 2nd discount of 50% = 50 - 50% of 50 = Rs. 25

Price after both discount = Rs. 25

$$\% \text{ discount} = \frac{100 - 25}{100} \times 100 = 75\%$$

or, Using Shortcut Formula

$$\% \text{ discount} = x + y - \frac{xy}{100} \quad [\text{where } x = 50\%, y = 50\%]$$

$$= 50 + 50 - \frac{50 \times 50}{100} = 100 - 25 = 75\%$$

Solved Examples

1. There is a profit of 20% on the cost price of an article. Find the profit percent when calculated on selling price?

Sol. Let the cost price of an article be Rs. 100
 then, Profit = 20% of 100 = Rs. 20
 Selling price = Cost price + profit
 = 100 + 20 = Rs. 120
 Profit% when calculated on SP
 $= \frac{20}{120} \times 100 = \frac{100}{6}$

2. By selling a bicycle for Rs. 2850, a shopkeeper gains 14%. If the profit is reduced to 8%, find the selling price of bicycle?

Sol. $CP = \frac{SP \times 100}{100 + \text{Profit}\%} = \frac{2850 \times 100}{100 + 14}$
 $= \frac{2850 \times 100}{114} = \text{Rs. } 2500$
 SP of article for 8% Profit
 $SP = \frac{CP \times (100 + \text{Profit}\%)}{100} = \frac{2500 \times 108}{100}$
 $= 25 \times 108 = \text{Rs. } 2700$

3. The selling price of 12 articles is equal to the cost price of 15 articles. Find the gain percent?

Sol. Let the CP of 1 article = Rs. x
 Cost Price of 15 article = Rs. 15x
 Selling Price of 12 article = Rs. 15x
 SP of 1 article = Rs. $\frac{15}{12}x$
 Gain = $\frac{15x}{12} - x = \frac{3x}{12} = \frac{x}{4}$
 Gain% = $\frac{\text{Gain} \times 100}{CP} = \frac{\frac{x}{4} \times 100}{x} = 25\%$

4. A fruit seller buys some fruits at the rate of 11 for Rs. 10 and the same number at the rate of 9 for Rs. 10. If all the fruits are sold for Rs. 1 each. Find the gain or loss percent?

Sol. In these types of question, we have to take the LCM of number of individual things.
 Number of fruits of each type he bought
 = LCM of 11 and 9 = 99
 Total number of fruits = 99 × 2 = 198
 CP of 198 fruits = $\frac{10}{11} \times 99 + \frac{10}{9} \times 99$
 $= 90 + 110 = \text{Rs. } 200$
 SP = 198 × 1 = Rs. 198
 Loss% = $\frac{CP - SP}{CP} \times 100 = \frac{200 - 198}{200} \times 100$
 $= \frac{2}{200} \times 100 = 1\%$

5. A book vendor sold a book at a loss of 10%. Had he sold it for Rs. 108 more, he would have earned a profit of 10%. Find the cost of the book.

Sol. Let the CP article = x
 $SP = \frac{x(100-10)}{100} = \frac{90x}{100} = \frac{9x}{10}$ [Loss of 10%]
 $\frac{9x}{10} + 108 = \frac{110x}{100}$ [If vendor sold for Rs. 108 more]
 $\frac{110x}{100} - \frac{9x}{10} = 108$ $\frac{11x}{10} - \frac{9x}{10} = 108$
 $2x = 1080$ $2x = \text{Rs. } 540$

6. A person bought some article at the rate of 5 per rupee and the same number at the rate of 4 per rupee. He mixed both the types and sold at the rate of 9 for Rs. 2. In this business he suffered a loss of Rs. 3. Find th total no. of articles bought by him?

Sol. Let the person buys 10 articles
 Total CP = Rs. $(5 \times \frac{1}{5} + \frac{5 \times 1}{4}) = \text{Rs. } (1 + \frac{5}{4}) = \text{Rs. } \frac{9}{4}$
 SP of 10 articles = $\frac{2}{9} \times 10 = \text{Rs. } \frac{20}{9}$
 Loss = Rs. $(\frac{9}{4} - \frac{20}{9}) = (\frac{81 - 80}{36}) = \text{Rs. } \frac{1}{36}$
 If loss is Rs. $\frac{1}{36}$, then number of articles = 10
 If loss is Rs. 3, number of articles = $36 \times 10 \times 3 = 1080$

7. A man buys a field of agricultural land for Rs. 360000. He sell $\frac{1}{3}$ rd $\frac{1}{3}$ rd sat a loss of 20% and $\frac{2}{5}$ that a gain of 25%. At what price must he sell the remaining field so as to make an overall profit of 10%?

Sol. SP of total agricultural field = Rs. $(360000 \times \frac{110}{100})$
 $= \text{Rs. } 396000$ [overall profit of 10%]
 SP of $\frac{1}{3}$ rd of the field
 $= \frac{1}{3} \times 360000 \times \frac{80}{100}$ [Loss of 20%] $\Rightarrow \text{Rs. } 96000$
 SP of $\frac{2}{5}$ th of the field
 $= \frac{2}{5} \times 360000 \times \frac{125}{100}$ [Gain of 25%] $\Rightarrow \text{Rs. } 180000$
 SP of the remaining field
 $= \text{Rs. } (396000 - 96000 - 180000) = \text{Rs. } 120000$

8. One trader calculates the percentage of profit on the buying price and another calculates on the selling price. When their selling price are the same, then difference of their actual profit is Rs. 85 and both claim to have made 20% profit. What is the selling price of each?

Sol. For first trader,

Let the CP of the article of Rs. 100, SP = Rs. 120

For second trader, SP of the article = Rs. 120

Gain = 20% [For both the traders]

Let the CP be x

$$\frac{120-x}{120} \times 100 = 20 \Rightarrow 120 - x = \frac{20}{5} \times 6$$

$$\Rightarrow 120 - x = 24 \Rightarrow x = 120 - 24 = \text{Rs. } 96$$

Gain = Rs. 24 [SP - CP]

Difference of gain = 24 - 20 = Rs. 4

If the difference of gain be Rs. 4, then

SP = Rs. 120

When the difference be Rs. 85, then

$$SP = \frac{120}{4} \times 85 = \text{Rs. } 2550$$

9. If the sales tax be reduced from $3\frac{1}{2}\%$ to $3\frac{1}{3}\%$. What difference does it make to person who purchases an article whose marked price is Rs. 8400?

Sol. Initial sales tax, = $3\frac{1}{2}\%$ Final sales tax = $3\frac{1}{3}\%$

Difference in percentage of sales tax

$$= \left(3\frac{1}{2} - 3\frac{1}{3}\right)\%$$

$$\text{Req. diff.} = \frac{1}{6}\% \times 8400 = \frac{1}{6} \times \frac{1}{100} \times 8400 = \text{Rs. } 14$$

10. A man sells two cycle for Rs. 1710. The cost price of the first is equal to the selling price of the second. If the first is sold at 10% loss and the second at 25% gain, what is his total gain or loss?

Sol.

	1 st Cycle	2 nd Cycle	Total
CP	100	$100 \left(\frac{100}{125}\right) = 80$	180
SP	$100 \left(\frac{90}{100}\right) = 90$	100	190

$$\begin{aligned} \text{Total CP} &= (\text{CP of 1st Cycle}) + (\text{CP of 2nd Cycle}) \\ &= 100 + 80 = \text{Rs. } 180 \end{aligned}$$

$$\begin{aligned} \text{Total SP} &= (\text{SP of 1st Cycle}) + (\text{SP of 2nd Cycle}) \\ &= 90 + 100 = \text{Rs. } 190 \end{aligned}$$

$$\text{CP} : \text{SP} = 180 : 190 = 18 : 19$$

$$\text{Profit} = \frac{19-18}{19} \times 1710 = \text{Rs. } 90$$

11. Ashish bought an article with 20% discount on the labelled price. He sold the article with 30% profit on the labelled price. What was his percent profit on the price he bought?

Sol. Let the labelled price of the article be Rs. x

$$\text{Cost Price} = x \left(\frac{100-20}{100}\right) = \text{Rs. } \frac{4x}{5}$$

$$\text{Selling Price} = x \left(\frac{100+30}{100}\right) = \text{Rs. } \frac{13}{10}x$$

$$\text{Profit} = \frac{13}{10}x - \frac{4}{5}x = \frac{13x-8x}{10} = \frac{x}{2} \quad [\text{SP} - \text{CP}]$$

$$\% \text{Profit} = \frac{\frac{x}{2}}{\frac{4x}{5}} \times 100 = \frac{5}{8} \times 100 = \frac{125}{2} = 62.5\%$$

12. A shopkeeper sold an article for Rs. 400 after giving 20% discount on the labelled price and made 20% profit on cost price. What was the percentage profit, had he not given the discount?

Sol. Labelled Price = $\frac{400 \times 100}{80}$ [Before discount of 20%]
= Rs. 500

$$\begin{aligned} \text{Cost Price of article} \\ &= \frac{400 \times 100}{120} = \text{Rs. } \frac{1000}{3} \quad [20\% \text{ profit on CP}] \end{aligned}$$

$$\begin{aligned} \text{Profit\%} &= \frac{500 - \frac{1000}{3}}{\frac{1000}{3}} \times 100 = \frac{1500 - 1000}{1000} \times 100 \\ &= \frac{500}{1000} \times 100 = 50\% \end{aligned}$$

13. A reduction of 20% in the price of mangoes enables a person to purchase 12 more for Rs. 15. Find the price of 16 mangoes before reduction?

Sol. Let the price of 1 mango be x paise

Number of mangoes for

$$\text{Rs. } 15 = \frac{1500}{x} \quad [\text{Rs. } 1 = 100 \text{ paise}]$$

New price of one mango = (80% of x) paise

$$= \frac{80}{100} \times x = \frac{4}{5}x \text{ paise}$$

$$\text{Number of mangoes for Rs. } 15 = \left(\frac{1500 \times 5}{4x}\right)$$

$$\frac{7500}{4x} - \frac{1500}{x} = 12 \quad [\text{Diff. as mentioned in the Ques.}]$$

$$x = 31.25$$

Cost of 16 mangoes before reduction

$$= \frac{31.25 \times 16}{100} = \text{Rs. } 5$$

14. A garment company declared 15% discount for wholesale buyers. Mr. Hemant bought garments from the company for Rs. 8500 after getting discount. The fixed up selling price of garments in such a way that he earned a profit of 10% on original company price. What is the total selling price?

Sol. Original Company price = $\frac{8500 \times 100}{100 - 15} = \text{Rs. } 10000$

Let the total selling price be Rs. x.

Now, according to the question,

$$\frac{x - 10000}{10000} \times 100 = 10 \quad [\text{Profit of } 10\%]$$

$$100x - 1000000 = 100000 \Rightarrow x = \text{Rs. } 11000$$

Total selling price = Rs. 11000

- 15.** A publisher published 5000 books in 5 lakh rupees. If he gives 500 books in free, $\frac{2}{3}$ rd of the rest he sell on 20% discount and remaining $\frac{1}{3}$ rd on M.P. He also gives 20% commission of the total selling. Find the profit% of the publisher if market price of each book is Rs. 200?

Sol. Total number of books = 5000

he gives free book = 500

$$\text{SP of 1st part} = 3000 \times 200 \times \frac{4}{5} = \text{Rs. } 480000$$

[20% Discount on $\frac{2}{3}$ rd of rest]

$$\text{SP or 2nd part} = 1500 \times 200 = \text{Rs. } 300000$$

[Price is MP of $\frac{1}{3}$ rd of the rest]

$$\text{Total SP} = 480000 + 300000 = \text{Rs. } 780000$$

$$\text{Total SP after Commission} = \frac{80}{100} \times 780000$$

[20% Commission]

$$= \text{Rs. } 624000$$

$$\text{Total CP} = \text{Rs. } 5,00,000, \text{ Total SP} = \text{Rs. } 6,24,000$$

$$\text{Net profit} = 6,24,000 - 5,00,000 = 1,24,000$$

$$\text{Profit\%} = \frac{124000}{500000} \times 100 = 24.8\%$$

Basic Questions

- A man buys an article for Rs. 27.50 and sells it for Rs. 28.60. Find the gain percent?
(a) 4% (b) 3% (c) 5%
(d) 10% (e) None of these
- If a radio is purchased for Rs. 490 and sold for Rs. 465.50. Find the loss%?
(a) 6% (b) 5% (c) 4%
(d) 3% (e) None of these
- Find SP when CP = Rs. 56.25 and Gain = 20%?
(a) Rs. 72 (b) Rs. 67.5 (c) Rs. 50
(d) Rs. 75 (e) None of these
- Find SP when CP = Rs. 80.40, loss = 5%?
(a) Rs. 81 (b) Rs. 84.72 (c) Rs. 76.38
(d) Rs. 82.9 (e) None of these
- Find CP when SP = Rs. 40.60, gain = 16%?
(a) Rs. 35 (b) Rs. 50 (c) Rs. 75
(d) Rs. 89 (e) None of these
- If the cost price is 96% of the selling price, then what is the profit percent?
(a) 5.72% (b) 3.72% (c) 8.92%
(d) 2.8% (e) None of these
- A discount dealer professes to sell his goods at cost price but uses a weight of 960 gms instead of a Kg weight. Find his gain%?
(a) $\frac{27}{4}\%$ (b) $\frac{8}{3}\%$ (c) $\frac{25}{6}\%$
(d) $\frac{21}{4}\%$ (e) None of these
- A man sold two cows at Rs. 1995 each. On one he lost 10% and on the other he gained 10%. What his gain or loss percent?
(a) 4% (b) 2% (c) 0.5%
(d) 1% (e) None of these
- Two discounts of 40% and 20% equal to a single discount of?
(a) 48% (b) 53% (c) 52%
(d) 60% (e) None of these
- Amit purchased 13 chair of Rs. 115 each and sold all at Rs. 1220. Then find the profit or Loss on the transaction
(a) Rs. 280 Loss (b) Rs. 275 Loss (c) Rs. 325 Profit
(d) Rs. 350 Profit (e) None of these
- Some articles were bought at 6 articles for Rs. 5 and sold at 5 articles for Rs. 6. Gain percent is:
(a) 30% (b) $33\frac{1}{3}\%$ (c) 35%
(d) 44% (e) None of these
- The cost price of 12 tables is equal to the selling price of 16 tables. The loss percent is
(a) 15% (b) 20% (c) 25%
(d) 30% (e) None of these
- A sells a bicycle to B at a profit of 20% and B sells it to C at a profit of 25%. If C pays Rs. 1500, what did A pay for it?
(a) Rs. 825 (b) Rs. 1000 (c) Rs. 1100
(d) Rs. 1125 (e) None of these

14. If the CP of 13 bats is Rs. 390. What is the price when it is sold at 10% loss?
 (a) Rs. 200 (b) Rs. 300 (c) Rs. 350
 (d) Rs. 400 (e) None of these

15. If an item is sold for Rs. 924 then there is a profit of 10% then what is the cost price?
 (a) Rs. 840 (b) Rs. 860 (c) Rs. 880
 (d) Rs. 900 (e) None of these

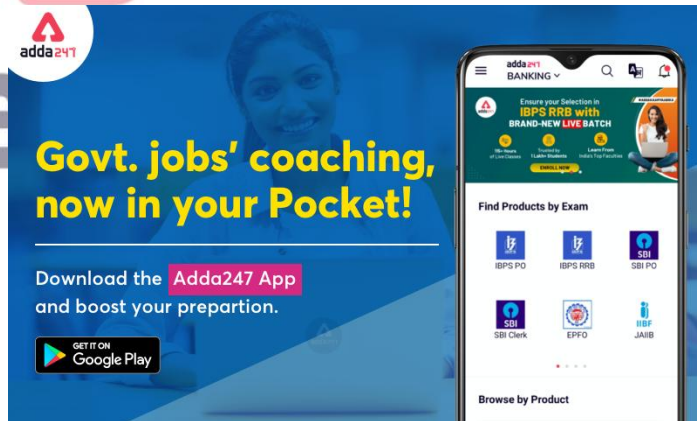
Prelims Questions

Level - 1

1. A shopkeeper earns profit of $16\frac{2}{3}\%$ after selling a book at 12.5% discount on the printed price. Then, find the ratio of the cost price & printed price of the book?
 (a) 1 : 2 (b) 2 : 3 (c) 3 : 4
 (d) 4 : 5 (e) 5 : 6
2. A sells man has 6 red and 5 black shirts. If two shirts are picked up randomly, then what is the probability of getting shirts of same color?
 (a) $\frac{6}{11}$ (b) $\frac{5}{11}$ (c) $\frac{10}{11}$
 (d) $\frac{7}{11}$ (e) $\frac{4}{11}$
3. Ratio of cost price to that of marked price is 3: 5 and ratio of loss to that of discount is 1:4 then find the discount % given?
 (a) $48\frac{1}{3}\%$ (b) $53\frac{1}{3}\%$ (c) $58\frac{1}{3}\%$
 (d) $63\frac{1}{3}\%$ (e) 60 %
4. On selling 40 articles for Rs. 68 a shopkeeper incurred a loss of 25%. How many articles he should sell for Rs. 51 to earn profit of 12.5%?
 (a) 15 (b) 20 (c) 24
 (d) 18 (e) 30
5. Cost price of 20 pens is same as selling price of 16 pens and profit earned on 4 pens is same as discount given on 3 pens then find the mark up percentage with respect to cost price?
 (a) $33\frac{1}{3}\%$ (b) $66\frac{2}{3}\%$ (c) $48\frac{1}{3}\%$
 (d) $58\frac{1}{3}\%$ (e) $57\frac{1}{2}\%$
6. Mohan mixed two types of wheats costing Rs. 80 per kg and Rs. 120 per kg in the ratio of 1 : 3 and sold this mixture at the price of Rs. 143 per kg. Find the profit percentage of Mohan?
 (a) 25% (b) 30% (c) 35%
 (d) 40% (e) 20%
7. A shopkeeper sold an article at a profit of $13\frac{1}{3}\%$ of its selling price to Anurag. If Anurag further sold it at 2.5% loss for Rs. 1170. Find cost price of shopkeeper.
 (a) Rs 980 (b) Rs 1110 (c) Rs 1040
 (d) Rs 1080 (e) Rs 1140
8. A trader wants to earn $16\frac{2}{3}\%$ profit after allowing a discount of 25% find by how much percent he has to increase his cost price to make it marked price?(approximate)
 (a) 50% (b) 56% (c) 40%
 (d) 52% (e) 46%
9. A shopkeeper sells a product after allowing two successive discounts of 10% and 20% on it. Find the profit percent if the profit is 30% of the price by which the product is marked up?
 (a) 30% (b) 17.5% (c) 25%
 (d) 15% (e) 20%
10. When an article is sold at 75% of certain selling price, there is a loss of 20%. Calculate profit percent when the same article is sold at 125% of the certain selling price?
 (a) $33\frac{1}{3}\%$ (b) $22\frac{2}{9}\%$ (c) 30%
 (d) $32\frac{1}{2}\%$ (e) 36%
11. An article is sold at 40% discount on M.P. and ratio of C.P. to S.P. is 5: 8 then what is the M.P. of article if the profit obtained on the article is Rs. 450.
 (a) Rs. 1400 (b) Rs. 2400 (c) Rs. 1600
 (d) Rs. 2200 (e) Rs. 2000
12. Marked price of an article is Rs 360 more than its cost price. If profit earned is equal to the discount given then find the profit earned?
 (a) Rs 190 (b) Rs 200 (c) Rs 150
 (d) Rs 180 (e) Rs 175
13. Veer purchased two mobiles for Rs. 36,000 and he sold first mobile at 30% profit and second mobile at 20% loss. If in this transaction Veer gets no profit no loss, then by how much rupees more than the previous selling price, the second mobile must be sold in order to make a profit of 25% on it?
 (a) Rs. 9720 (b) Rs. 9700 (c) Rs. 9750
 (d) Rs. 9690 (e) Rs. 9780

14. Ashish buys a T.V at a discount of 15 %.If he buys the same T.V at a discount of 12.5%, then he would have to pay Rs. 175 more. Find the marked price of T.V?(in Rs.)
 (a) 6000 (b) 7000 (c) 5000
 (d) 6500 (e) 7500
15. The cost price of 50 items is equal to the marked price of 30 items. If no profit or loss is made in selling those items, then what is the percentage discount provided?
 (a) 50 % (b) 45 % (c) 55 %
 (d) 40 % (e) 35 %
16. Arun purchased 8 apples for Rs. 40 while 10 oranges at Rs. 30. he sold an apple at Rs. 6 while an orange at Rs. 4. What will be his profit/loss% if he sells equal quantity of both?
 (a) 15 % (b) 20 % (c) 25%
 (d) 22 % (e) None of these
17. There are 3 articles A, B and C having same cost price which are sold at 10% profit, 15% profit and 10% loss respectively. find the overall profit/loss percentage.
 (a) 15 % loss (b) 15% profit (c) 5% loss
 (d) 5% profit (e) None of these
18. When a discount of 20% is given on a product then a loss of 4% occurs. When a discount of 6.5% is given on the same product, then what will be the profit percent?
 (a) 13.4% (b) 11.5% (c) 16.9%
 (d) 12.2% (e) 15.8%
19. Cost price of article A is twice that of article B. If on selling A and B there is a profit of 8.3% and 14.4% respectively and total profit obtained is Rs 186, then find the cost price of article A.
 (a) 1000 (b) 1100 (c) 1200
 (d) 1250 (e) 1050
20. A dealer marked up his goods 20% above its cost price and sold 75% of the goods at 25% profit and remaining at marked price. Find his overall profit percentage.
 (a) $25\frac{1}{2}\%$ (b) $23\frac{3}{4}\%$ (c) $12\frac{1}{2}\%$
 (d) $22\frac{1}{4}\%$ (e) 32%
21. Two articles - A and B are sold at 25% profit and 40% profit respectively. If total profit is Rs. 178 and the cost price of A is Rs 120 less than B. find the CP of B.
 (a)Rs. 310 (b)Rs. 370 (c)Rs. 320
 (d)Rs. 430 (e)None of these
22. If the cost price is same and the selling price is reduced by 40%, the profit gets reduced by 50%. If the selling price is increased by 20% then what will be the profit percentage?
 (a) 400% (b) 250% (c) 500%
 (d) 600% (e) 750%
23. An article when sold at $\frac{4}{5}$ of its original selling price, gives a profit of 20%. Find the profit % when the same article is sold at its actual selling price.
 (a) 15 % (b) 20 % (c) 25%
 (d) 22 % (e) None of these
24. Akshay buys an article and markup it 30 % above its cost price. At the time of sale, he gives 10% discount instead of 15% due to which he earns Rs. 13 more. Find cost price.
 (a) Rs. 230 (b) None of these (c) Rs. 150
 (d) Rs. 130 (e) Rs. 200
25. Cost price of 2 bags is in ratio 4:5 and these bags are sold at 10% profit & 20% profit respectively. Find overall profit percentage in entire transaction.
 (a) $15\frac{5}{9}\%$ (b) $12\frac{5}{9}\%$ (c) $18\frac{5}{9}\%$
 (d) $14\frac{5}{9}\%$ (e) Cannot be determined
26. If the shopkeeper marked the price of an item 60% above the cost price and then gives two successive discount of 10% and 15% respectively, then find the profit percentage of the shopkeeper on selling the item?
 (a) 25.4% (b) 22.4% (c) 20%
 (d) 28.5% (e) 32%
27. Johny calculates his profit at cost price while Jini at selling price. If cost price is same for all and everyone calculate their profit as 10%. Find ratio of selling price.
 (a) 100: 111 (b) 10: 11 (c) 10: 101
 (d) 99: 100 (e) *Cannot be determined*
28. Aakash sells an article at a profit of 10%.Had he bought it for 5% less and sold it for 120 rs more then he would have gained 20% profit. What is the cost price of the article ?
 (a)Rs 2500 (b) Rs 4000 (c) Rs 3000
 (d) Rs 3500 (e) Rs 2000
29. A shopkeeper marked up the price of a bag by 20% while gave two discounts of 10% and d%. If he has allowed only first discount then he would have gained Rs 27 more. Find CP if he gained Rs 13 in whole transaction.
 (a) Cannot be determined
 (b) Rs 540 (c) Rs 600
 (d) Rs 500 (e) None of these
30. Anurag ordered three burgers for Rs. 200, Deepak ordered 2 burgers of average price Rs 80 & Veer ordered 3 burgers, each burger cost him Rs 95. Find average cost of each burger.
 (a) Rs.85.625 (b) Rs.75.625 (c) Rs.70.625
 (d) Rs.105.65 (e) Rs 80.625

31. Rohan sells his cycle to Mohan at 20% profit and Mohan spends Rs 400 on the repairing of cycle after that he sold it to Tina at 12.5% profit. If the cost price of cycle for Tina is Rs 4500, then find the cost price of cycle for Rohan?
 (a) Rs 2500 (b) Rs 3500 (c) Rs 3000
 (d) Rs 4200 (e) Rs 4000
32. Type A milk of cost price Rs 35 per litre is mixed with Type B milk having cost price rs 50 per litre in the ratio 3:2 respectively, then find the selling price(per kg) of the final mixture when sold at 25% profit ?(in rs)
 (a) 51.25 (b) 48.75 (c) 53.3
 (d) 57.4 (e) 53.5
33. By selling two articles a man earns 15% profit on first article and 10% loss on second article. Find his overall gain or loss percent if C.P. of both articles were same?
 (a) 2% (b) 5% (c) 2.5%
 (d) 3% (e) 3.5%
34. A shopkeeper in place of selling a article at 10% profit, mark up the article 30% above cost price and gives a discount of 10%. In this process he gets Rs. 56 more profit. Find the cost price of article.
 (a) Rs. 400 (b) Rs. 1000 (c) Rs. 800
 (d) Rs. 600 (e) Rs. 500
35. Hemant makes $12\frac{1}{2}\%$ profit on selling a book at a certain price. If he sells it at Rs. 4 more than it's selling price, then he would gain $\frac{1}{4}$ th of cost price. Find new selling price of book?
 (a) Rs. 32 (b) Rs. 36 (c) Rs. 34
 (d) Rs. 40 (e) Rs. 48
36. A man purchases three type of item in ratio 2:3:4 and their cost price are Rs. 300, Rs. 500 and Rs. 700 respectively. If he sold first, second and third type of article at 10%, 5% and 4% profit respectively, then find his overall approximate profit percentage?
 (a) 7% (b) 2% (c) 4%
 (d) 9% (e) 5%
37. A Shopkeeper Marked up an article 40% above its cost price and gives two successive discounts of $14\frac{2}{7}\%$ and 10% on it. If Difference between profit earned and discount given on article is Rs. 24, then find M.R.P of article?
 (a) Rs. 112 (b) Rs. 140 (c) Rs. 108
 (d) Rs. 120 (e) Rs. 116
38. A person earns 12.5% on one article but loss 10% on another article. If the ratio of the cost price of two articles be 4 :5. What is the gain/loss on selling two both articles?
 (a) 1% loss (b) 0.5% gain (c) 0.75% loss
 (d) Neither gain nor loss (e) 0.5% loss
39. Two horses were sold at Rs 12600. First horse was sold at 20% loss and second at 25% profit. If the cost price of first horse is equal to selling price of second horse. Find the overall profit/loss.
 (a) Rs 360 (b) Rs 440
 (c) No profit or no loss (d) Rs 542
 (e) Can't be determined
40. Lokesh marks up his goods 20% above cost price and allows 25% discount on them while selling. if he sells the article for Rs 1080, then what was the cost price?
 (a) Rs 1200 (b) Rs 1080 (c) Rs 1134
 (d) Rs 1120 (e) Rs 1300



Level - 2

1. Shivam bought a stock of soaps worth Rs.80000. He sold 20% stock at profit of 12% and he sold 60% stock at 15% profit. If remaining stock of soap is damaged by fire, then find profit/loss of Shivam on the whole transaction.
 (a)Rs.3940 profit (b) Rs.5620 loss (c) Rs.2480 loss
 (d)Rs.6880 loss (e) Rs.1680 profit
2. A shopkeeper have 4 kg of pure sugar and 3 kg of impure sugar, if price of pure and impure sugar is Rs. 75 per kg and Rs. X per kg respectively. Shopkeeper sold mixture of all available sugar in Rs. 450 and made profit of 20%, then find the price of per kg of impure sugar ?
 (a) 10 Rs. (b) 15 Rs. (c) 20 Rs.
 (d) 25 Rs. (e) 35 Rs.

3. A shopkeeper sold a bat at the profit of 20%, if he sold it at Rs. 17.5 more then he would have earned 30% profit. Find at what price shopkeeper should sell the bat to earn profit of 60% ?
 (a) 280Rs. (b) 260 Rs. (c) 240 Rs.
 (d) 220 Rs. (e) 250 Rs.
4. A shopkeeper marks up price of an article by 60% above cost price and allow 25% discount on it. If shopkeeper marks up article by 75% above cost price and allow 20% discount on it, then find later profit is what percent more than earlier profit?
 (a) 112.5% (b) 125% (c) 100%
 (d) 75% (e) 50%
5. A veg roll was offered at Rs 200 on which a customer gets 20% discount (maximum discount limit per bill is Rs 80) for being first time user. He also gets 10% cashback by paying using Paytm provided the minimum bill is of Rs 300 so he purchased two same rolls. Find total discount% got by him.
 (a) 32% (b) 28% (c) 35%
 (d) 25% (e) None of these
6. Ankur purchased 20 dozens diary at 40 rs per dozen. He sold 8 dozen of it at 10% profit and the remaining 12 dozen at 20 % profit. What is his percentage profit in the whole transaction?
 (a) 15 % (b) 20 % (c) 16 %
 (d) 22 % (e) 25 %
7. Cost price of an article is 39% less than the marked price of the article and shopkeeper earned 40% profit in selling the article. If amount of profit is Rs.196 more than amount of discount, then find cost price of article.
 (a) Rs.1345 (b) Rs.1325 (c) Rs.1290
 (d) Rs.1245 (e) Rs.1220
8. Hemant purchased some book and by selling 40% of total books he will get cost price of 80% books. If he sells 70% of remaining books at half of its initial profit percent and rest of the books remain unsold, find his overall profit %.
 (a) 40% (b) 45% (c) 75%
 (d) 43% (e) 63%
9. Pankaj purchased 3575 balls and 2002 bats and cost price of one bat is equal to cost price of one ball. He sold ball in such a way that he can buy 850 balls by selling 799 balls and can buy 777 bats by selling 987 bats. Find approximate overall loss/profit percent earned by Pankaj by selling all balls and bats.
 (a) 4% (b) 5% (c) 7%
 (d) 6% (e) 9%
10. Sanjay buys some articles for Rs. 1,80,000. He sells $2/5^{\text{th}}$ of it at a loss of 12%. If he wants to earn overall profit of 18% on selling all the articles, then at what profit % he should sell the remaining articles?
 (a) 48% (b) 73% (c) 42%
 (d) 38% (e) 60%
11. A shopkeeper marked his article 60% above the cost price and ratio of discount allowed to profit earned is 4 : 1. If profit earned is Rs.180 less than discount allowed, then find ratio of selling price to marked price of the article.
 (a) 3 : 5 (b) 6 : 7 (c) 4 : 7
 (d) 7 : 10 (e) None of the above.
12. A shopkeeper mark up 60% above cost price of an article and allows three successive discounts of 20%, 12.5% and 'd' % and made a profit of 7.52%. If shopkeeper allows only first and third discounts, then find profit percentage earned by shopkeeper?
 (a) 22.88% (b) 20.80% (c) 18.88%
 (d) 24.80% (e) 28.88%
13. Amit bought total of 44 laptops and mobiles together. Laptop costs two times of mobiles. He marked up the laptop by 50 % and phones by Rs. 3000 and sold these. He sold 80 % of mobiles and 6 laptops at Rs. 636000. The remaining mobiles and remaining 3 laptops are unsold due to some faults. Find his overall profit/loss on total quantity?
 (a) Rs 600 (b) None of these (c) Rs 750
 (d) Rs 350 (e) Rs 425
14. A shopkeeper sells a car for Rs.52510 and incurs a loss of 11%. He sells another car at 5% profit. If on selling both the cars he neither earns profit nor incurs loss, then find the cost price of second car.
 (a) Rs.128300 (b) Rs.129800 (c) Rs.127400
 (d) Rs.126800 (e) Rs.125200
15. A salesman in order to boost the sale of his articles increased the marked price of each article by 60% and then offered a scheme – when a buyer buys 5 articles then salesman will give him 3 articles free. If each article was initially marked up 50% above the cost price, then find overall profit or loss percentage earned by salesman due to above scheme?
 (a) 20% loss (b) 25% profit (c) 30% loss
 (d) 50% profit (e) 90% profit
16. Cost price of 10 articles is equal to marked price of 8 articles and when shopkeeper sells an article at 20% discount then he earns Rs.48 less than the amount he earned when he sells an article at 12% discount. Find cost price of the article.
 (a) Rs.560 (b) Rs.540 (c) Rs.420
 (d) Rs.480 (e) Rs.500

17. A salesman purchased 50 laptops from a manufacturer at Rs.36000 each. If salesman marked each laptop 150% above the cost of each laptop and started a scheme – on purchase of every laptop he will give accessories worth Rs.25000 free and 30% discount on marked price of each laptop, then find the amount of profit earned by the salesman on selling all the laptops.
(a) Rs.150000 (b) Rs.200000 (c) Rs.80000
(d) Rs.100000 (e) Rs.140000
18. A shopkeeper wants to sell 10 items each at Rs. 60 to earn some profits. But for every Rs. 10 increment in selling price of one item, he left with one unsold item. Find at what selling price, he would be able to maximize his profits (some unsold items, remain with him).
(a) Rs. 75 (b) Rs. 60 (c) Rs. 90
(d) Rs. 80 (e) Rs. 100
19. 'A' purchased two beds at same price. He further sold one bed to 'B' at 60% profit and other bed to 'C' at 20% profit. 'C' further sold the bed to 'D' at 20% less than the average of cost price of bed for 'B' & 'C'. If D incurred 25% loss by selling the bed to 'E' at Rs.2100, then find the difference between the cost price of a bed for 'A' and 'D'.
(a) Rs.700 (b) Rs.450 (c) Rs.900
(d) Rs.300 (e) Rs.600
20. A shopkeeper sold an article to a man at Rs 600 profit. Man increased its price by 60% and sold it to another person at a discount of 25%. Profit earned by Man is Rs 40 more than that of shopkeeper. Find cost price for shopkeeper?
(a) Rs 2600 (b) Rs 2500 (c) Rs 2750
(d) Rs 2400 (e) Rs 2250
21. Cost price of article A is Rs 600 more than that of B and selling price of A is Rs 1200 more than that of B. If difference between profit earned on selling these two articles is $13\frac{1}{3}\%$ of the cost price of A then find profit earned on B if profit % earned on A is $33\frac{1}{3}\%$?
(a) Rs 800 (b) Rs 900 (c) Rs 840
(d) Rs 960 (e) Rs 1000
- Direction (22 – 23):** Cost price of article A is 60% more than selling price of another article B and discount allowed on article B is 20% and article A is sold at 25% profit.
22. If difference between marked price of B & selling price of A is Rs. 48 and profit on article B is 60%, then find profit on article B is how much less than cost price of article A?
(a) Rs. 74.4 (b) Rs. 78.4 (c) Rs. 88.4
(d) Rs. 68.4 (e) Rs. 72.4
23. If selling price of article C is 20% more than selling price of article A and loss on article C is 4%, then find cost price of article A is what percent less than that of article C?
(a) 32% (b) 28% (c) 36%
(d) 46% (e) 40%
24. A shopkeeper has two articles A & B. He sold A at Rs. 128 and cost price of article A is Rs. x and gains $(x - 20)\%$ in this transaction. If cost price of article B is 25% more than A, then find at what price shopkeeper should sold B to make of profit of 40%?
(a) 118 (b) 124 (c) 136
(d) 148 (e) 140
25. Cost price of a jeans is Rs. 200 more than cost price of a shirt. If shirt is sold at 20% loss and jeans is sold at 25% profit, then shopkeeper gets a total profit of $5\frac{5}{7}\%$ on selling a shirt and a jeans. Find the overall profit or loss (in %) of shopkeeper, if shirt is sold at 25% profit and jeans is sold at 20% loss?
(a) $\frac{5}{7}\%$ (b) $\frac{4}{7}\%$ (c) $\frac{3}{7}\%$
(d) $\frac{2}{7}\%$ (e) $\frac{6}{7}\%$
26. Levi's on the occasion of Independence Day announced an additional discount of 10% after existing discount of 10%. If a customer donates 0.75% of the selling price of jeans for the development of the country, then find the amount paid by Amitabh on purchasing jeans for which he paid Rs. 4500 earlier.
(a) Rs. 4050 (b) Rs. 4080.375 (c) Rs. 4030
(d) Rs. 3979.625 (e) Rs. 4533.75
27. Mr. Ambani purchased two steel factories in Mumbai and Chennai for total Rs.72 crores. After a year, he sold Mumbai factory at 16% profit while other at 24% profit. Thus he gained 19% profit on selling both factories. Find the selling price of Mumbai factory? (in crores)
(a) 52.2 (b) 55.8 (c) 53.55
(d) Cannot be determined (e) None of these
28. Sudeep marked up the price at a price higher than cost price & gave 10% discount on every purchase and a complimentary chocolate box worth Rs. 300 on minimum purchase of Rs. 2000. This way he gained 20%. If a customer purchased for Rs. 3000. Find the cost price for Sudeep for the articles sold.
(a)Rs. 2500 (b) Rs. 2250 (c) Rs. 2750
(d)Rs. 2000 (e) None of these

29. A dishonest shopkeeper mark up the price of sugar by 20% and gives a discount of 20% and while purchasing from whole-seller he takes 25% more quantity and while selling he gives 10% less quantity. Find his entire profit/loss% in this entire transaction? (in %)
- (a) $33\frac{1}{3}$ (b) $16\frac{2}{3}$ (c) $16\frac{1}{6}$
 (d) $66\frac{2}{3}$ (e) $44\frac{4}{9}$
30. Marked price is 25% more than the selling price of the product and the profit earned on selling is also 25%. If the difference between profit and the difference between cost price and marked price is Rs 200, then find the cost price of the product?
- (a) Rs 500 (b) Rs 640 (c) Rs 600
 (d) Rs 700 (e) Rs 800
31. A salesman marks a bat and a ball 25% and 40% above their cost price respectively and salesman allowed discount of 15% on each bat & ball. If cost price of a bat is 260% more than that of a ball and profit earned on selling a ball is Rs.38, then find difference in selling price of a bat & a ball.
- (a) Rs.527 (b) Rs.375 (c) Rs.497
 (d) Rs.456 (e) Rs.332
32. A salesman bought 50 phones from manufacturer for Rs.780000. He spent Rs.20000 on transportation of phones. If salesman marks each phone 20% above the cost price of each phone and sold each phone at 8% discount, then find profit earned by salesman on a phone.
- (a) Rs.1756 (b) Rs.1608 (c) Rs.1520
 (d) Rs.1872 (e) Rs.1664
33. Marked price of a jeans is 50% above its cost price and marked price of a shirt is 70% above its cost price. Cost price of both jeans & shirt is same. If 20% discount is given on each article and difference between profit earned on shirt and jeans is Rs. 320, then find selling price of shirt.
- (a) 2520 Rs. (b) 2320 Rs. (c) 3020 Rs
 (d) 2720 Rs. (e) 3120 Rs.
34. A manufacturer of tables wants to earn 20% profit on total manufacturing cost after giving a discount of 28% on MRP. But due to fire in the store he lost 10% of tables manufactured by him, then find at what discount percentage should he sell the remaining tables, if he still wants to earn 20% profit on total manufacturing cost?
- (a) 25% (b) 15% (c) 10%
 (d) 20% (e) 18%
35. Marked price of a bat is Rs 350. A shopkeeper gives a discount of Rs x and makes a profit of $12\frac{1}{2}\%$. If manufacturing cost of bat is Rs 280, then find the discount percent given by shopkeeper on bat?
- (a) 10% (b) 6% (c) 4%
 (d) 3% (e) 5%
36. Retailer mark up an article 35% above its cost price and earn Rs 480 by giving 20% discount on the marked price. If he sells article at 15% discount on marked price then, find retailer's profit on selling one article.
- (a) 885 Rs. (b) 875 Rs. (c) 855 Rs.
 (d) 845 Rs. (e) 840 Rs.
37. There is some profit when an article is sold for Rs. 840. However, when the same article is sold for Rs. 480, there is some loss. If the value of profit is two times the value of loss, then find the selling price when the article is sold at profit of $37\frac{1}{2}\%$
- (a) Rs. 800 (b) Rs. 775 (c) Rs. 825
 (d) Rs. 845 (e) Rs. 875
38. Retailer mark up an article 35% above its cost price and earn Rs 96 by giving 20% discount on the marked price. If he sells article at 15% discount on marked price then, find retailer's profit on selling one article.
- (a) 118 (b) 177 (c) 236
 (d) 214 (e) 154
39. When an article is sold at 40% discount, a loss of 10% occurs but when it sold at 20% discount then there is a profit of Rs.7.5. What is the cost price of the article?
- (a) 37.5 Rs (b) 40 Rs (c) 66.67 Rs
 (d) 48 Rs (e) 39.2 Rs
40. 20% of product bought by a shopkeeper is damaged and are sold at 30% discount. Remaining products is sold at a discount of 10%. If difference between total selling price of products sold at 30% discounts and 10% discount is 29,000, Then find the sum of marked price of all product? (in rs)
- (a) 50,000 (b) 40,000 (c) 25,000
 (d) 75,000 (e) 60,000

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Mains Questions

Directions (1-2): Abhishek bought some chairs and tables from a shopkeeper. The marked price of a chair and a table were in the ratio 5 : 8. The shopkeeper gave discounts of 20% and 25% on the chair & the table respectively. The ratio of number of chairs and tables bought by Abhishek is 6 : 5.

1. If Abhishek sells each chair and table bought by him at discounts of 25% and 20% respectively after marking up the prices of both by 50% and gives one table free for every four chairs bought by a customer and only $\frac{2}{3}$ rd of the total chairs are sold in bunch of four chairs, then what is the net profit /loss % made by Abhishek after selling all of the items which he bought from the shopkeeper?

- (a) $6\frac{2}{3}\%$ (b) $3\frac{1}{3}\%$ (c) $2\frac{1}{2}\%$
 (d) $4\frac{1}{4}\%$ (e) $5\frac{1}{3}\%$

2. If the marked price of a table set by the shopkeeper was Rs.300 more than that of a chair and the total expenditure made by Abhishek in purchasing the chairs and tables from the shopkeeper was Rs.108000, then how many chairs were purchased by Abhishek?

- (a) 150 (b) 60 (c) 120
 (d) 90 (e) 140

3. A garment company declared 17% discount for wholesale buyers. Mr Sameer bought garments from the company for Rs. 1660 after getting discount. He fixed up the selling price of garments in such a way that he earned a profit of 7% on original company price. What is the selling price ?

- (a) Rs. 2130 (b) Rs. 2140 (c) Rs. 2410
 (d) Rs. 2310 (e) Rs. 2160

Directions (4-5): Raju, Rancho and Farhan enter into a business plan with their investments in the ratio of 5 : 7 : 9 respectively. After 3 months, Raju withdraws his whole amount, Rancho withdraws half of his amount and Farhan triples his amount. After another 6 months, Farhan withdraws $\frac{8}{9}$ of his amount, Rancho doubles his amount and Raju re-enters into business with an amount equal to his initial investment.

4. If total profit at the end of year is Rs 11737 and profit is shared among all of them in ratio of their investments. then the profit of Raju is how much less than that of Rancho?

- (a) Rs 2861 (b) Rs 984 (c) Rs 1331
 (d) Rs 4187 (e) Rs. 1296

5. All of them maintain their amounts at the end of 1st year for another 12 months. What is the share of Rancho if the overall profit for only 2nd year is Rs. 22500?

- (a) 10000 (b) 11250 (c) 9725
 (d) 12050 (e) 10500

Directions (6-7): Ramu and Shyamu decide to sell their cars each at Rs. 36,000. While Ramu decided to give a discount of 8% on the first Rs. 8000, 5% on next Rs. 12000 and 3% on the rest to buyer Shashi. Shyamu decided to give a discount of 7% on the first 12000, 6% on next 8000 and 5% on the rest to buyer Rajesh. These discounts were, however, subject to the buyers making the payment on time failing which the discount gets reduced by 1% for every delay of a week. In each case, the selling price of 36,000 was arrived at by increasing the cost price by 25%.

6. If each of them got the payments on time, what is the approximate percentage profit of the person getting the higher profit ?

- (a) 19% (b) 21% (c) 25%
 (d) 17% (e) 20%

7. If Shashi defaults by 1 and 2 weeks in the second and third payments respectively, what would be the profit of Ramu in the sale of the car ?

- (a) Rs. 5920 (b) Rs. 6240 (c) Rs. 5860
 (d) Rs. 5980 (e) Rs. 5940

Directions (8-9): Read the following and answer the questions that follow.

Two friends Shayam and Kailash own two versions of a car. Shayam owns the diesel version of the car, while Kailash owns the petrol version. Kailash's car gives an average that is 20% higher than Shayam's (in terms of litres per kilometer). It is known that petrol costs 60% of its price higher than diesel.

8. The ratio of the cost per kilometer of Kailash's car to Shayam's car is

- (a) 3 : 1 (b) 1 : 3 (c) 4 : 1
 (d) 2 : 1 (e) 5 : 1

9. If Shyam's car gives an average of 20 km per litre and diesel cost Rs. 12.5 per litre, then the difference in the cost of travel per kilometer between the two cars is

- (a) Rs. 4.35 (b) Rs. 3.55 (c) Rs. 2.55
 (d) Rs. 3.55 (e) Rs. 1.25

Directions (10-11): Four retailers Satish, Veer, Arun and Yogesh buy some bicycle from a wholeseller, who gave different discount on marked price to every retailers. Discount (in percentage) given to Veer and Arun together

is equal to discount (in percentage) given to Satish and Yogesh together. Number of bicycle bought by Satish and Veer together is equal to number of bicycle bought by Arun. Number of bicycle bought by Veer and Arun together is equal to number of bicycle bought by Yogesh. Discount offered to Arun is equal to discount offered to Satish & Veer together and Yogesh get 10% more discount than Veer. Arun bought 20 number of bicycle and Yogesh buy 24 more bicycle than Satish. Discount offered to yogesh is equal to total discount Satish and Arun get.

10. If Satish and Arun both sell 8 bicycle at M.P. then profit earn by Arun is how much percent more than profit earn by Satish.

- (a) 100% (b) 150% (c) 200%
(d) 250% (e) 225%

11. Yogesh sell 8 bicycle at 10% discount on marked price, 18 bicycle on 30% discount on marked price and remaining on Marked price. Find the total profit or loss earn by Yogesh if marked price is equals to 20,000?

- (a) 12,000 (b) 10,000 (c) 8,000
(d) 6,000 (e) 4000

Directions (12-13): Raghav bought some chairs & tables from a shopkeeper. The marked price of a chair and a table were in the ratio 5 : 7. The shopkeeper gives discounts of 20% and 25% on the chair & the table respectively. The ratio of chairs and tables bought by Raghav is 9 : 8.

12. If Raghav sells each chair and table bought by him at discounts of 25% and 20% respectively after marking up the prices of both by 50% on the price at which he bought both items and gives one 1 chair free for every 4 tables bought by a customer, then what is the net profit /loss % made by Raghav after selling all of the items which he bought from the shopkeeper?

- (a) 7% (b) 5% (c) 8%
(d) 6% (e) 9%

13. If Raghav buys 170 chairs and tables in all, then what is the approximately average price at which he must sell all of them to be in a situation of no profit -no loss?

- (a) Rs 45.88 (b) Rs 52.67 (c) Rs 48.88
(d) Rs 42.88 (e) Rs. 46.88

14. A shopkeeper has 12 kg of pure rice and 4 kg of impure rice. He mixes both type of rice but 4 kg of the mixture gets spoiled. If he again mixes 4 kg of impure rice to the remaining mixture and professes to sell mixture at a profit of 20% on cost of pure rice. Then what is actual profit or loss percentage if cost of impure rice is 40% of cost of pure rice.

- (a) $\frac{400}{19}$ % (b) $\frac{250}{21}$ % (c) $\frac{250}{19}$ %
(d) $\frac{250}{17}$ % (e) $\frac{500}{19}$ %

15. Cost price of 3 pens is equal to the cost price of 5 pencils. If equal number of pens and pencils are sold and pens are sold at 20% profit and pencils are sold at $\frac{100}{3}$ % profit then what is the overall profit percentage.

- (a) 18% (b) 15% (c) 22%
(d) 25% (e) 30%

16. A manufacturer estimates that on inspection 12% of the articles he produces will be rejected. He accepts an order to supply 22,000 articles at Rs. 7.50 each. He estimates the profit on his outlay including the manufacturing of rejected articles, to be 20%. Find the manufacturing cost price of each article.

- (a) Rs. 6.50 (b) Rs. 5.50 (c) Rs. 5.75
(d) Rs. 4.50 (e) Rs. 3.75

17. A man bought a scooter and a car. His total profit is 30% by selling both of items. Scooter is sold at 10% profit. Cost price of scooter is $\frac{1}{10}$ of the cost of car. Marked price of a car is Rs. 4,50,000. If he bought scooter at a discount of 20% on marked price and car at a discount of 10% on marked price then, what will be the ratio of marked price of scooter to the selling price of the car.

- (a) $\frac{25}{264}$ (b) $\frac{25}{268}$ (c) $\frac{35}{260}$
(d) $\frac{34}{260}$ (e) $\frac{25}{267}$

18. A person sells his table at a profit of $12\frac{1}{2}$ % and the chair at a loss of $8\frac{1}{3}$ % but on the whole he gains Rs. 25.

On the other hand if he sells the table at a loss of $8\frac{1}{3}$ % and the chair at a profit of $12\frac{1}{2}$ % then he neither gains nor loses. Find the cost price of the table and the chair.

- (a) Rs. 360, Rs. 240
(b) Rs. 380, Rs. 260
(c) Rs. 400, Rs. 420
(d) Rs. 360, Rs. 410
(e) Rs. 360, Rs. 120

19. A shopkeeper defrauds both the dealer and the customer by measuring weights incorrectly. When he is purchasing items from the dealer, he takes 20% more than the indicated weight and when he is selling them to the customer, he gives 20% less than the indicated weight. If the price that the shopkeeper charges his customer is the same as what the dealer charges the shopkeeper, then what profit percentage does the shopkeeper make?

- (a) 40% (b) 44% (c) 50%
(d) 60% (e) 55%

20. A shokeeper bought 150 calculators at the rate of Rs. 250 per calculator. He spent Rs. 2500 on transportation and packing. If the marked price of calculator is Rs. 320 per calculator and the shopkeeper gives a discount of 5% on the marked price then what will be the percentage profit gained by the shopkeeper?

- (a) 20% (b) 14% (c) 15%
(d) 16% (e) 18%

21. A shopkeeper mark up the price of a article $\frac{3}{2}$ th time the cost price. We gave some discount to a customer and earn a profit such that, percentage of profit he earn and percentage of discount he gives is same. Find the discount percent.

- (a) 30% (b) 20% (c) 40%
(d) 25% (e) 10%

22. A dishonest shopkeeper takes 25% more than the indicated weight when he purchases the items from the dealer. He gives 25% less than the indicated weight to his customer at the cost price, then find the profit percentage of the shopkeeper.

- (a) 44.44% (b) 66.67% (c) 50.55%
(d) 37.75% (e) 33.34%

23. A seller gives 10% discount on an item, if he marked up price of item 50% above cost price and While selling,

he cheats customer by giving 20% less in weight. Find his overall profit percent (approximate) ?

- (a) 62% (b) 65% (c) 68%
(d) 72% (e) 76%

Directions (24-25): These questions are based on the information given below:

In manufacturing a certain item, 40% of the expenditure is on account of raw materials, 20% on account of labour charges, 20% on account to fixed charges and the rest on miscellaneous. The item is sold at a profit of 25%. The price of the raw materials went up by 15% and the labour charges went up by 20% and the cost on the miscellaneous heads went up by 50% while the fixed costs remained unchanged.

24. If the selling price remained unchanged, then what is the new profit percentage ?

- (a) 2% (b) 4% (c) $4\frac{1}{6}\%$
(d) 10% (e) $3\frac{1}{3}\%$

25. If the manufacturer wants a $13\frac{7}{11}\%$ profit, then by what percentage should he reduce his expenditure on raw materials (at the increased price) as to achieve that target, the selling price remaining the same ?

- (a) $17\frac{17}{23}\%$ (b) $20\frac{14}{23}\%$ (c) $21\frac{17}{23}\%$
(d) $24\frac{14}{23}\%$ (e) $22\frac{13}{23}\%$

Previous Year Question

1. A person purchased two articles at the same price and on selling the first article he makes a profit of 12%. Selling price of second article is Rs 90 more than the selling price of the first article. Find the cost price of one article if his overall profit percent is 15%?

- (a) Rs 1800 (b) Rs 1500 (c) Rs 2000
(d) Rs 2400 (e) None of these

SBI PO Prelims 2019

2. A shopkeeper marked the price of jeans 25% above the cost price and allowed two successive discounts of 10% and 5% respectively. If shopkeeper made a profit of Rs. 89.1, then find at what price shopkeeper sold the jeans to make a profit of 40%?

- (a) 1844.4 Rs. (b) 1814.4 Rs. (c) 1860.4 Rs.
(d) 1890.4 Rs. (e) 1880.4 Rs.

SBI PO Prelims 2020

3. A person sold a book at 20% profit. If he had bought it at 10% less cost and sold for Rs 90 more then he would have gained 40% profit. Find cost price of book.

- (a) Rs 800 (b) Rs 1600 (c) Rs 1500
(d) None of these (e) Rs 1200

SBI Clerk Prelims 2020

4. A shopkeeper marks up price of LED 60% above its cost price and gives three successive discounts of $12\frac{1}{2}\%$, d% and 25%. If shopkeeper made a loss 16% on LED. Find the second discount allowed by shop?

- (a) 15% (b) 20% (c) 25%
(d) $16\frac{2}{3}\%$ (e) 17.5%

IBPS PO Prelims 2020

5. A shopkeeper marked up a shirt 50% above the cost price and allows successive discounts of $11\frac{1}{9}\%$ and 10% on it. If the difference between profit earned and

discount given is Rs. 200 then find the marked price of the shirt?

- (a) Rs. 2100 (b) Rs. 3000 (c) Rs. 2400
(d) Rs. 3600 (e) Rs. 3300

IBPS Clerk Prelims 2020

6. Selling price of an article becomes Rs.2160 after giving two successive discounts of $x\%$ and 25% and marked price of article is Rs.3600. Find the cost price of article if there is a profit of $x\%$ on selling the article after giving two successive discounts.

- (a) Rs. 1720 (b) Rs.1500 (c) Rs.1600
(d) Rs.1800 (e) Rs.1900

RRB PO Prelims 2020

7. An article was marked up by 50% above cost price and allowed Rs 50 discount on marked price. If shopkeeper still made a profit of Rs. 50, then find the selling price of the article (in Rs.)?

- (a) 350 Rs. (b) 300 Rs.
(c) 250 Rs. (d) 200 Rs. (e) 150 Rs.

RRB Clerk Prelims 2020

8. A shopkeeper gives 20% discount on a book and he still earns a profit of $33\frac{1}{3}\%$ on the book. If cost price of book is Rs.600, then what is the discount given on the book? (in Rs.)

- (a) 200 (b) 100 (c) 300
(d) 250 (e) 150

RBI Assistant Prelims 2020

9. Marked price of an article is 40% above its cost price and when shopkeeper allows ' $d\%$ ' discount then shopkeeper make a profit of $\underline{\hspace{2cm}}$ and when shopkeeper allows ' $2d\%$ ' discount then he make a profit of $\underline{\hspace{2cm}}$. Which of the following options possible to fill both respective blanks?

- (A) (22.5, 5) (B) (33, 26) (C) (19, 2)
(D) (26, 12) (E) (23.2, 6.4)
(a) Only option A, B, C possible
(b) Only option B, D & E possible
(c) Only option A, B, D & E possible
(d) All of above options are possible
(e) Only B, C, D & E possible

SBI PO Mains 2019

10. Retailer sold one article at $33\frac{1}{3}\%$ profit and another at 100% profit. Find his overall profit percentage if the selling price of both the article is same?

- (a) 60% (b) 55% (c) $66\frac{2}{3}\%$
(d) 75% (e) $56\frac{2}{3}\%$

SBI Clerk Prelims 2019

11. A shopkeeper marked the price of an article by 40% above cost price and gave discount of Rs. 224. On the final amount, he charged 10% tax. In the whole transaction, he earned Rs. 158.6. Find cost price of the article.

- (a) Rs 750 (b) Rs 760 (c) Rs 744
(d) Rs 757 (e) Rs 748

IBPS PO Prelims 2019

12. A shopkeeper sells two pens, he sold 1 pen at profit and other pen at loss. SP of each of the two pens is Rs.300 and profit percentage on 1 pen is equal to loss percentage on other. If overall loss of shopkeeper is 6.25% , then find difference between cost price of both pen.

- (a) Rs.350 (b) Rs.100 (c) Rs.240
(d) Rs.160 (e) Rs.300

IBPS Clerk Prelims 2019

13. A person sold an article for Rs 802. If it is sold for Rs 38 more, then selling price would be 20% more than cost price. What is the profit percent when article is sold at actual selling price?

- (a) 18.75% (b) 16.67% (c) 20%
(d) $11\frac{1}{9}\%$ (e) $14\frac{4}{7}\%$

IBPS Clerk Mains 2019

14. A shopkeeper sets MRP of a product such that after giving 10% discount, he earns 12.5% profit. What will be his profit/loss percent if he allows a discount of 25% ?

- (a) 5% (b) 10.45% (c) 8.33%
(d) 6.25% (e) 9.09%

IBPS Clerk Mains 2019

15. When a person sold an article, his profit percent is 60% of the selling price. If the cost price is increased by 75% and the selling price remains the same, then find decrement in the profit is what percent of the selling price of the article?

- (a) 25% (b) 30% (c) 40%
(d) 27.5% (e) None of these

IBPS RRB PO Prelims 2019

16. Cost price of a jeans is Rs. 200 more than cost price of a shirt. If shirt is sold at 20% loss and jeans is sold at 25% profit, then shopkeeper gets a total profit of $5\frac{5}{7}\%$ on selling a shirt and a jeans. Find the overall profit or loss (in %) of shopkeeper, if shirt is sold at 25% profit and jeans is sold at 20% loss?

- (a) $\frac{5}{7}\%$ (b) $\frac{4}{7}\%$ (c) $\frac{3}{7}\%$
(d) $\frac{2}{7}\%$ (e) $\frac{6}{7}\%$

RRB Clerk Mains 2019

17. Cost price of article A is Rs 600 more than that of B and selling price of A is Rs 1200 more than that of B. If difference between profit earned on selling these two articles is $13\frac{1}{3}\%$ of the cost price of A then find profit earned on B if profit % earned on A is $33\frac{1}{3}\%$?
- (a) Rs 800 (b) Rs 900 (c) Rs 840
(d) Rs 960 (e) Rs 1000

RRB Clerk Mains 2019

18. Sudeep marked up the price at a price higher than cost price & gave 10% discount on every purchase and a complimentary chocolate box worth Rs. 300 on minimum purchase of Rs. 2000. This way he gained 20%. If a customer purchased for Rs. 3000. Find the cost price for Sudeep for the articles sold.
- (a) Rs. 2500 (b) Rs. 2250 (c) Rs. 2750
(d) Rs. 2000 (e) None of these

RBI Grade B Phase I 2019

19. Shopkeeper sells two articles – M & N. He marks article – M 20% above its cost price and he gave 5% discount on it. Cost price of article – N is 20% more than cost price of article – M. If shopkeeper sold article – M at Rs.285 and article – N at 15% profit, then find selling price of article – N.
- (a) Rs.345 (b) Rs.230 (c) Rs.460
(d) Rs.414 (e) Rs.322

SBI Clerk Mains 2019

20. Marked price of an article is Rs 250 more than cost price of that article and it is sold at a discount of 15% on marked price. Find the cost price of the article if the profit percent earned is 27.5%?
- (a) Rs 600 (b) Rs 550 (c) Rs 500
(d) Rs 750 (e) Rs 900

RRB Clerk Prelims 2019

21. Abhishek makes a profit of Rs.110, if he sells a certain number of pens he has at the price of Rs. 2.5 per pen and incurs a loss of Rs. 55, if he sells the same number of pens for Rs. 1.75 per pen. How many pens does Abhishek have?
- (a) 220 (b) 240 (c) 200
(d) Cannot be determined (e) None of these
22. Ram purchased a Computer set of Rs. 12500 and spent Rs.300 on transportation and Rs. 800 on installation. At what price should he sell it so as to earn an overall profit of 15%?
- (a) Rs. 14560 (b) Rs. 14375 (c) Rs. 15460
(d) Rs. 15375 (e) None of these

23. Mahesh purchased 25 kg of rice @ 32 per kg and 15 kg of rice @ Rs. 36 per kg. He mixed the two varieties of rice and sold it @ Rs. 40.20 per kg. What is the per cent profit earned?

(a) 25 (b) 40 (c) 30
(d) 20 (e) None of these

24. While selling a watch, a shopkeeper gives a discount of 15%. If he gives a discount of 20%, he earns Rs. 51 less as profit. What is the original price of the watch?

(a) Rs. 920 (b) Rs. 985 (c) Rs. 1125
(d) Rs. 1020 (e) None of these

25. A shopkeeper purchased 245 pieces of an article at Rs. 30 per piece. He spent Rs. 980 on transport and Rs. 1470 on packing the articles. He sold the articles at the rate of Rs. 50 per piece. What is the percent profit earned?

(a) 25% (b) 20% (c) 28%
(d) 22.5% (e) None of these

26. An article is marked for sale at Rs. 504. The shopkeeper gives a discount of 5% on the sale price and still earns a profit of 20%. What could be the purchase price of the article?

(a) Rs. 399 (b) Rs. 405 (c) Rs. 403
(d) Rs. 400 (e) None of these

27. A shopkeeper sold an article for Rs. 400 after giving 20% discount on the labelled price and made 30% profit on the cost price. What would have been the percentage profit, had he not given the discount?

(a) 25% (b) 35% (c) 50%
(d) 62.5% (e) None of these

28. Suresh purchased a TV set for Rs. 11250. He spent Rs. 800 on installation and Rs. 150 on transportation. At what price should it be sold so that the profit earned would have been 15%, if no discount was offered?

(a) Rs. 12938 (b) Rs. 14030 (c) Rs. 13450
(d) Rs. 15467 (e) None of these

29. Mr A sold a goods, to Mr. B at 10% discounted value of printed rate. The discounted value is Rs. 1242. If 15% profit is earned on purchase rate by selling the goods at printed rate, what is the purchase rate?

(a) Rs. 1242 (b) Rs. 1380 (c) Rs. 1280
(d) Rs. 1200 (e) None of these

30. Rajesh purchased a mobile phone and a refrigerator for Rs. 12000 and Rs. 10000 respectively. She sold the refrigerator at a loss of 12 per cent and mobile phone at a profit of 8 per cent. What is her overall loss/profit?

(a) Loss of Rs. 280 (b) Profit of Rs. 2160
(c) Loss of Rs. 240 (d) Profit of Rs. 2060
(e) None of these

Solutions

Basic Solutions

1. **(a)**; CP = Rs. 27.50, SP = Rs. 28.60
 Then Gain = SP - CP = 28.60 - 27.50 = Rs. 1.10
 Since, $\text{Gain}\% = \frac{\text{gain} \times 100}{\text{CP}}\%$
 $\Rightarrow \text{Gain}\% = \frac{1.10 \times 100}{27.50} = 4\%$

2. **(b)**; CP = Rs. 490, SP = Rs. 465.50
 Loss = CP - SP = 490 - 465.50 = Rs. 24.50
 $\text{Loss}\% = \frac{\text{loss} \times 100}{\text{CP}}\% = \frac{24.50 \times 100}{490} = 5\%$

3. **(b)**; $\text{SP} = \left[\frac{100 + \text{gain}\%}{100} \right] \times \text{CP}$
 $\Rightarrow \text{SP} = \left[\frac{100 + 20}{100} \right] 56.25 = \text{Rs. } 67.50$

4. **(c)**; $\text{SP} = \left[\frac{100 - \text{loss}\%}{100} \right] \times \text{CP}$
 $\Rightarrow \text{SP} = \left[\frac{100 - 5}{100} \right] \times 80.40 = \text{Rs. } 76.38$

5. **(a)**; $\text{CP} = \frac{100 \times \text{SP}}{100 + \text{gain}\%}$
 $\Rightarrow = \text{Rs. } 35$

6. **(e)**; Let SP = Rs. 100 then CP = Rs. 96
 Profit = SP - CP = 100 - 96 = Rs. 4
 $\text{Profit}\% = \frac{\text{profit}}{\text{CP}} \times 100\% = \frac{4}{96} \times 100 = 4.17\%$

7. **(c)**; Here, True weight = 1000g.
 False weight = 960g.
 Error change = (1000 - 960)g. = 40g.
 $\Rightarrow \text{Gain}\% = \frac{\text{Error change}}{\text{True weight} - \text{Error}} \times 100\%$
 $= \frac{40}{1000 - 40} \times 100\% = \frac{25}{6}\%$

8. **(d)**; Here, since both gain and loss percent is same, hence the resultant value would be loss percent only.
 $\Rightarrow \text{Loss}\% = \frac{a^2}{100}$ [where a = 10%]
 $= 1\%$

9. **(c)**; Using net discount formula

$$\Rightarrow \left[a + b - \frac{ab}{100} \right] \%$$

Here, a = 40%, b = 20%

Applying both values in above formula:

$$\Rightarrow \left[40 + 20 - \frac{40 \times 20}{100} \right] \% = 52\%$$

10. **(b)**; Total SP given = Rs. 1220
 Total CP of 13 chairs = Rs. 13 × 115 = Rs. 1495
 \Rightarrow Hence, CP > SP
 \Rightarrow Loss = CP - SP = Rs. 1495 - 1220 = Rs. 275

11. **(d)**; CP of 6 articles = Rs. 5, CP of 5 articles = Rs. $\frac{25}{6}$
 SP of 5 articles = Rs. 6
 $\text{gain}\% = \frac{6 - \frac{25}{6}}{\frac{25}{6}} \times 100 = \frac{11}{25} \times 100 = 44\%$

12. **(c)**; CP of 12 tables = SP of 16 tables
 $\frac{\text{CP of 1 table}}{\text{SP of 1 table}} = \frac{16}{12} = \frac{4}{3}$
 $\text{Loss}\% = \frac{4 - 3}{4} \times 100 = 25\%$

13. **(b)**; Let CP for A be Rs. 100
 A sells it to B at 20% profit
 Rs. [100 + 20% of 100] = Rs. 120
 Now B sells it to C at 25% profit
 Rs. [120 + 25% of 120] = Rs. 150
 If C buys at Rs. 150, A bought at Rs. 100
 Hence, by unitary method,
 If C bought at Rs. 1500, A paid = Rs. $\left[\frac{100}{150} \times 1500 \right]$
 $= \text{Rs. } 1000$

14. **(e)**; Given Loss% = 10%
 $\Rightarrow 10\% = \left(\frac{\text{CP} - \text{SP}}{\text{CP}} \right) \times 100$
 $\frac{10}{100} = \frac{390 - \text{SP}}{390}$, SP = Rs. 351

15. **(a)**; Here, Profit% = 10%
 $\Rightarrow \frac{10}{100} = \frac{\text{SP} - \text{CP}}{\text{CP}} \Rightarrow \frac{1}{10} = \frac{924 - \text{CP}}{\text{CP}}$
 $11\text{CP} = 9240 \Rightarrow \text{CP} = \text{Rs. } 840$

Prelims Solutions

Level - 1

1. (c): Let cost price of book be '100x'

$$\text{So, Selling price of book} = 100x \times \left(1 + \frac{50}{300}\right) = \frac{350}{3}x$$

$$\text{Mark price of book} = \frac{350}{3}x \times \frac{100}{87.5} = \frac{400}{3}x$$

$$\therefore \text{Required Ratio} = \frac{100x}{\frac{400}{3}x} = \frac{3}{4}$$

2. (b): Required probability = $\frac{6}{11} \times \frac{5}{10} + \frac{5}{11} \times \frac{4}{10}$

$$= \frac{30+20}{110}$$

$$= \frac{50}{110}$$

$$= \frac{5}{11}$$

3. (b): Let the cost price and marked price be Rs 3x and Rs 5x respectively

And let the loss and discount be Rs y and Rs 4y respectively

ATQ

$$3x - y = 5x - 4y$$

$$3y = 2x$$

$$\text{Marked price} = \text{Rs } \frac{15}{2}y$$

$$\text{Required discount \%} = \frac{4y}{\frac{15}{2}y} \times 100 = 53\frac{1}{3}\%$$

4. (b): Selling price of 1 article = $\frac{68}{40}$ Rs.

$$\text{So, cost price of 1 article} = \frac{68}{40} \times \frac{100}{75} = \frac{34}{15} \text{ Rs.}$$

$$\text{Selling price of 1 article after 12.5\% profit} = \frac{34}{15} \times \frac{112.5}{100} = \frac{51}{20} \text{ Rs.}$$

So, he should sell 20 articles for Rs 51 to make profit of 12.5%.

5. (d): $\frac{CP}{SP} = \frac{16}{20} = \frac{4}{5}$

Let CP be Rs 4x and SP be Rs 5x

And, profit = Rs x

Atq,

$$x \times 4 = 3 \times \text{discount}$$

$$\Rightarrow \text{discount} = \frac{4x}{3}$$

$$CP \rightarrow 4x$$

$$\text{And, MP} = 5x + \frac{4x}{3}$$

$$\Rightarrow \frac{19x}{3}$$

$$\text{Required \%} = \frac{\frac{19x}{3} - 4x}{4x} \times 100$$

$$= \frac{7x}{12x} \times 100 = 58\frac{1}{3}\%$$

6. (b): Let cost price of mixture = x Rs. per kg

ATQ -

$$\frac{(120-x)}{(x-80)} = \frac{1}{3}$$

$$360 - 3x = x - 80$$

$$x = 110 \text{ Rs.}$$

$$\text{Profit percentage} = \frac{143-110}{110} \times 100$$

$$= \frac{33}{110} \times 100 = 30\%$$

7. (c): Let selling price of article for shopkeeper be Rs 15x

Then, profit = Rs 2x

Cost price of article for Shopkeeper = Rs 13x

ATQ

$$15x \times \frac{2.5}{100} = 15x - 1170$$

$$x = 80$$

$$\text{Required cost price} = 13 \times 80 = \text{Rs. } 1040$$

8. (b): Profit % = $16\frac{2}{3}\% = \frac{1}{6}$

Let CP = 6

So, SP = 7

$$\text{Now MP} = 7 \times \frac{4}{3} = \frac{28}{3}$$

$$\text{Required \%} = \frac{\frac{28}{3} - 6}{6} \times 100$$

$$= \frac{10}{18} \times 100 = 55.55\%$$

9. (e): Let the marked price be Rs 100x

$$\text{Then SP} = 100x \times \frac{8}{10} \times \frac{9}{10} = \text{Rs } 72x$$

Let cost price be Rs y

ATQ

$$\frac{72x-y}{100x-y} = 0.3$$

$$y = 60x$$

$$\text{Profit percent} = \frac{12x}{60x} \times 100 = 20\%$$

10. (a): Let that certain SP be Rs. 100x.

Now, SP at which article is sold = $0.75 \times 100x = \text{Rs. } 75x$

$$\text{Now, CP} = \frac{75x}{80} \times 100 = \text{Rs. } \frac{375}{4}x$$

$$\text{Again, SP} = 1.25 \times 100x = \text{Rs. } 125x$$

$$\text{Required profit \%} = \frac{125x - \frac{375}{4}x}{\frac{375}{4}x} \times 100 = 33\frac{1}{3}\%$$

11. (e): $S.P. = M.P. \left(\frac{60}{100}\right)$

$$\frac{SP}{MP} = \frac{3}{5}$$

Let CP be 5y & SP be 8y.

ATQ,

$$3y = 450$$

$$y = \text{Rs. } 150$$

$$\therefore SP = 8 \times 150 = \text{Rs. } 1200$$

$$\therefore MP = \frac{1200 \times 5}{3} = \text{Rs. } 2000$$

12. (d): Let the cost price and selling price of the article be Rs x and Rs y respectively

Then its Marked price = Rs(x+360)

ATQ

$$(x+360) - y = y - x$$

$$y - x = 180$$

13. (a): Let cost price of first mobile = Rs. x

And, cost price of second mobile = Rs. (36000 - x)

ATQ—

$$36000 = x \times \frac{130}{100} + (36000 - x) \times \frac{80}{100}$$

$$x = \text{Rs. } 14400$$

Cost price of second mobile = (36000 - 14400) = Rs. 21600

Selling price of second mobile

$$= 21600 \times \frac{80}{100}$$

$$= \text{Rs. } 17280$$

For 25% profit second mobile should sold at

$$= 21600 \times \frac{125}{100}$$

$$= \text{Rs. } 27000$$

Required much price than previous selling price

$$= 27000 - 17280$$

$$= \text{Rs. } 9720$$

14. (b): Let marked price of T.V = Rs. 100X

Selling price in 1st case = Rs. 85x

Selling price in 2nd case = Rs. 87.5x

Discount difference = 15x - 12.5x = 175

$$2.5X = 175$$

$$X = 70$$

marked price = 100x = 100 × 70 = Rs. 7000

15. (d): Let cost price of each item be Rs. 1

CP of 50 items = MP of 30 items

$$MP \text{ of } 1 \text{ item} = CP \text{ of } \frac{5}{3} \text{ items} = \text{Rs. } \frac{5}{3}$$

SP of 1 item = CP of 1 item = Rs. 1

So, percentage discount = $\left(\frac{MP - SP}{MP}\right) \times 100\%$

$$= \left(\frac{\frac{5}{3} - 1}{\frac{5}{3}}\right) \times 100\%$$

$$= 40\%$$

16. (c): CP (1 apple) = $\frac{40}{8} = \text{Rs. } 5$

$$CP \text{ (1 orange)} = \frac{30}{10} = \text{Rs. } 3$$

Making quantities equal; (apple = 40, orange = 40)

$$\text{Total CP} = 40 \times 5 + 40 \times 3 = \text{Rs. } 320$$

$$\text{Total SP} = 40 \times 6 + 40 \times 4 = \text{Rs. } 400$$

$$\text{Required profit}\% = \frac{400 - 320}{320} \times 100 = 25\%$$

17. (d): let CP of each article be Rs. 100x

$$SP \text{ (A)} = \frac{110}{100} \times 100x = \text{Rs. } 110x$$

$$SP \text{ (B)} = \frac{115}{100} \times 100x = \text{Rs. } 115x$$

$$SP \text{ (C)} = \frac{90}{100} \times 100x = \text{Rs. } 90x$$

$$\text{Total CP} = 3 \times 100x = \text{Rs. } 300x$$

$$\text{Total SP} = 110x + 115x + 90x = \text{Rs. } 315x$$

$$\text{Profit}\% = \frac{315x - 300x}{300x} \times 100 = 5\%$$

18. (d): Let marked price of a product be Rs. 120x

$$\text{So, selling price of the product} = 120x \times \frac{80}{100} = \text{Rs. } 96x$$

$$\text{And cost price of the product} = 96x \times \frac{100}{96} = \text{Rs. } 100x$$

Now,

$$\text{New selling price of the product} = 120x \times \frac{93.5}{100} = \text{Rs. } 112.2x$$

$$\text{Required profit}\% = \frac{112.2x - 100x}{100x} \times 100 = 12.2\%$$

19. (c): Let cp of article A = 4x

And cp of article B = 2x

So,

$$4x \times \frac{83}{100} + 2x \times \frac{14.4}{100} = 186$$

$$\frac{2x}{100} [16.6 + 14.4] = 186$$

$$\frac{2x}{100} \times 31 = 186$$

$$x = 300$$

Cost price of A = Rs 1200

20. (b): Let Cost Price of each good be Rs 100x

Then Marked Price of each good be Rs 100x ×

$$\frac{120}{100} = \text{Rs } 120x$$

Let total number of goods be 4y

$$\text{Now, SP of } \left(\frac{3}{4} \times 4y = 3y\right) \text{ goods} = 3y \times 125x$$

$$= 375xy$$

$$\text{S.P. of remaining good} = y \times 120x = 120xy$$

$$\text{Total S.P.} = 375xy + 120xy = 495xy$$

$$\text{Profit}\% = \frac{(SP - CP)}{CP} \times 100$$

$$= \frac{495xy - 4y \times 100x}{4y \times 100x} \times 100$$

$$= \frac{95}{400} \times 100 = 23\frac{3}{4}\%$$

21. (c): Let, CP of B be $x + 120$

And that of A be x

$$\text{Then, } \frac{25}{100} \times x + \frac{40}{100} (x + 120) = 178$$

$$\text{or, } \frac{65x}{100} + 48 = 178$$

$$\text{or, } x = 200$$

$$\text{C.P. of B} = x + 120 = \text{Rs. } 320$$

22. (c): Let the cost price and selling price be Rs x and Rs y respectively.

ATQ

$$\frac{1}{2} \times \frac{y-x}{x} \times 100 = \frac{0.6y-x}{x} \times 100$$

$$x = 0.2y$$

$$\text{Required profit \%} = \frac{1.2y - 0.2y}{0.2y} \times 100 = 500\%$$

23. (e): let actual SP be Rs. x

$$\text{New selling price} = \text{Rs. } \frac{4x}{5}$$

Let CP be Rs. y

$$\text{ATQ, } \frac{\frac{4x}{5} - y}{y} = \frac{20}{100} = \frac{1}{5}$$

$$\frac{4x}{5} - y = \frac{y}{5}$$

$$\frac{y}{x} = \frac{2}{3}$$

When article sold at actual selling price,

$$\text{Profit \%} = \frac{x-y}{y} \times 100 = \frac{\frac{3y}{2} - y}{y} \times 100 = 50\%$$

24. (e): let CP be Rs. x

$$\text{MP} = \frac{130}{100} \times x = \text{Rs. } 1.3x$$

$$\text{SP (given)} = \frac{90}{100} \times 1.3x = \text{Rs. } 1.17x$$

$$\text{Earlier SP (announced)} = \frac{85}{100} \times 1.3x = \text{Rs. } 1.105x$$

$$\text{Gain} = 1.17x - 1.105x = \text{Rs. } 0.065x$$

$$0.065x = 13$$

$$x = \text{Rs. } 200$$

25. (a): let CP of bags be Rs. $4x$ & Rs. $5x$ respectively.

$$\text{Total SP of bags} = \frac{110}{100} \times 4x + \frac{120}{100} \times 5x = 4.4x +$$

$$6x = \text{Rs. } 10.4x$$

$$\text{Required Profit \%} = \frac{10.4x - 9x}{9x} \times 100 = 15\frac{5}{9}\%$$

26. (b): Let cost price of the item be $100x$

$$\text{Marked price of the item} = 100x + 100x \times \frac{60}{100}$$

$$= 160x$$

$$\text{Selling price of items after giving discounts} = 160x$$

$$\times \frac{90}{100} \times \frac{85}{100}$$

$$= 122.4x$$

$$\text{Profit percentage} = \frac{122.4x - 100x}{100x} \times 100$$

$$= 22.4\%$$

27. (d): let CP be Rs. x

$$\text{SP (Johny)} = \frac{110}{100} \times x = \text{Rs. } 1.1x$$

Since Jini calculate profit at SP

$$\frac{SP-x}{SP} \times 100 = 10$$

$$10SP - 10x = SP$$

$$SP = \text{Rs. } \frac{10}{9}x$$

$$\text{Required ratio} = 1.1x : \frac{10x}{9} = 99 : 100$$

28. (c): Let original cost price of the article be Rs. $100x$.

$$\text{So, original selling price of the article} = 100x \times \frac{110}{100} = \text{Rs. } 110x$$

$$\text{Now, new cost price of the article} = 100x \times \frac{95}{100} = \text{Rs. } 95x$$

$$\text{And, new selling price of the article} = \text{Rs. } (110x + 120)$$

ATQ,

$$95x \times \frac{120}{100} = 110x + 120$$

$$\Rightarrow 4x = 120$$

$$x = 30$$

$$\text{So, cost price of the article} = 100x = \text{Rs. } 3000$$

29. (d): let cost price of bag be Rs $100x$

$$\text{MP} = \frac{120}{100} \times 100x = \text{Rs. } 120x$$

$$\text{SP (only first discount)} = \frac{90}{100} \times 120x = \text{Rs. } 108x$$

$$\text{SP (both discount provided)} = 108x \frac{100-d}{100} = \text{Rs. } (108x - 1.08xd)$$

$$\text{ATQ, } 108x - (108x - 1.08xd) = 27$$

$$1.08xd = 27 \dots\dots\dots (i)$$

$$\text{Also, } (108x - 1.08xd) - 100x = 13$$

$$8x - 27 = 13$$

$$x = 5$$

$$\text{CP} = 100x = \text{Rs. } 500$$

$$\text{30. (e): required average cost} = \frac{200+2 \times 80+3 \times 95}{8} = \frac{645}{8} = \text{Rs. } 80.625$$

31. (c): Let cost price of cycle for Rohan be Rs x

$$\text{CP of cycle for Tina} = \left(\frac{6x}{5} + 400\right) \times \frac{112.5}{100}$$

$$\text{ATQ, } 4500 = \left(\frac{6x}{5} + 400\right) \times \frac{9}{8}$$

$$4000 = \frac{6x}{5} + 400$$

$$x = \text{Rs. } 3000$$

32. (a): Let cost price of the mixture = Rs x per kg

$$\begin{array}{ccc} 35 & & 50 \\ & & x \\ 3 & & 2 \end{array}$$

$$(50 - x) : (x - 35) = 3 : 2$$

$$\frac{50-x}{x-35} = \frac{3}{2}$$

$$100 - 2x = 3x - 105$$

$$5x = 205$$

$$x = 41$$

Selling price of the mixture when sold at 25% profit = $41 \times \frac{125}{100} = \text{Rs } 51.25$ per kg

33. (c): Let C.P. of articles be Rs. 100 each.

\therefore S.P. of 1st article = Rs. 115

S.P. of 2nd article = Rs. 90

Total S.P. = Rs. 205

Overall profit percent = $\left(\frac{205-200}{200}\right) \times 100 = 2.5\%$

Alternate method

Required percentage = $\frac{+15\% - 10\%}{2} = \frac{+5\%}{2} = 2.5\%$

34. (c): Let C.P. of article = $100x$

S.P. of article if sold at 10% profit = $110x$

S.P. of article if it is marked up above 30% of C.P. and 10% discount is given

= $100x \times \frac{130}{100} \times \frac{90}{100} = 117x$

ATQ,

$117x - 110x = 56$

$x = 8$

So, C.P. of article = $100x$

= $100 \times 8 = \text{Rs. } 800$

35. (d): Let C.P. of book = Rs. $8x$

Selling price of book = $8x \times \frac{225}{200} = \text{Rs. } 9x$

ATQ,

$9x + 4 - 8x = \frac{1}{4} \times 8x$

$\Rightarrow x + 4 = 2x$

$\Rightarrow x = 4$

New selling price = $9 \times 4 + 4 = \text{Rs. } 40$

36. (e): let no of first, second and third type of items are $2x$, $3x$ and $4x$ respectively

Total cost price = $2x \times 300 + 3x \times 500 + 4x \times 700 = \text{Rs. } 4900x$

Total profit = $600x \times \frac{10}{100} + 1500x \times \frac{5}{100} + 2800x \times \frac{4}{100} = \text{Rs. } 247x$

Overall profit percentage = $\frac{247x}{4900x} \times 100 \approx 5\%$

37. (b): Let Cost price = Rs. $100x$

Then M.R.P = $100x \times \frac{140}{100} = \text{Rs. } 140x$

Selling price = $140x \times \frac{6}{7} \times \frac{9}{10} = \text{Rs. } 108x$

ATQ

$(140x - 108x) - (108x - 100x) = 24$

$24x = 24$

$x = 1$

So, $140x = \text{Rs. } 140$

38. (d): Let the cost price of first and second article be Rs $4x$ and $5x$ respectively.

ATQ

Total selling price = $\frac{112.5}{100} \times 4x + \frac{90}{100} \times 5x = \text{Rs } 9x$

Total cost price = $4x + 5x = \text{Rs } 9x$

So, neither gain nor loss obtained.

39. (c): Let cost price of first horse is Rs P .

ATQ

$\frac{80}{100} \times P + P = 12600$

$P = \text{Rs } 7000$

Cost price of second horse = $P \times \frac{100}{125} = \text{Rs } 5600$

So, total cost price = $7000 + 5600 = \text{Rs } 12600$

Total selling price = Rs 12600

So, no profit or no loss occurred.

40. (a): Let cost price = Rs $100x$

So, marked price = $\frac{120}{100} \times 100x = \text{Rs } 120x$

And selling price = $\frac{75}{100} \times 120 = \text{Rs } 90x$

ATQ

$90x = 1080$

$x = 12$

So, cost price = $100x = \text{Rs } 1200$

Level - 2

1. **(d):** Selling price of 20% stock on which Shivam earned 12% profit = $\frac{112}{100} \times \frac{20}{100} \times 80000$
 = Rs.17920
 Selling price of 60% stock on which Shivam earned 15% profit = $\frac{115}{100} \times \frac{60}{100} \times 80000$
 = Rs.55200
 Total selling price = 55200 + 17920
 = Rs.73120
 Required profit/loss = 80000 - 73120
 = Rs.6880 loss
2. **(d):** Cost price of total mixture
 = $\frac{450}{6} \times 5$
 = 375 Rs.
 ATQ—
 $4 \times 75 + 3X = 375$
 $3X = 375 - 300$
 $X = 25$ Rs.
3. **(a):** Let C.P. of bat = x Rs.
 S.P. of bat = 1.2x Rs.
 ATQ—
 $(1.2x + 17.5) = \frac{130x}{100}$
 $120x + 1750 = 130x$
 $x = \frac{1750}{10}$
 $x = 175$ Rs.
 for 60% profit = $175 \times \frac{160}{100}$
 = 280 Rs.
4. **(c):** Let cost price of article be 100x
For first case -
 Mark price of article = 160x
 Selling price of article = $160x \times \frac{3}{4} = 120x$
 Profit = $120x - 100x = 20x$
For second case -
 Mark price of article = 175x
 Selling price of article = $175x \times \frac{80}{100} = 140x$
 Profit = $140x - 100x = 40x$
 Required profit = $\frac{40x - 20x}{20x} \times 100 = 100\%$
5. **(b):** MP (2 rolls) = 200 + 200 = Rs 400
 Bill amount = $400 \times \frac{80}{100} =$ Rs 320
 Actual amount paid = $320 \times \frac{90}{100} =$ Rs 288
 Required % = $\frac{400 - 288}{400} \times 100 = 28\%$
6. **(c):** Cost price(CP) of 20 dozen diary = $20 \times 40 =$ Rs.800
 Selling price(SP) of 8 dozen at 10 % profit = $40 \times 8 \times \frac{110}{100} =$ Rs.352

Selling price(SP) of 12 dozen at 20 % profit = $40 \times 12 \times \frac{120}{100} =$ Rs.576

$$\text{Required \% on whole transaction} = \frac{(352 + 576) - 800}{800} \times 100$$

$$= \frac{928 - 800}{800} \times 100$$

$$= \frac{128}{800} \times 100 = 16\%$$

7. **(e):** Let marked price of the article be Rs. 100x.
 So, cost price of the article = $100x \times \frac{61}{100} =$ Rs. 61x
 And selling price of the article = $61x \times \frac{140}{100} =$ Rs. 85.4x
 ATQ,
 $(85.4x - 61x) - (100x - 85.4x) = 196$
 $24.4x - 14.6x = 196$
 $\Rightarrow x = 20$
 So, C.P of the article = 61x
 = Rs.1220
8. **(d):** Let total book = 100x
 ATQ
 S.P of 40% books = C.P of 80% books
 $\frac{S.P}{C.P} = \frac{2}{1}$
 Let C.P and S.P of a book be a and 2a respectively.
 Then profit percent on selling 40% books = $\frac{2a - a}{a} \times 100 = 100\%$
 S.P for 70% of remaining books = $a \times \frac{150}{100} = 1.5a$
 Total S.P = $40x \times 2a + \frac{70}{100} \times 60x \times 1.5a = 143ax$
 Actual profit % = $\frac{143ax - 100ax}{100ax} \times 100 = 43\%$
9. **(a):** When answer is asked in percent, we do not need exact data we can use ratio
 So, $\frac{\text{ball}}{\text{bat}} = \frac{3575}{2002} = 25:14$
 Let total no. of ball be 25 and total no. of bat be 14
 ATQ
 For ball
 $850c.p = 799s.p$
 $\frac{c.p}{s.p} = \frac{47}{50}$
 Let c.p of one ball be 47a and s.p of one ball be 50a
 For bat
 $777c.p = 987s.p$
 $\frac{c.p}{s.p} = \frac{47}{37}$
 Let c.p of one bat be 47a and s.p of one bat be 37a
 Total c.p for Pankaj = $47a \times 25 + 47a \times 14 = 1833a$

Total s.p for Pankaj = $50a \times 25 + 37a \times 14 = 1768a$

$$\text{Loss \%} = \frac{1833a - 1768a}{1833a} \times 100 \approx 4\%$$

10. (d): Let total items be x and profit % earned on remaining items be $y\%$.

ATQ,

$$\frac{2}{5}x \times 1,80,000 \times \left(1 - \frac{12}{100}\right) + \frac{3}{5}x \times 1,80,000 \times \left(1 + \frac{y}{100}\right) = x \times 1,80,000 \times \left(1 + \frac{18}{100}\right)$$

$$72,000x \times \frac{88}{100} + 108,000x \times \left(\frac{100+y}{100}\right) = 1,80,000x \times \frac{118}{100}$$

$$y = 38\%$$

11. (d): Let C.P of the article be Rs. $100x$

$$\text{So, M.P. of the article} = 100x \times \frac{160}{100} = \text{Rs. } 160x$$

Let discount allowed on article & profit earned on article be 'Rs. $4y$ ' & 'Rs. y ' respectively.

ATQ,

$$4y - y = 180$$

$$y = 60$$

$$\text{Hence, discount allowed on article} = 4y = \text{Rs. } 240$$

$$\text{And profit earned on article} = y = \text{Rs. } 60$$

Now,

$$160x - 240 = 100x + 60$$

$$60x = 300$$

$$x = 5$$

$$\text{Hence, M.P of the article} = \text{Rs. } 160x = \text{Rs. } 800$$

$$\text{And S.P. of the article} = 800 - 240 = 560$$

$$\text{So, Required ratio} = \frac{560}{800} = \frac{7}{10}$$

12. (a): Let cost price of article = $100x$

$$\text{So, Marked price of article} = 160x$$

$$\text{Selling price of article} = 107.52x$$

ATQ-

$$160x \times \frac{80}{100} \times \frac{7}{8} \times \frac{(100-d)}{100} = 107.52x$$

$$112x \times \frac{(100-d)}{100} = 107.52x$$

$$(112 - 1.12d) = 107.52$$

$$1.12d = 4.48$$

$$d = 4\%$$

$$\text{New selling price} = 160x \times \frac{80}{100} \times \frac{96}{100} = 122.88x$$

$$\text{Required profit \%} = \frac{22.88x}{100x} \times 100 = 22.88\%$$

13. (b): Let total no. of mobiles be y

$$\Rightarrow y + 9 = 44$$

$$\text{So, number of mobiles} = y = 35$$

$$\text{And number of laptops} = 9$$

Let cost price of a laptop and a mobile be Rs $2P$ and P respectively

ATQ

$$\text{Total selling price} = \frac{4}{5} \times 35 \times (P+3000) + 6 \times 2P \times$$

$$\frac{150}{100} = \text{Rs. } 636000$$

$$\Rightarrow P = 12000$$

So, cost price of laptop and mobiles are Rs 24000 and Rs 12000 respectively.

$$\text{Total cost price} = 35 \times 12000 + 9 \times 24000 = \text{Rs } 636000$$

\therefore no profit no loss occurs

14. (b): Amount of loss incurred on selling 1st Car

$$= \left[52510 \times \frac{100}{89} - 52510\right]$$

$$= 59000 - 52510 = \text{Rs. } 6490$$

Let cost price of second car be Rs. $20x$.

$$\text{Selling price of second car will be} = 20x \times \frac{105}{100} =$$

$$\text{Rs. } 21x$$

ATQ,

$$21x - 20x = 6490$$

$$x = 6490$$

$$20x = \text{Rs. } 129800$$

15. (d): Let cost price of each article be Rs. $100x$.

Then, original M.P. of each article

$$= 100x \times \frac{150}{100} = \text{Rs. } 150x$$

$$\text{New M.P. of each article} = 150x \times \frac{160}{100} = \text{Rs. } 240x$$

When salesman applied the scheme:

$$\text{Total revenue of salesman} = 240x \times 5 = \text{Rs. } 1200x$$

$$\text{Total cost of articles for salesman} = 100x \times 8 = \text{Rs. } 800x$$

$$\text{Profit of salesman} = 1200x - 800x = \text{Rs. } 400x$$

$$\text{Required profit\%} = \frac{400x}{800x} \times 100 = 50\%$$

16. (d): Let cost price of an article be Rs. $100x$.

$$\text{So, marked price of an article} = \frac{100x \times 10}{8}$$

$$= \text{Rs. } 125x$$

ATQ,

$$125x \times \frac{88}{100} - 125x \times \frac{80}{100} = 48$$

$$\Rightarrow 125x \times \frac{8}{100} = 48$$

$$\Rightarrow x = \frac{24}{5}$$

$$\text{Required amount} = 100x$$

$$= \text{Rs. } 480$$

17. (d): Cost price of each laptop for salesman = Rs. 36,000

$$\text{Marked price of each laptop for salesman} = 36000 \times \frac{250}{100} = \text{Rs. } 90000$$

$$\text{Selling price of each laptop for salesman} = \left[90000 - 90000 \times \frac{30}{100} - 25000\right]$$

$$= \text{Rs. } 38000$$

$$\text{Profit earned by salesman on selling each laptop} = 38000 - 36000 = \text{Rs. } 2000$$

$$\text{Required amount} = 2000 \times 50 = \text{Rs. } 100000$$

18. (d): Let he has maximum profits when he has x items unsold with him.

And when he has maximum selling price, he will have maximum profits.

ATQ,

$$SP = (10 - x) \times (60 + 10x)$$

$$= 600 - 60x + 100x - 10x^2$$

$$= 600 + 40x - 10x^2$$

$$= 600 + 10(4x - x^2)$$

SP will maximum when $(4x - x^2)$ will have maximum value.

\Rightarrow for maximum value of $x \times (4 - x)$

We have

$$x = (4 - x)$$

$$\Rightarrow x = 2$$

$$\text{Required SP} = \text{Rs. } (60 + 2 \times 10) = \text{Rs. } 80$$

19. (d): Let 'A' purchased each bed for Rs. 100x

So, cost price of a bed for 'A' = Rs. 100x

$$\text{Now, cost price of a bed for 'B'} = 100x \times \frac{160}{100} = \text{Rs. } 160x$$

$$160x$$

$$\text{And cost price of a bed for 'C'} = 100x \times \frac{120}{100} = \text{Rs. } 120x$$

$$120x$$

Now,

$$\text{Cost price of a bed for 'D'} = \frac{80}{100} \left(\frac{160x + 120x}{2} \right) =$$

$$\frac{8}{10} \times 140x = \text{Rs. } 112x$$

ATQ,

$$112x \times \frac{75}{100} = 2100$$

$$84x = 2100$$

$$x = 25$$

$$\text{Hence, required difference} = 112x - 100x = 12x = \text{Rs. } 300$$

20. (a): Let cost price for shopkeeper be Rs x

Selling price for shopkeeper = $(x + 600)$

ATQ,

$$(x + 600) = \text{Cost price for Man}$$

$$\text{Selling price for Man} = (x + 600) \times \frac{160}{100} \times \frac{75}{100}$$

$$= 1.2x + 720$$

ATQ,

$$1.2x + 720 - x - 600 = 640$$

$$0.2x + 120 = 640$$

$$x = \frac{520}{0.2} \Rightarrow x = 2600$$

$$\text{Cost price for the shopkeeper} = \text{Rs } 2600$$

21. (b): Let the cost price and selling price of B be Rs x and Rs y respectively

CP of A = $(x + 600)$

And SP of A = $(y + 1200)$

$$\text{Difference of their profits} = (y + 1200 - x - 600) - (y - x) = 600$$

ATQ

$$(x + 600) \times \frac{40}{300} = 600$$

$$x = 3900$$

$$\text{Profit earned of B} = 4500 \times \frac{1}{3} - 600 = \text{Rs } 900$$

Direction (22 - 23):

Let selling price of article B = Rs. 100x

So, cost price of article A = Rs. 160x

$$\text{Marked price of article B} = \frac{100x}{80} \times 100 = \text{Rs. } 125x$$

$$\text{Selling price of article, A} = 160x \times \frac{125}{100} = \text{Rs. } 200x$$

22. (b): Given, $200x - 125x = 48$

$$75x = 48$$

$$x = \text{Rs. } 0.64$$

$$\text{Profit on article B} = 100x \times \frac{3}{8} = \text{Rs. } 37.5x$$

$$\text{Profit on article B} = 37.5 \times 0.64 = \text{Rs. } 24$$

$$\text{Cost price of A} = 160 \times 0.64 = \text{Rs. } 102.4$$

$$\text{Required difference} = 102.4 - 24 = \text{Rs. } 78.4$$

23. (c): Selling price of article C = $200x \times \frac{120}{100} = \text{Rs. } 240x$

$$\text{Cost price of article C} = 240x \times \frac{100}{96} = \text{Rs. } 250x$$

$$\text{Required percentage} = \frac{250x - 160x}{250x} \times 100$$

$$= \frac{90x}{250x} \times 100 = 36\%$$

24. (e): Given, cost price of A = Rs. x And SP = Rs 128

ATQ -

$$x \left(1 + \frac{(x-20)}{100} \right) = 128$$

$$100x + x^2 - 20x = 128$$

$$x^2 + 80x - 12800 = 0$$

$$x^2 + 160x - 80x - 12800 = 0$$

$$x(x + 160) - 80(x + 160)$$

$x = \text{Rs. } 80$ (neglecting the negative value of x since amount can never be in negative)

$$\text{Cost price of B} = 80 \times \frac{125}{100} = \text{Rs. } 100$$

Price at which shopkeeper should sell B to make profit of

$$40\% = 100 \times \frac{140}{100} = \text{Rs. } 140$$

25. (a): Let cost price of shirt = X Rs.

So, cost price of jeans = $(X + 200)$ Rs.

$$\text{Selling price of shirt} = \frac{4X}{5} = 0.80X \text{ Rs.}$$

$$\text{Selling price of jeans} = (X + 200) \times \frac{5}{4} = (1.25X + 250) \text{ Rs.}$$

ATQ -

$$2X + 200 = (2.05X + 250) \times \frac{700}{740}$$

$$74X + 7400 = 71.75X + 8750$$

$$2.25X = 1350$$

$$X = 600 \text{ Rs.}$$

$$\text{Cost price of jeans} = 800 \text{ Rs.}$$

Now, SP of shirt when shirt sold at 25% profit =
 $600 \times \frac{125}{100} = 750 \text{ Rs.}$
 And, SP of jeans when jeans sold at 20% loss = $800 \times \frac{80}{100} = 640 \text{ Rs.}$
 Total selling price = $750 + 640 = 1390 \text{ Rs.}$
 Required loss % = $\frac{1400-1390}{1400} \times 100$
 $= \frac{10}{14} \% = \frac{5}{7} \%$

26. (b): Actual MP = $\frac{4500}{90} \times 100 = \text{Rs. } 5000$
 Now, Amitabh got 10% more discount $\Rightarrow 4500 \times \frac{90}{100} = \text{Rs. } 4050$
 Bill amount = $4050 + 4050 \times 0.75\% = \text{Rs. } 4080.375$

27. (a): Let cost price of Mumbai steel factory be Rs.x
 So, cost price of Chennai steel factory = Rs.(72 - x)
 ATQ,
 $x \times \frac{116}{100} + (72 - x) \times \frac{124}{100} = 72 \times \frac{119}{100}$
 $\Rightarrow x = 45 \text{ crores}$
 Hence, selling price of Mumbai factory = $45 \times \frac{116}{100}$
 $= 52.2 \text{ crores}$

28. (b): SP of article (to customer) = $3000 - 300 = \text{Rs. } 2700$
 Marked price = $2700 \times \frac{100}{90} = \text{Rs. } 3000$
 CP of article = $2700 \times \frac{100}{120} = \text{Rs. } 2250$

29. (a): Let for 100 gm sugar purchase he takes 125 gm from the whole-seller and while selling he sells only 90 gm instead of 100 gm.
 Let the price of 100 gm sugar is Rs.100
 Then the actual C.P of the sugar that will be sold = $\left(\frac{100}{125}\right) \times 90 = \text{Rs. } 72$
 S.P of sugar = $100 \times \frac{120}{100} \times \frac{80}{100} = \text{Rs. } 96$
 So entire Profit will be = $\text{Rs. } ((96 - 72)) = \text{Rs. } 24$
 So required profit % = $\left(\frac{24}{72}\right) \times 100 = 33\frac{1}{3} \%$

30. (b): Let the selling price be Rs 100x
 Then Marked price = Rs 125x
 Cost price = $100x \div 1.25 = \text{Rs } 80x$
 ATQ
 $45x - 20x = 200$
 $x = 8$
 Cost price = Rs 640

31. (a): Let cost price of a ball be Rs 100x
 So, cost price of a bat = $100x \times \frac{360}{100} = \text{Rs. } 360x$
 Now, marked price of a bat
 $= 360x \times \frac{125}{100} = \text{Rs. } 450x$
 And marked price of a ball = $100x \times \frac{140}{100}$
 $= \text{Rs } 140x$

And, selling price of a bat = $450x \times \frac{85}{100}$
 $= \text{Rs } 382.5x$
 And selling price of a ball = $140x \times \frac{85}{100}$
 $= \text{Rs } 119x$
 Atq,
 $119x - 100x = 38$
 $19x = 38$
 $x = 2$
 Required difference = $382.5x - 119x$
 $= 263.5x = \text{Rs } 527$

32. (e): Cost price of a phone for salesman = $\frac{780000 + 20000}{50}$
 $= \text{Rs. } 16000$
 Mark price marked by salesman of a phone =
 $16000 \times \frac{120}{100}$
 $= \text{Rs. } 19200$
 Salesman sold each phone at = $19200 \times \frac{92}{100}$
 $= \text{Rs. } 17664$
 Required amount = $17664 - 16000$
 $= \text{Rs. } 1664$

33. (d): Let cost price of each of the both articles be 100c
 Mark price of jeans = 150c
 Mark price of shirt = 170c
 Selling price of jeans = $150c \times \frac{80}{100} = 120c$
 Selling price of shirt = $170c \times \frac{80}{100} = 136c$
 Profit earned on jeans = $120c - 100c = 20c$
 Profit earned on shirt = $136c - 100c = 36c$
 ATQ -
 $36c - 20c = 320$
 $16c = 320$
 $c = 20 \text{ Rs.}$
 Selling price of shirt = $20 \times 136 = 2720 \text{ Rs.}$

34. (d): Let total tables manufactured by the manufacturer be 100y and let marked price of each table be Rs. 100x.
 So, selling price of each table = $100x \times \frac{72}{100}$
 $= \text{Rs. } 72x$
 And cost price of each table = $72x \times \frac{100}{120}$
 $= \text{Rs. } 60x$
 Hence, total manufacturing cost of the manufacturer = $60x \times 100y$
 $= \text{Rs. } 6000xy$
 Total selling price of the tables = $6000xy \times \frac{120}{100}$
 $= \text{Rs. } 7200xy$
 So, selling price of each table from the remaining tables = $\frac{7200xy}{90y} = \text{Rs. } 80x$
 Hence, required discount % = $\frac{100x - 80x}{100x} \times 100$
 $= 20\%$

35. (a): Given,

MP of bat = 350 Rs

Discount = x Rs

CP of bat = 280 Rs

Atq,

$$(350 - x) = 280 \times \frac{9}{8}$$

$$x = 35 \text{ Rs}$$

$$\text{discount percentage} = \frac{35}{350} \times 100$$

$$= 10\%$$

36. (a): Let cost price of article = 100P

$$\text{Mark price of article} = 100P \times \frac{135}{100} = 135P$$

ATQ -

$$135P \times \frac{80}{100} - 100P = 480$$

$$108P - 100P = 480$$

$$P = 60 \text{ Rs.}$$

When retailer's sell at 15% discount,

$$\text{Selling price} = 135P \times \frac{85}{100} = 114.75P$$

$$\text{Profit} = 114.75P - 100P = 14.75P$$

$$\text{So, Profit} = 14.75 \times 60 = 885 \text{ Rs.}$$

37. (c): Let the CP be Rs. x

Then,

$$840 - x = 2(x - 480)$$

$$\Rightarrow 840 - x = 2x - 960$$

$$\Rightarrow 3x = 840 + 960 = 1800$$

$$\Rightarrow x = \text{Rs. } 600$$

$$\text{SP} = 600 \times \frac{11}{8} = \text{Rs. } 825$$

38. (b): Let cost price of an article = 100x

$$\text{Mark price of an article} = 100x \times \frac{135}{100} = 135x$$

ATQ,

$$135x \times \frac{80}{100} - 100x = 96$$

$$\Rightarrow 108x - 100x = 96$$

$$\Rightarrow x = \frac{96}{8} = 12$$

Retailer's profit if he sells article at 15% discount

$$= 135x \times \frac{85}{100} - 100x$$

$$= 114.75x - 100x$$

$$= 14.75x$$

$$= 14.75 \times 12$$

$$= 177$$

39. (a): Let mark price = Rs. 100x

After discount of 40% selling price

$$= \frac{100x \times 60}{100} = \text{Rs. } 60x$$

Loss \rightarrow 10%

$$\text{Cost price} \rightarrow \frac{60x}{90} \times 100 = \text{Rs. } \frac{200}{3}x \quad \dots(i)$$

When discount of 20% is given

$$\text{Selling price} \rightarrow \frac{100x \times 80}{100} = \text{Rs. } 80x$$

$$\text{Cost price} \Rightarrow 80x - 7.5 \quad \dots(ii)$$

Comparing (i) & (ii)

$$\frac{200x}{3} = 80x - 7.5$$

$$x = \frac{9}{16}$$

$$\text{Cost price} = \frac{200}{3} \times \frac{9}{16} = \text{Rs. } 37.5$$

40. (a): Let mark price of each product and number of products are Rs.100y and 100x respectively.

Damaged product = 20x

Undamaged product = 80x

S.P. of damage product = Rs.70y

S.P. of good product = Rs.90y

ATQ,

$$80x \times 90y - 20x \times 70y = 29000$$

$$xy = 5$$

Sum of mark price of all product

$$= 100x \times 100y$$

$$= 10000xy$$

$$= \text{Rs. } 50,000$$

Mains Solutions

1. (b): Let the MP of a chair and a table be Rs.5x and Rs.8x respectively.

And, the number of chairs and tables bought be 6y and 5y respectively.

CP of a chair for Abhishek = (100 - 20)% of 5x = Rs.4x

CP of a table for Abhishek = (100 - 25)% of 8x = Rs.6x

Total CP for Abhishek = 4x × 6y + 6x × 5y = 24xy + 30xy = 54xy

SP of a chair for Abhishek = (100 - 25)% of (100 + 50)% of 4x = 4.5x

SP of a table for Abhishek = (100 - 20)% of (100 + 50)% of 6x = 7.2x

Number of chairs sold in bunch of four by Abhishek = $\frac{2}{3}$ rd of 6y = 4y

So, number of table sold for free by Abhishek

$$= \frac{1}{4} \text{th of } 4y = y$$

Total SP for Abhishek = 4.5x × 6y + 7.2x × (5y - y) = 27xy + 28.8xy = 55.8xy

$$\text{Profit \%} = \frac{55.8xy - 54xy}{54xy} \times 100 = \frac{1.8xy}{54xy} \times 100 =$$

$$3\frac{1}{3}\%$$

2. (c): According to the question,
 MP of a table = 300 + MP of a chair
 $\Rightarrow 8x = 300 + 5x$
 $\Rightarrow x = 100$
 Total CP for Abhishek = 108000
 $\Rightarrow 54xy = 108000$
 $\Rightarrow 54 \times 100 \times y = 108000$
 $\Rightarrow y = 20$
 Number of chairs purchased by Abhishek
 $= 6y = 120$
3. (b): Original company price = $1660 \times \frac{100}{83} = 2000$ Rs.
 SP of garments, which Sameer fixed
 $= 2000 \times \frac{107}{100} = 2140$ Rs.
4. (c): Ratio of profits = Ratio of (amount \times time)
 Let, initial amounts of Raju, Rancho & Farhan be
 $5x, 7x$ and $9x$ respectively
 $5x \times 3 + 5x \times 3 : 7x \times 3 + \frac{7x}{2} \times 6 + 7x \times 3 : 9x \times 3$
 $3 + 27x \times 6 + \frac{27x}{9} \times 3$
 $= 10 : 21 : 66$
 $\frac{(21-10)}{97} \times 11737 = 11 \times 121 = 1331$ Rs
5. (e): Ratio of their amounts at the end of 1st year
 $= 5 : 7 : 3$
 Profit Share of Rancho = $\frac{7}{15} \times 22500 = 7 \times 1500 =$ Rs 10500
6. (a): Ramu's discount:
 8% on 8000 = 640
 5% on 12000 = 600
 3% on 16000 = 480
 Total = 1720 on 36000
 Final S.P. on Ramu sold shashi = 34280
 Shyamu's Discount:
 7% on 12000 = 840
 6% on 8000 = 480
 5% on 16000 = 800
 Total = 2120 on 36000
 Final SP on Shyamu sold to Rajesh = 33880
 C.P. for both of them = $36000 \times \frac{100}{125} = 28800$
 Ramu has greater Profit
 Profit% for Ramu = $\frac{(34280-28800)}{28800} \times 100 = 19\%$
 (approx.)
7. (a): Ramu's Discount:
 8% on 8000 = 640
 4% on 12000 = 480
 1% on 16000 = 160
 Total = 1280 on 36000
 Final SP for him = $36000 - 1280 = 34720$
 Profit = $34720 - 28800 = 5920$

8. (a): Given that Kailash car's average (in term of litres per kilometer is 20% higher the Shyam is car)
 Let Kailash car takes x litres of petrol per kilometer then, Shyam car will take $\frac{5}{6}x$ litres of diesel per kilometer
 Also,
 Cost price/ litre of petrol = cost price / litre of diesel + 60% of cost price/litre of petrol.
 $\frac{\text{cost price / L of petrol}}{\text{cost price / L of diesel}} = \frac{5}{2}$
 Required ratio = $\frac{\text{cost/kilometere kailash car}}{\text{cost /kilometer of shyam's car}}$
 $= \frac{x \times 5}{\frac{5}{6}x \times 2} = 3 : 1$
9. (e): Shyam's car gives 20 km/litre means, it takes 0.05 litres of diesel per kilometer
 $\frac{5}{6}x \rightarrow 0.05$
 $x \rightarrow 0.06$ (litre/km for kailash car)
 cost price per litre of diesel = 12.5 Rs/L
 so, cost per litre of petrol = $\frac{12.5}{2} \times 5 = 31.25$ Rs/L
 Required difference = $0.06 \times 31.25 - 0.05 \times 12.5 = 1.25$
10. (c): Let Satish, Veer, Arun and Yogesh buy 'w', 'x', 'y' and 'z' bicycle respectively.
 According to direction given
 $w + x = y$... (i)
 $x + y = z$... (ii)
 $y = 20$... (iii)
 $z - w = 24$... (iv)
 By solve (i), (ii), (iii) and (iv)
 We get
 $w = 8, x = 12, y = 20, z = 32$
 Let Satish, Veer, Arun and Yogesh get 'a%', 'b%', 'c%' and 'd%' discount by wholeseller on MP.
 According to direction given,
 $b + c = a + d$... (i)
 $c = a + b$... (ii)
 $d = a + c$... (iii)
 $d - b = 10\%$... (iv)
 By solving (i), (ii), (iii) and (iv)
 We get
 $a = 5\%, b = 10\%, c = 15\%, d = 20\%$
 Let marked price of each bicycle = $100x$
 Satish buy 1 bicycle at = $95x$
 Arun buy 1 bicycle at = $85x$
 Profit earn by Satish = $800x - 8 \times 95x$
 $= 800x - 760x = 40x$
 Profit earn by Arun = $800x - 8 \times 85x$
 $= 800x - 680x = 120x$
 Desired % = $\frac{120x - 40x}{40x} \times 100 = \frac{80x}{40x} \times 100 = 200\%$

11. (e): Total bicycle Yogesh bought = 32
 Let M.P. = 100x
 C.P. of 32 bicycle = $32 \times 80x = 2560x$
 S.P. of 8 bicycle at 10% discount = $8 \times 90x = 720x$
 S.P. of 18 bicycle at 30% discount = $18 \times 70x = 1260x$
 S.P. of 6 bicycle on M.P. = $6 \times 100x = 600x$
 Total S.P. = $720x + 1260x + 600x = 2580x$
 Profit = $2580x - 2560x = 20x$
 $100x = 20,000$
 $x = 200$
 Total profit = $20 \times 200 = 4000$

12. (b): Let the marked price of a chair be = Rs 50
 And the marked price of a table be = Rs 70
 Also, no. of chairs bought be = 9x
 And no. of tables bought be = 8x
 C.P. of chair for Raghav = $\frac{4}{5} \times 50 = 40$
 C.P. of table for Raghav = $\frac{3}{4} \times 70 = 52.5$
 Total C.P. for Raghav = $9x \times 40 + 8x \times 52.5 = 780x$
 Total S.P. for Raghav = $7x \times 40 \times 1.5 \times 0.75 + 8x \times 52.5 \times 1.5 \times 0.8$
 $= 315x + 504x = 819x$
 Profit % = $\frac{819-780}{780} \times 100 = \frac{39}{780} \times 100 = 5\%$

13. (a): C.P. for Raghav = $90 \times 40 + 80 \times 52.5 = 3600 + 4200 = 7800$
 Required average price = $\frac{7800}{170} = \text{Rs } 45.88$

14. (e): Let cost of pure rice per kg is 10 Rs.
 So cost of impure rice per kg is 4 Rs.
 Total cost for the shopkeeper
 $= 12 \times 10 + 4 \times (4 + 4)$
 $= 120 + 32 = 152 \text{ Rs.}$
 Total selling price = $\frac{10}{100} \times 120 \times 16 = 192$
 Required percentage = $\frac{40}{152} \times 100 = \frac{500}{19}\%$

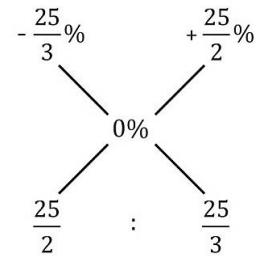
15. (d): Let 15 pens and 15 pencils are sold and cost of 1 pen is 10 Rs.
 So, Cost of 3 pen is 30 Rs. which is equal to cost of 5 pencils.
 Total cost price of 15 pens and 15 pencils
 $= 15 \times 10 + 6 \times 15$
 $= 150 + 90 = 240 \text{ Rs.}$
 Total selling prices of 15 pens and 15 pencils
 $= 150 \times \frac{6}{5} + 90 \times \frac{4}{3} = 180 + 120 = 300$
 Overall percentage profit = $\frac{300-240}{240} \times 100$
 $= \frac{60}{240} \times 100 \Rightarrow 25\%$

16. (b): If 100 articles are Manufactured then 12 will be rejected

Total selling price of 88 articles = $88 \times 7.5 = 660$
 Total cost price of 100 article = $\frac{660 \times 100}{120} = 550$
 Manufacturing cost of per article = $\frac{550}{100} = 5.50 \text{ Rs}$

17. (a): C. P. of car = $\frac{90}{100} \times 4,50,000 = \text{Rs. } 4,05,000$
 C. P. of scooter = $\frac{1}{10} \times 4,05,000 = \text{Rs. } 40,500$
 M. P. of scooter = Rs. 50,625
 C.P. of car and scooter = $4,05,000 + 40,500 = 4,45,500$
 S. P of car and scooter = $\frac{130}{100} \times 4,45,500 = \text{Rs. } 5,79,150$
 S. P. of car = $5,79,150 - \frac{110}{100} \times 40,500 = 5,79,150 - 44,550 = 5,34,600$
 Required Ratio = $\frac{50,625}{5,34,600} = \frac{25}{264}$

18. (a):



$\therefore \text{Table} : \text{Chair} = \frac{1}{2} : \frac{1}{3}$
 $= 3 : 2$
 Let table = 3x
 Chair = 2x
 ATQ-
 $3x \times \frac{25}{2} \times \frac{1}{100} - 2x \times \frac{25}{3} \times \frac{1}{100} = 25$
 $\frac{5x}{24} = 25$
 $x = 120$
 $\therefore \text{Table} = 360 \text{ Rs.}$
 Chair = 240 Rs.

19. (c): Let dealer cost for 100. kg
 Shopkeeper buys goods worth : $1.2 \times 100 = 120 \text{ kg}$
 shopkeeper sells to customer goods worth
 $= 100 \times \frac{80}{100} = 80 \text{ kg}$
 profit = $120 - 80 = 40 \text{ kg}$
 Required % = $40 \times \frac{100}{80}$
 $\therefore \text{Profit \%} = 50\%$

20. (b): CP of 150 calculators = $150 \times 250 = \text{Rs. } 37500$
 Total CP = $37500 + 2500 = \text{Rs. } 40000$
 MP of 150 calculators = $150 \times 320 = \text{Rs. } 48000$
 SP after discount = $48000 \times \frac{95}{100} = \text{Rs. } 45600$
 $\therefore \text{Percentage profit} = \frac{45600 - 40000}{40000} \times 100 = 14\%$

- 21. (b):** Let cost price = 100
Then mark price = $100 \times \frac{3}{2} = 150$
Let discount percent and profit percent = x
ATQ,
$$\frac{100(100+x)}{100} = \frac{150(100-x)}{100}$$
$$x = 20\%$$
- 22. (b):** Let the correct weight be 1 kg and C.P. be Rs 1/g
Quantity purchased by the shopkeeper = 1250 g
Quantity sold by the shopkeeper = 750 g
We have
S.P. of 750 g = C.P. of 1250 g
 \Rightarrow S.P. of 750 g = Rs 1000
 \Rightarrow C.P. of 750 g = $\frac{1000 \times 750}{1250} = 600$ Rs
Therefore, profit by selling 750 g of item
= $1000 - 600 =$ Rs 400
Profit percentage = $\frac{400}{600} \times 100 = 66.67\%$
- 23. (c):** Let the cost price be Rs. 100
Then marked price will be Rs. 150
He gives 10% discount, so

Selling price = $150 \times \frac{90}{100} =$ Rs. 135
As he cheats and gives 20% less in weight,
Cost price becomes = $100 \times \frac{80}{100} =$ Rs. 80
 \therefore Profit percentage = $\frac{135-80}{80} \times 100 \approx 68\%$

- 24. (c):** Let, total expenditure on an item be Rs. 100
Then S.P. of item = 125
New expenditure on raw materials = $1.15 \times 40 = 46$
New expenditure on labour = $1.2 \times 20 = 24$
New expenditure on miscellaneous = $1.5 \times 20 = 30$
Profit percentage = $\frac{125-120}{120} \times 100 = 4\frac{1}{6}\%$
- 25. (c):** To get a profit of $13\frac{7}{11}\%$ at a selling price of Rs. 125, the C.P. of an item must be equal to $125 \times \frac{1100}{1250} = 110$
We need to reduce C.P. (or expenditure) by 10, and this 10 has to be reduced from expenditure on raw materials.
Required % = $\frac{10}{46} \times 100 = 21\frac{17}{23}\%$

Previous Year Question

- 1. (b):** Let the profit earned on second article be $x\%$
Using allegation method,

12	x	
15		
(x-15)	3	
1	:	1----- (ratio of cost price)

 $\Rightarrow x = 18\%$
ATQ
6% = Rs 90
So, cost price = $100\% =$ Rs 1500
- 2. (b):** Let cost price of Jeans = $100x$ Rs.
Marked price of Jeans = $125x$ Rs.
Selling price of jeans = $125x \times \frac{90}{100} \times \frac{95}{100}$
= $106.875x$ Rs.
ATQ —
 $106.875x - 100x = 89.1$
 $x = 12.96$
Cost price of jeans = 1296 Rs.
For 40% of profit
Selling price = $1296 \times \frac{140}{100} = 1814.4$ Rs.
- 3. (c):** let CP of book be Rs x
SP = Rs $1.2x$
New CP = Rs $0.9x$
New SP = Rs $1.2x + 90$
ATQ, $0.9x \times \frac{140}{100} = 1.2x + 90$
 $1.26x = 1.2x + 90$
 $x =$ Rs 1500
- 4. (b):** Let C.P. of LED = $100x$ Rs.
M.P of LED = $160x$ Rs.
First discount = $160x \times \frac{1}{8}$
= $20x$ Rs.
Second and third discount
 $(160x - 20x) \times \frac{(100-d)}{100} \times \frac{(100-25)}{100} = 84x$
 $140x \times \frac{100-d}{100} \times \frac{3}{4} = 84x$
 $21(100 - d) = 84 \times 20$
 $21d = 2100 - 1680$
 $d = \frac{420}{21}$
 $d = 20\%$
- 5. (b):** Let the CP of shirt be Rs. $100x$
Then MP = Rs. $150x$
SP = $150x \times \frac{8}{9} \times \frac{9}{10} =$ Rs. $120x$
Profit = Rs. $20x$
Discount given = Rs. $30x$
ATQ,
 $10x = 200$
 $\Rightarrow x = 20$
MP = Rs 3000
- 6. (d):** ATQ,
 $2160 = 3600 \times \frac{75}{100} \times \frac{(100-x)}{100}$
 $2160 = 2700 - 27x$
 $27x = 540$
 $x = 20$
So, required amount = $2160 \times \frac{100}{120} =$ Rs. 1800

7. (c): Let cost price of article = $100x$ Rs.
 So, marked price of article = $100x \times \left(1 + \frac{50}{100}\right) = 150x$ Rs.
 And, selling price of article = $(150x - 50)$ Rs.
 ATQ -
 $(150x - 50) - 100x = 50$
 $50x = 100$
 $x = 2$ Rs.
 So, selling price of article = $(150 \times 2 - 50) = 250$ Rs.

8. (a): SP of book = $600 \times \frac{4}{3} = 800$ Rs.
 MRP of the book = $\frac{100}{80} \times 800 = 1000$ Rs.
 Discount given on the book
 = $1000 - 800 = 200$ Rs.

9. (c): Let CP of article = $100x$ Rs.
 So, MP of article = $140x$ Rs.
From (A)
 When profit is 22.5%, then selling price of article = $122.5x$ Rs.
 Discount (d)% = $\frac{140x - 122.5x}{140x} \times 100 = 12.5\%$
 And, when discount doubled then profit = $140x \times \frac{75}{100} - 100x = Rs. 5x$
 Profit % = $\frac{5x}{100x} \times 100 = 5\%$
 So, option (A) possible to fill the both respective fillers

From (B)
 When profit is 33%, then selling price of article = $133x$ Rs.
 Discount (d)% = $\frac{140x - 133x}{140x} \times 100 = 5\%$
 And, when discount doubled then profit = $140x \times \frac{90}{100} - 100x = Rs. 26x$
 Profit % = $\frac{26x}{100x} \times 100 = 26\%$
 So, option (B) possible to fill the both respective fillers

From (C)
 When profit is 19%, then selling price of article = $119x$ Rs.
 Discount (d)% = $\frac{140x - 119x}{140x} \times 100 = 15\%$
 And, when discount doubled then profit = $140x \times \frac{70}{100} - 100x = Rs. -2x$
 So, option (C) can't fill the both respective fillers, because it gave a loss

From (D)
 When profit is 26%, then selling price of article = $126x$ Rs.
 Discount (d)% = $\frac{14x}{140} \times 100 = 10\%$
 And, when discount doubled then profit

= $140x \times \frac{80}{100} - 100x = 12x$ Rs.
 Profit % = $\frac{12x}{100x} \times 100 = 12\%$
 So, option (D) possible to fill the both respective fillers

From (E)
 When profit is 23.2%, then selling price of article = $123.2x$ Rs.
 Discount (d)% = $\frac{140x - 123.2x}{140x} \times 100 = 12\%$
 And, when discount doubled then profit = $140x \times \frac{76}{100} - 100x = Rs. 6.4x$
 Profit % = $\frac{6.4x}{100x} \times 100 = 6.4\%$
 So, option (E) possible to fill the both respective fillers
 So, only option A, B, D & E possible to fill both respective fillers

10. (a): Let SP of both article = $8x$
 ATQ,

	Article 1	Article 2	
CP	$6x$	$4x$	= $10x$
SP	$8x$	$8x$	= $16x$

 Profit % = $\frac{16x - 10x}{10x} \times 100 = 60\%$

11. (a): let cost price be Rs. $100x$
 Marked price = $\frac{140}{100} \times 100x = Rs. 140x$
 Selling price = $Rs. (140x - 224)$
 Selling price after tax = $\frac{110}{100} \times (140x - 224)$
 = $Rs. (154x - 246.4)$
 ATQ, $100x + 158.6 = 154x - 246.4$
 $x = 7.5$
 Cost price of article = $100x = Rs. 750$

12. (d): Cost price of both pens = $(300 \times 2) \times \frac{100}{93.75}$
 = $Rs. 640$
 Let profit percentage and loss percentage earned on both pens be $x\%$.
 ATQ,
 $300 \times \frac{100}{100+x} + 300 \times \frac{100}{100-x} = 640$
 $30000 \times \frac{200}{(100)^2 - x^2} = 640$
 $\frac{1}{10000 - x^2} = \frac{1}{9375}$
 $x = 25$
 Required difference = $300 \times \frac{100}{100-25} - 300 \times \frac{100}{100+25}$
 = $400 - 240$
 = $Rs. 160$

- 13. (e):** let CP be Rs x
 ATQ, $\frac{120}{100} \times x = 802 + 38$
 $x = \text{Rs } 700$
 required profit % = $\frac{802-700}{700} \times 100 = 14\frac{4}{7}\%$
- 14. (d):** Let MP be Rs $100x$
 SP = Rs $90x$
 $CP = \frac{100}{112.5} \times 90x = \text{Rs } 80x$
 New SP = Rs $75x$
 Required loss % = $\frac{5x}{80x} \times 100 = 6.25\%$
- 15. (b):** Let the selling price be $250x$
 then, profit = $150x$
 $CP = 250x - 150x = 100x$
 Now, new C.P. = $100x \times \frac{175}{100} = 175x$
 New S.P. = $250x$
 New profit = $250x - 175x = 75x$
 Required % = $\frac{150x-75x}{250x} \times 100 = 30\%$
- 16. (a):** Let cost price of shirt = X Rs.
 So, cost price of jeans = $(X + 200)$ Rs.
 Selling price of shirt = $\frac{4X}{5} = 0.80X$ Rs.
 Selling price of jeans = $(X + 200) \times \frac{5}{4}$
 = $(1.25x + 250)$ Rs.
 ATQ -
 $2X + 200 = (2.05X + 250) \times \frac{700}{740}$
 $74X + 7400 = 71.75X + 8750$
 $2.25X = 1350 \Rightarrow X = 600$ Rs.
 Cost price of jeans = 800 Rs.
 Now, SP of shirt when shirt sold at 25% profit
 = $600 \times \frac{125}{100} = 750$ Rs.
 And, SP of jeans when jeans sold at 20% loss
 = $800 \times \frac{80}{100} = 640$ Rs.
 Total selling price = $750 + 640 = 1390$ Rs.
 Required loss % = $\frac{1400-1390}{1400} \times 100 = \frac{10}{14}\% = \frac{5}{7}\%$
- 17. (b):** Let the cost price and selling price of B be Rs x and Rs y respectively
 CP of A = $(x + 600)$
 And SP of A = $(y + 1200)$
 Difference of their profits
 = $(y + 1200 - x - 600) - (y - x) = 600$
 ATQ
 $(x + 600) \times \frac{40}{300} = 600 \Rightarrow x = 3900$
 Profit earned of B = $4500 \times \frac{1}{3} - 600 = \text{Rs } 900$
- 18. (b):** SP of article (to customer) = $3000 - 300 = \text{Rs. } 2700$
 Marked price = $2700 \times \frac{100}{90} = \text{Rs. } 3000$
 CP of article = $2700 \times \frac{100}{120} = \text{Rs. } 2250$

- 19. (a):** Let cost price of article - M be Rs. $100x$.
 So, marked price of article - M = $100x \times \frac{120}{100}$
 = Rs. $120x$
 And, selling price of article - M = $120x \times \frac{95}{100}$
 = Rs. $114x$
ATQ,
 $114x = 285 \Rightarrow x = 2.5$
 Hence, cost price of article - N = $\frac{120}{100} \times 100 \times 2.5$
 = Rs. 300
 So, selling price of article - N = $300 \times \frac{115}{100} = \text{Rs. } 345$
- 20. (c):** Let the marked price be Rs $100x$
 Then selling price = Rs $85x$
 Cost price = $\text{Rs } \frac{200}{3}x$
ATQ
 $100x - \frac{200}{3}x = 250$
 $x = 7.5$
 Cost price = Rs 500
- 21. (a):** Let the no. of pens be x .
 The CP of pens is same in both transaction cases.
 $(CP)_1 = (CP)_2$
 $(SP)_1 - \text{Profit} = (SP)_2 + \text{Loss} \quad \dots(i)$
 Given $(SP)_1 = \text{Rs. } 2.5$ (For 1 pen)
 = Rs. $2.5x$ (For x pens)
 Profit = Rs. 110
 Similarly, $(SP)_2 = \text{Rs. } 1.75x$
 Loss = Rs. 55
 Applying values in (i)
 $2.5x - 110 = 1.75x + 55$
 On solving, $x = 220$ pens.
- 22. (e):** Total CP of Computer set (including transportation and installation)
 = Rs. $(12500 + 300 + 800) = \text{Rs. } 13600$
 Profit% $\Rightarrow \frac{15}{100} = \frac{SP - 13600}{13600} \Rightarrow SP = \text{Rs. } 15640$
- 23. (d):** Total CP of mixture = Rs. $[25 \times 32 + 15 \times 36]$
 = Rs. $[800 + 540] = \text{Rs. } 1340$
 CP of 1 kg mixture = Rs. $\left[\frac{1340}{25 + 15} \right] = \text{Rs. } 33.5$
 SP of 1 kg mixture (given) = Rs. 40.20
 Profit% = $\frac{SP - CP}{CP} \times 100 = \frac{40.20 - 33.5}{33.5} \times 100 = 20\%$

24. (d): Let the original price of watch be Rs. x
Now in earlier situation,
He gave discount of 15%

$$\text{So, selling price of watch} = \text{Rs. } x \left(\frac{100 - D\%}{100} \right)$$

$$= \text{Rs. } x \left(\frac{85}{100} \right)$$

Now if he would have gave 20% discount,

$$\text{Selling price of watch} = \text{Rs. } x \left(\frac{80}{100} \right)$$

According to question

$$\Rightarrow x \left(\frac{85}{100} \right) - x \left(\frac{80}{100} \right) = 51$$

$$\Rightarrow x = \frac{51 \times 100}{85 - 80} = \text{Rs. } 1020$$

25. (a): CP of 245 pieces of article = Rs. (245×30)
= Rs. 7350

Total CP (including transport and packing)
= Rs. $(7350 + 980 + 1470)$ = Rs. 9800

$$\text{Hence, CP of 1 piece} = \frac{9800}{245} = \text{Rs. } 40$$

SP of 1 piece = Rs. 50

$$\text{Gain\%} = \frac{10}{40} \times 100 = 25\%$$

26. (a): Let the original price of article be Rs. 100
After 5% discount, its SP = Rs. $[100 - 5\% \text{ of } 100]$
= Rs. 95

= For original price = Rs. 100, SP = Rs. 95

Hence, for original price = Rs. 504 (given)

$$= \text{SP} = \frac{95}{100} \times 504 = \text{Rs. } 478.80$$

Given, Profit% = 20%

$$\frac{20}{100} = \frac{478.8 - \text{CP}}{\text{CP}} \Rightarrow \text{CP} = \text{Rs. } 399$$

27. (d): In this question, you don't need to solve in multiple steps to first find MP, then CP etc.

In such questions if we need to find profit % if no discount is given, then formula is:

$$\text{Profit\%} = \frac{(\text{Discount\%}) + (\text{Profit\% earlier})}{(100 - \text{Discount\%})} \times 100$$

$$= \frac{20 + 30}{100 - 20} \times 100 = 62.5\%$$

28. (b): CP of TV for Suresh (including transportation and installation)

$$= \text{Rs. } [11250 + 150 + 800] = \text{Rs. } 12200$$

Req. Selling price (if no discount given)

$$\Rightarrow \text{Rs. } \left[12200 \times \frac{115}{100} \right] = \text{Rs. } 14030$$

29. (d): We can determine CP (cost price)/purchase rate by below formula:

$$\text{CP} = \text{SP} \times \frac{100}{100 - \text{Discount\%}} \times \frac{100}{100 + \text{Profit\%}}$$

$$= 1242 \times \frac{100}{90} \times \frac{100}{115} = \text{Rs. } 1200$$

30. (c): (Loss% on refrigerator) = $\frac{12}{100} = \frac{10000 - \text{SP}}{10000}$

SP of refrigerator = Rs. 8800

$$(\text{Profit\% on phone}) = \frac{8}{100} = \frac{\text{SP} - 12000}{12000}$$

SP of phone = Rs. 12960

Hence, Profit/Loss = (Total SP) - (Total CP)

$$= 12960 + 8800 - 12000 - 10000$$

$$= \text{Rs. } - 240 \text{ (Loss of Rs. } 240)$$



Simple Interest and Compound Interest

Simple Interest

If Principal = Rs. 'P', Time = 'T' years, Rate = 'R%' per annum,

$$\text{Simple Interest (SI)} = \frac{P \times R \times T}{100}$$

Amount = Principal + Simple Interest

$$A = P + \frac{P \times R \times T}{100} = P \left[1 + \frac{RT}{100} \right]$$

Example: Find the simple interest on Rs. 200 for 5 years at 6% per annum?

Sol. Here, P = Rs. 200, T = 5 years, R = 6%

$$\therefore \text{SI} = \frac{P \times R \times T}{100} = \frac{200 \times 5 \times 6}{100} = \text{Rs. } 60$$

(i) If rate of interest is half-yearly, Rate $\left(\frac{R}{2}\right)\%$ and Time = 2T

(ii) If rate of interest is quarterly, Rate $\left(\frac{R}{4}\right)\%$ and Time = 4T

(iii) If rate of interest is monthly, Rate $\left(\frac{R}{12}\right)\%$ and Time = 12T

Installments

When the borrower paid total money in some equal parts, then we can say that he is paying in installments.

For simple interest,

$$A = \left[x + \left(x + \frac{x \times R \times 1}{100} \right) + \left(x + \frac{x \times R \times 2}{100} \right) + \dots \right]$$

where A = Total amount paid

x = value of each installment

Example: A scooty is sold by an automobile agency for Rs. 19200 cash or for Rs. 4800 cash down payment together with five equal monthly instalments. If the rate of interest charged by the company is 12% per annum, then find each instalment?

Sol. Balance of the price to be paid through instalments

$$P = 19200 - 4800 = 14400$$

Now, according to the formula,

$$A = \left[x + \left(x + \frac{x \times R \times 1}{100} \right) + \left(x + \frac{x \times R \times 2}{100} \right) + \dots + \left(x + \frac{x \times R \times 4}{100} \right) \right]$$

where, $A = P + \frac{P \times n \times R}{100}$

$$\Rightarrow \left(14400 + \frac{14400 \times 12 \times 5}{100 \times 12} \right) = \left[x + \left(x + \frac{12x}{12 \times 100} \right) + \left(x + \frac{12x \times 2}{12 \times 100} \right) + \dots + \left(x + \frac{12x \times 4}{12 \times 100} \right) \right]$$

$$\Rightarrow 15120 = 5x + \frac{x}{10} \Rightarrow x = \frac{151200}{51} \Rightarrow x = \text{Rs. } 2964.70$$

Compound Interest

If Principal = Rs. P, Time = n years, Rate = r% per annum and interest compounded annually

(i) When interest compounded annually \Rightarrow Amount = $P \left[1 + \frac{r}{100} \right]^n$

(ii) When interest compounded half yearly \Rightarrow Amount = $P \left[1 + \frac{\left(\frac{r}{2}\right)}{100} \right]^{2n}$

(iii) When interest compounded quarterly \Rightarrow Amount = $P \left[1 + \frac{\left(\frac{r}{4}\right)}{100} \right]^{4n}$

(iv) When interest compounded monthly \Rightarrow Amount = $P \left[1 + \frac{\left(\frac{r}{12}\right)}{100} \right]^{12n}$

(v) When time is in fraction of a year, say $3\frac{4}{5}$ years \Rightarrow Amount = $P \left[1 + \frac{r}{100} \right]^3 \left[1 + \frac{\left(\frac{4}{5}r\right)}{100} \right]$

(vi) When rate of interest is $r_1\%$ during first year, $r_2\%$ during 2nd year, $r_3\%$ during 3rd year.

$$\text{Amount} = P \left[1 + \frac{r_1}{100} \right] \left[1 + \frac{r_2}{100} \right] \left[1 + \frac{r_3}{100} \right]$$

Concept 2: $A = P \left(1 + \frac{r}{100} \right)^n$, $CI = A - P = P \left(1 + \frac{r}{100} \right)^n - P$, $CI = P \left[\left(1 + \frac{r}{100} \right)^n - 1 \right]$

Concept 3: A sum of money, placed at compound interest, becomes n times in t years and m times in x years then,

Example: A sum of money at compound interest amounts to thrice itself in 3 years, in how many years will it be 9 times itself?

Sol. $3^{\frac{1}{3}} = 9^{\frac{1}{x}}$, $3^{\frac{1}{3}} = 3^{\frac{2}{x}}$, $\frac{1}{3} = \frac{2}{x}$, $x = 6$ years

Concept 4: Relationship between CI and SI for two years

$$\frac{CI}{SI} = \frac{200+r}{200}$$

Example: The SI on a certain sum of money for 2 years at 10% per annum is Rs. 400, find CI at the same rate and for the same time.

Sol. $CI = \frac{210}{200} \times 400 = \text{Rs. } 420$

Concept 5: When difference between the CI and SI on a certain sum of money for 2 years at r%, is given by,

$$\text{Difference} = P \left(\frac{r}{100} \right)^2$$

Example: The difference between the CI and SI on a certain sum of money at 5% per annum for 2 years is Rs. 1.50, Find the sum

Sol. $1.5 = \frac{P(5)^2}{100^2}$, $P = \text{Rs. } 600$

Concept 6: The difference between CI and SI on a certain sum for 3 years is given by,

$$\text{Difference} = \frac{Pr^2(300+r)}{100^3}$$

Example: If the difference between CI and SI on a certain sum of money for 3 years at 5% per annum is Rs. 122 find the sum.

Sol. $122 = \frac{P \cdot 5^2 \cdot 300 + 5}{100^3}$, $P = \text{Rs. } 16000$

Concept 7: If a sum 'A' becomes 'B' in t_1 years at compound rate of interest, then after t_2 years the sum becomes

$$\frac{(B)^{\frac{t_2}{t_1}}}{(A)^{\frac{t_2-1}{t_1}}}$$

Example: Rs. 4800 becomes Rs. 6000 in 4 years at a certain rate of CI. What will be the sum after 12 years.

$$\text{Required Amount} = \frac{6000^{\frac{12}{4}}}{4800^{\frac{12}{4}-1}} = \frac{6000^3}{4800^2} = \text{Rs. } 9375$$

Concept 8: If a sum of money Rs. x is divided among 'n' parts in such a manner that when placed at CI, amount obtained in each case remains equal while the rate of interest on each part is $r_1, r_2, r_3, \dots, r_n$ respectively and time period for each part is $t_1, t_2, t_3, \dots, t_n$ respectively. Then the divided parts of sum will be in the ratio of:

$$\frac{1}{\left(1 + \frac{r_1}{100}\right)^{t_1}} : \frac{1}{\left(1 + \frac{r_2}{100}\right)^{t_2}} : \frac{1}{\left(1 + \frac{r_3}{100}\right)^{t_3}} : \dots : \frac{1}{\left(1 + \frac{r_n}{100}\right)^{t_n}}$$

Example: A sum of Rs. 3903 is divided between A and B, so that A's share at the end of the 7 years be equal to B's share at the end of 9 years, CI being 4%. Find A's share.

$$\text{A's share : B's share} = \frac{1}{\left(1 + \frac{4}{100}\right)^7} : \frac{1}{\left(1 + \frac{4}{100}\right)^9} = 1 : \frac{1}{\left(1 + \frac{4}{100}\right)^2} = 1 : \frac{625}{676} = 676 : 625$$

$$\text{A's share} = \frac{676}{(676 + 625)} \times 3903 = \text{Rs. } 2028$$

Types of Question

1. A sum of money becomes four times in 20 years at SI. Find the rate of interest.

Sol. Given, $T = 20$ years,

Let sum = P

Then, the sum after 20 years = $4P$

$$\therefore \text{SI} = 4P - P = 3P$$

$$\text{Now, } 3P = \frac{PRT}{100} = \frac{P \times R \times 20}{100}$$

$$\Rightarrow 3 = \frac{20R}{100} = \frac{R}{5}$$

$$\therefore R = 15\%$$

2. A sum becomes two times in 5 years at a certain rate of interest. Find the time in which the same amount will be 8 times at the same rate of interest.

Sol. Let sum = P

Then, for 5 years,

$$\text{SI} = 2P - P = P$$

$$\text{SI} = \frac{P \times R \times T}{100}$$

$$\therefore P = \frac{P \times R \times 5}{100} = \frac{PR}{20}$$

$$\Rightarrow R = 20\%$$

Again, for another time (T),

$$\text{SI} = 8P - P = 7P$$

$$\therefore 7P = \frac{P \times 20 \times T}{100} = \frac{20TP}{100} = \frac{TP}{5}$$

$$\therefore T = 7 \times 5 = 35 \text{ years}$$

3. Ravi lent out a certain sum. He lent $\frac{1}{3}$ part of his sum at 7% SI, $\frac{1}{4}$ part at 8% SI and remaining part at 10% SI.

If Rs. 510 is his annual total interest, then find the money lent out.

Sol. Let entire sum = P

Now, according to the question,

$$\frac{1}{3}P \times 7\% + \frac{1}{4}P \times 8\% + \left[1 - \left(\frac{1}{3} + \frac{1}{4}\right)\right] \times P \times 10\% = 510$$

$$\Rightarrow \frac{1}{3}P \times 7 + \frac{1}{4}P \times 8 + \frac{5}{12}P \times 10 = 510$$

$$\Rightarrow \frac{7P}{3} + 2P + \frac{25P}{6} = 510 \times 100$$

$$\therefore P = \frac{510 \times 100 \times 6}{51} = \text{Rs. } 6000$$

4. A sum of Rs. 7700 is lent out in two parts in such a way that the interest on one part at 20% for 5 years is equal to that on another part at 9% for 6 years. Find the two sums.

Sol. Let the first sum be Rs. x . Then, second sum = Rs. $(7700 - x)$

Now, according to the question,

$$\frac{x \times 20 \times 5}{100} = \frac{(7700 - x) \times 9 \times 6}{100}$$

$$\Rightarrow 50x = (7700 - x) \times 27$$

$$\Rightarrow 50x = 7700 \times 27 - 27x$$

$$\Rightarrow 77x = 7700 \times 27$$

$$\Rightarrow x = \text{Rs. } 2700$$

$$\therefore \text{The second part} = (7700 - x) = 7700 - 2700 = \text{Rs. } 5000$$

5. What annual payment will discharge a debt of Rs. 848 in 8 years at 8% per annum?

Sol. Here, P = Rs. 848, T = 8 years, R = 8%

According to the formula,

$$\text{Annual payment} = \frac{100P}{100T + \frac{RT(T-1)}{2}}$$

$$= \frac{100 \times 848}{100 \times 8 + \frac{8 \times 8(8-1)}{2}}$$

$$= \frac{848 \times 100}{800 + 32 \times 7} = \frac{84800}{1024} = \text{Rs. } 82.8125$$

6. Raviraj invested an amount of Rs. 10000 at compound interest rate of 10% per annum for a period of three years. How much amount will Raviraj get after 3 years?

Sol. Amount = $P \left[1 + \frac{r}{100} \right]^n$

where P → Principal, r → Rate, n → time

$$\text{Amount} = 10000 \left(1 + \frac{10}{100} \right)^3 = \text{Rs. } 13310$$

7. Seema invested an amount of Rs. 16000 for two years at compound interest and received an amount of Rs. 17640 on maturity. What is the rate of interest?

Sol. $\frac{A}{P} = \left(1 + \frac{r}{100} \right)^n$

$$\frac{17640}{16000} = \left(1 + \frac{r}{100} \right)^2 = \frac{1764}{1600}$$

$$\left(\frac{42}{40} \right)^2 = \left(1 + \frac{r}{100} \right)^2, \quad r = 5\%$$

8. Rs. 7500 is borrowed at CI at the rate of 4% per annum. What will be the amount to be paid after 1 year, if interest is compounded half-yearly?

Sol. $A = P \left[1 + \frac{\frac{r}{2}}{100} \right]^{2t} = 7500 \left[1 + \frac{\frac{4}{2}}{100} \right]^{2 \times 1} = \text{Rs. } 7803$

9. Rs. 7500 is borrowed at CI at the rate of 4% per annum. What will be the amount to be paid after 6 months, if interest is compounded quarterly?

Sol. $A = P \left[1 + \frac{\frac{r}{4}}{100} \right]^{4t} = 7500 \left[1 + \frac{\frac{4}{4}}{100} \right]^{4 \times \frac{6}{12}} = \text{Rs. } 7650.75$

10. Find the compound interest on Rs. 2000 at 5% per annum, compounded yearly for $2\frac{1}{2}$ years?

Sol. $A = P \left[1 + \frac{r}{100} \right]^2 \left[1 + \frac{\frac{r}{2}}{100} \right]$

$$= 2000 \left[1 + \frac{5}{100} \right]^2 \left[1 + \frac{5}{200} \right] = 2260.125$$

$$\text{CI} = 2260.12 - 2000 = \text{Rs. } 260.125$$

11. An amount of money grows upto Rs. 4840 in 2 years and upto Rs. 5324 in 3 years on compound interest. Find the rate per cent.

Sol. P + CI of 3 years = Rs. 5324

P + CI of 2 years = Rs. 4840

$$\text{CI for 3rd year} = 5324 - 4840 = \text{Rs. } 484$$

$$\text{Required } r\% = \frac{484 \times 100}{4840} = 10\%$$

12. Find the ratio of CI to SI on a certain sum at 10% per annum for 2 years?

Sol. $\frac{\text{CI}}{\text{SI}} = \frac{200 + r}{200} = \frac{210}{200} = 21 : 20$

13. Rs. 1600 becomes Rs. 2000 in 2 years at a certain rate of compound interest. What will be the sum after 4 years?

Sol. If a sum 'A' becomes 'B' in t_1 years at CI, then after t_2

years, the sum becomes $\frac{(B)^{\frac{t_2}{t_1}}}{(A)^{\frac{t_2}{t_1} - 1}}$

$$\text{Required Amount} = \frac{(2000)^{\frac{4}{2}}}{(1600)^{\frac{4}{2} - 1}} = \frac{(2000)^2}{(1600)^1} = \text{Rs. } 2500$$

14. What sum of money at compound interest will amount to Rs. 2249.52 in 3 years, if the rate of interest is 3% for the first year, 4% for the second year and 5% for the third year?

Sol. $A = P \left(1 + \frac{r_1}{100} \right) \left(1 + \frac{r_2}{100} \right) \left(1 + \frac{r_3}{100} \right)$

$$2249.52 = P \left(1 + \frac{3}{100} \right) \left(1 + \frac{4}{100} \right) \left(1 + \frac{5}{100} \right)$$

$$P = \text{Rs. } 2000$$

15. Find the difference between CI and SI on Rs. 8000 for 3 years at 2.5% pa.

Sol. Difference = $\frac{Pr^2(300+r)}{100^3}$ [only possible for 3 years]

$$= \frac{8000(2.5)^2(300+2.5)}{100^3} = \text{Rs. } 15.125$$

Basic Questions

1. What is S.I. of Rs. 800 on 5% per annum for 3 years?
(a) 120 (b) 140 (c) 210
(d) 230 (e) None of these
2. How many years will it take for amount of Rs. 600 to yield Rs. 120 as interest at 10% per annum of S.I.?
(a) 1 year (b) 3 year (c) 2 year
(d) 4 year (e) None of these
3. A sum of Rs. 15000 amount gave Rs. 4500 as interest in 5 year. What is rate of interest?
(a) 3% (b) 4% (c) 5%
(d) 6% (e) None of these
4. A sum of money becomes Rs. 1100 in 2 years and Rs. 1400 in 6 years at S.I. Find the rate percent.
(a) $7\frac{14}{19}$ (b) $1\frac{7}{13}$ (c) $2\frac{4}{3}$
(d) $5\frac{2}{3}$ (e) None of these
5. What would be the C.I. on Rs. 17500 at the rate of 12 p.c.p.a. after 2 years?
(a) Rs. 4442 (b) Rs. 4452 (c) Rs. 4462
(d) Rs. 4482 (e) None of these
6. What would be the C.I. obtained on an amount of Rs. 12000 at the rate of 9 p.c.p.a for 3 years?
(a) Rs. 3840 (b) Rs. 3740.75 (c) Rs. 3540
(d) Rs. 3640 (e) None of these
7. What would be the C.I. obtained on an amount of Rs. 4800 at the rate of 5 p.c.p.a for 3 years?
(a) Rs. 448.7 (b) Rs. 817.8 (c) Rs. 623.5
(d) Rs. 756.6 (e) None of these
8. What would be the C.I. obtained on an amount of 12500 at the rate of 12 p.c.p.a. after 2 years?
(a) Rs. 3180 (b) Rs. 3360 (c) Rs. 3540
(d) Rs. 3720 (e) None of these
9. The difference between simple and compound interest on sum of 10000 is 64 for 2 years. Find the rate of interest.
(a) 8 (b) 64 (c) 4
(d) 2 (e) None of these
10. The difference between simple and compound interest compounded annually on a certain sum of money for 2 years at 4% per annum is Rs. 1. The sum (in Rs.) is:
(a) 625 (b) 630 (c) 640
(d) 650 (e) None of these
11. Find the compound interest on Rs. 12500 at 8% per annum for 9 months compounded quarterly.
(a) Rs. 1020 (b) Rs. 1428 (c) Rs. 510
(d) Rs. 550 (e) None of these
12. Find the compound Interest on Rs. 32000 at 20% per annum for 1 year, compounded half yearly.
(a) Rs. 6320 (b) Rs. 6720 (c) Rs. 6400
(d) Rs. 6500 (e) None of these
13. The difference between C.I. & S.I. on Rs. 700 in 2 years at 5% per annum is:
(a) Rs. 10 (b) Rs. 5 (c) Rs. 1
(d) Rs. 2.5 (e) Rs. 1.75
14. The difference between the compound and simple interest on a sum of money for 2 years at $6\frac{1}{4}\%$ per annum is Rs. 10. The sum is
(a) Rs. 2000 (b) Rs. 2200 (c) Rs. 2560
(d) Rs. 2600 (e) None of these
15. If a sum of money doubles itself in 8 years at S.I. then the rate of interest per annum is:
(a) Rs. 10.5 (b) Rs. 12.5 (c) Rs. 11.5
(d) Rs. 13.5 (e) None of these
16. What sum lent at 10% per year on S.I. will amount to Rs. 450 in 2 years?
(a) Rs. 350 (b) Rs. 375 (c) Rs. 240
(d) Rs. 280 (e) None of these
17. Nutan invest Rs. 22400 on S.I. at rate 12 p.c.p.a. How much amount she will get after seven year.
(a) 41,116 (b) 41,216 (c) 42,116
(d) 42, 216 (e) None of these
18. What time taken by sum of Rs. 7000 to became 10500 at the rate of 5% per annum?
(a) 8 years (b) 10 years (c) 5 years
(d) 15 years (e) None of these
19. A sum fetched a total simple interest of Rs. 4016.25 at the rate of 9% p.a. in 5 years. What is the sum?
(a) Rs. 4462.50 (b) Rs. 8032.50 (c) Rs. 8900
(d) Rs. 8925 (e) None of these
20. If the difference between the C.I. compounded half yearly and simple interest on a sum at 10% per annum for one year is Rs. 25, the sum is:
(a) Rs. 9000 (b) Rs. 9500 (c) Rs. 10,000
(d) Rs. 10,500 (e) None of these

Prelims Questions

Level - 1

1. An amount of Rs. 20000 when invested at R% simple interest for 2 years becomes Rs. 24000. What will it become in 3 years if invested at $(R+2)\%$? (in Rs.)
 (a) 27200 (b) 26300 (c) 25200
 (d) 27400 (e) 28100
2. A sum of Rs. x was invested at 10% simple interest for 3 years. If the same sum was invested at 4% more for same period, then it would have fetched Rs. 120 more. Find the value of 5x. (in Rs.)
 (a) 5000 (b) 4800 (c) 3600
 (d) 5500 (e) 4000
3. A sum of Rs. P was invested at 10% for 2 years at simple interest. If the same sum was invested at 20% for 'x' years, it would have fetched Rs. 200 more. Find 'x' if $Px = 5000$. (value of x is given in months)
 (a) 12 (b) 18 (c) 15
 (d) Cannot be determined (e) None of these
4. A sum of Rs 1400 becomes Rs 2408 in 8 yrs at simple interest, then find the rate of interest for last 4 yrs, if the interest rate for 1st 4 yrs is 12% per annum ?
 (a) 8 % (b) 10 % (c) 6%
 (d) 4 % (e) None of these
5. Rs. 12000 becomes Rs. 15000 in 18 months at a certain rate of interest at simple interest. Find amount if Rs. 5000 invested at same rate for 30 months at simple interest.
 (a) Rs. 7883.33 (b) Rs. 7083.33 (c) Rs. 7279.80
 (d) Rs. 7173.33 (e) None of these
6. The interest earned on an amount after 2 yrs at 10 % per annum compounded yearly is Rs 672. Find the interest earned on same amount after 4 yr at 14 % per annum at simple interest ?
 (a) Rs 1792 (b) Rs 1864 (c) Rs 1912
 (d) Rs 1754 (e) Rs 1720
7. An amount doubles in 5 years at simple interest. In what time will it become 12 times of itself at same rate? (in years)
 (a) 30 (b) 50 (c) 55
 (d) 36 (e) None of these
8. An amount of 4000 rs is invested at 20% per annum for 2 yrs at compound interest compounding half-yearly, then find the total interest amount received after 2 yrs ?
 (a) Rs 1856.4 (b) Rs 1812.4 (c) Rs 1882.4
 (d) Rs 1912.4 (e) None of these
9. A sum when invested for a year at 20% compounding annually would fetch Rs. 10 less when compounding is done half-yearly. Find the sum invested.
 (a) Rs. 850 (b) Rs. 950 (c) Rs. 1000
 (d) Rs. 1100 (e) Rs. 1050
10. What is the interest earned by a leader on 10000 Rupees for the period of 2 years at the rate of 12.5% S.I.
 (a) 2000 Rs. (b) 2500 Rs. (c) 3000 Rs.
 (d) 3500 Rs. (e) 1500 Rs.
11. Shikhar deposited Rs 15000 in a scheme for 2 yrs which offers compound interest at the rate of 10 %. Due to some emergency, he withdrew 12000 at the end of 1st year. How much amount he will get at the end of 2nd year?
 (a) Rs 4600 (b) Rs 5450 (c) Rs 4950
 (d) Rs 5600 (e) Rs 5870
12. Chandu invested Rs 1500 in a scheme offering 10% SI. After 2 years he invested a part of amount he received again in the same scheme for 3 years from which he received Rs 300. Find the amount he did not invest again.
 (a) Rs. 850 (b) Rs. 1000 (c) Rs. 950
 (d) Rs. 800 (e) Rs. 1050
13. Ravi deposited Rs 15000 in a scheme which offers compound interest at the rate of 15% per annum for 2 yrs. If due to some emergency, he withdrew 10000 rs at the end of 1st yr. What amount will ravi get at the end of 2nd year?
 (a) Rs 8337.5 (b) Rs 8625 (c) Rs 8725.5
 (d) Rs 9245.5 (e) Rs 8845
14. A bank offers an interest of 10% per annum which is compounded half yearly. Krishan invests Rs.10000, what is the total amount he will earn after 2 years? (approximately)
 (a) Rs 14,641 (b) Rs 12,155 (c) Rs 11,011
 (d) Rs 13,000 (e) Rs 13,310
15. A man invested Rs.P in three different schemes – A, B and C in the ratio 2 : 1 : 3 respectively. He invested in scheme A at the rate of 10% p.a. at SI for 2 years, in scheme B at the rate of 5% p.a. at C.I compounded annually for 2 years and in scheme C at the rate of 6% p.a. at CI compounded half yearly for 1 year and received total interest of Rs. 6852. Find the value of P.
 (a) Rs.60000 (b) Rs.72000 (c) Rs.48000
 (d) Rs.120000 (e) can't be determined.

16. Aakash invested Rs 16800 on simple interest at $r\%$ p.a. for 3 yrs and received Rs 7560 as total interest. Find the interest amount received by Aakash if the same amount is invested on compound interest at $(r+5)\%$ rate of interest after 2 yrs?
 (a) Rs 7560 (b) Rs 7392 (c) Rs 7120
 (d) Rs 7820 (e) Rs 7460
17. Harsh borrow Rs. 400 at 10% rate of interest. He paid Rs.200 and Rs.64 at the end of 1st and 2nd year respectively. Then find how much money he will pay at the end of 3rd year to clear his debt?
 (a) Rs. 200 (b) Rs. 240 (c) Rs. 264
 (d) Rs. 220 (e) Rs. can't be determined.
18. Manoj invested a sum at $x\%$ per annum at C.I. If first year and second year C.I on that sum is Rs. 845 and Rs. 910 Find Amount invested?
 (a) Rs. 10985 (b) Rs. 10000 (c) Rs. 13000
 (d) Rs. 10900 (e) Rs. 13985
19. Harish borrowed certain sum from Harsh for 2 years at SI. Harish lent this sum to Dinesh at the same rate for 2 years at Compound Interest. At the end of second year, Harish received Rs 550 as compound interest but paid Rs 500 as simple interest. Find the rate of interest.
 (a) 25% (b) 20% (c) 15%
 (d) 22.5% (e) 32%
20. If the compound interest on a certain sum for 2 years is Rs 308 and simple interest at same rate of interest and for same time is 280. Find the sum?
 (a) Rs 700 (b) Rs 1200 (c) Rs 1100
 (d) Rs 500 (e) Rs 900
21. A sum of money amounts to Rs 868 in 4 years at a simple interest. If the rate of interest increased by 25%, then the sum amounts to Rs 910 during the same period. Find the sum?
 (a) Rs 650 (b) Rs 750 (c) Rs 850
 (d) Rs 700 (e) Rs 600
22. Akash invested Rs 48000 at the rate of 15% per annum for one year. If the interest is compounded half-yearly, then find the amount received by Akash after one year.
 (a) Rs 58470 (b) Rs 47470 (c) Rs 55470
 (d) Rs 45470 (e) Rs 44570
23. A bag contains 7 green and 9 white balls. Three balls are drawn at random. Find the probability that one ball is green and two balls are white.
 (a) $\frac{9}{20}$ (b) $\frac{13}{20}$ (c) $\frac{11}{20}$
 (d) $\frac{7}{20}$ (e) $\frac{1}{4}$
24. On a sum of Rs. 6875, find difference between second year and third year C.I if rate of interest is 20% per Annum?
 (a) Rs. 275 (b) Rs. 300 (c) Rs. 330
 (d) Rs. 325 (e) Rs. 290
25. A and B lent equal amount of money at simple interest at the rate of 6% and 5% per annum at the same time. A recovered his amount 8 months earlier than B and the amount recovered in each case is Rs 3240. What is the sum?
 (a) Rs 2400 (b) Rs 3540 (c) Rs 2850
 (d) Rs 2700 (e) Rs 5400
26. On a sum of money, SI for 3 years was Rs 720 and Compound interest on same sum at same rate of interest compounded annually for 2 years is Rs 528. Find rate of interest?
 (a) 20% (b) 5% (c) 15%
 (d) 25% (e) 40%
27. Amount of Rs. 8000 is lent at simple interest in two parts at 20% and 10% respectively. If after one year he will get Rs. 1150 as interest then find amount which was lent at 20% per annum.
 (a) Rs.3000 (b) Rs.5000 (c) Rs.3500
 (d) Rs.4500 (e) Rs. 4200
28. Deepak invested some amount on SI out of Rs.47000 and rest amount on C.I. for two years. If S.I. is offering 12% p.a. and C. I. is offering 15% p.a. compounding annually and C.I. is Rs.532.5 more than S.I., then find amount invested by Deepak on C.I?
 (a) Rs.23000 (b) Rs.22000 (c) Rs.21000
 (d) Rs.25000 (e) Rs.24000
29. Dharam invested Rs.10000 in two schemes for two years and both schemes offer $R\%$ S.I. If difference between S.I. earned on both schemes is Rs.480 and ratio of interest earned from both schemes is 3 : 2. Then, find the value of R.
 (a) 15 % (b) 10 % (c) 20 %
 (d) 16 % (e) 12 %
30. A sum becomes Rs. 2880 in two years and Rs. 4147.2 in four years when compounded annually. If same sum is invested at 12% p.a. S.I. for 5 years, then find the amount after 5 years.
 (a) 3000 Rs. (b) 3600 Rs. (c) 2400 Rs.
 (d) 3200 Rs. (e) 2800 Rs.

Level - 2

1. Jaddu & Ravi invested equal amount at 10% p.a. rate of interest on simple interest & compound interest. Interest received by Ravi after 2 years is same as interest received by Jaddu after some years. Find investment period of Jaddu.
(a) 2.8 years (b) None of these (c) 2.4 years
(d) 2.1 years (e) Cannot be determined
2. Shivam invested Rs 30000 at a rate of interest 20% p.a. The interest was compounded half-yearly for first year and in the next year it was compounded yearly. What will be total interest earned at the end of the 2 yrs ?
(a) Rs 12960 (b) Rs 14800 (c) Rs 15600
(d) Rs 13560 (e) Rs 13980
3. On a certain sum and at the certain rate of interest, CI at the end of two years is Rs 252 while CI at the end of four years is Rs 556.92. Find that amount?
(a) Rs 1000 (b) Rs 1500 (c) Rs 1600
(d) Rs 1800 (e) Rs 1200
4. A sum of money becomes 8 times in 1.5 year if compounded half yearly. How much time it will take to become 81 times if compounded yearly.
(a) 4 years (b) 9 years (c) 3 years
(d) 5 years (e) 7 years
5. A lent B Rs.12000 on C.I. at the rate of 20% per annum and at the end of first year B borrowed Rs. 'x' more from A on C.I. at the same rate. If at the end of second year, B paid total amount of Rs.20400 to A, then find value of x?
(a) Rs.2400 (b) Rs.2000 (c) Rs.3600
(d) Rs.2600 (e) Rs.4000
6. A sum of money was lent at 25% p.a. C.I. compounding annually. If the interest accrued for the second year only is Rs3750, then find the sum.
(a) Rs.15000 (b) Rs.12000 (c) Rs.10000
(d) Rs.16000 (e) Rs.20000
7. Ayush invested Rs.P at R% p.a. CI. If compound interest received in second year and third year is Rs.3450 and Rs.3967.5 respectively, then find the value of P.
(a) Rs.30000 (b) Rs.20000 (c) Rs.25000
(d) Rs.15000 (e) None of the above
8. Aman invested Rs.(X + 2500) at 20% p.a. CI for 2 years and Rs.X at 30% p.a. SI for 2 years. If compound interest is Rs.60 more than simple interest, then find X.
(a) Rs.5500 (b) Rs.6500 (c) Rs.5000
(d) Rs.7000 (e) Rs.6000
9. A man invested Rs. X and Rs. 2X at 15% simple interest and at 8% compound interest (compounding annually) for two years respectively. Difference between simple interest and compound interest received after two years is Rs.820. Find the value of X.
(a) Rs.25000 (b) Rs.30600 (c) Rs.28600
(d) Rs.22200 (e) Rs.26200
10. Arun invested Rs. 10,000 for three years at CI at the rate of 20% per annum. If in 1st and 3rd year interest is calculated annually and in 2nd year it was calculated half-yearly, then find the total interest received by Arun in three years?
(a) Rs 7554 (b) Rs 7424 (c) Rs 7868
(d) Rs 7262 (e) Rs 7343
11. A certain money becomes $\frac{7}{4}$ th of itself in 6 years at a certain rate of simple interest. Find the rate of interest (in %).
(a) 25 (b) 30 (c) 12.5
(d) 6.25 (e) 10
12. The C.I at a certain rate for Rs 'X' for 2 years is same as the S.I at the same rate for same Rs 'X' for four years. Find the rate. (in % p.a)
(a)200 (b)300 (c)400
(d)500 (e)250
13. Veer invested an amount on simple interest, and it becomes two times of itself in 10 years. If Veer invested Rs. X at the same rate of interest on CI and he gets Rs. 5324 as amount after three years, then find amount invested by Veer (in Rs.)?
(a) 4400 (b) 3600 (c) 4800
(d) 4000 (e) 3000
14. Rahul invested a sum of Rs. 10000 in a scheme offering simple interest at 10% p.a. after 2 years, he again invested all the money he got from scheme in share market at Rs. 50 per share. After 1 month, he sold all his shares at Rs. 52 per share. Find his profit percent.
(a) 2 % (b) 24 % (c) 4 %
(d) 15 % (e) 12 %
15. Interest earned on a certain sum in 2 years at 20% pa at CI is twice the interest earned on Rs. 1100 for 2 yrs at 10% SI. Find sum.
(a) Rs. 1000 (b) Rs. 500 (c) Rs. 750
(d) Rs. 1250 (e) Rs. 1500
16. If the compound interest on a certain sum for second year and compound interest for third year is in ratio of 5:6. What would be the total amount after 2 years at the same rate on Rs. 10000? (in Rs.)
(a) 14400 (b) 11000 (c) 11236
(d) None of these (e) Cannot be determined

17. A sum of Rs. 1000 is lent partly at 10% and 15% at simple interest per annum. If total interest received after 3 years is Rs. 390. Find the amount lent at 10% rate.
 (a) 100 (b) 900 (c) 600
 (d) 400 (e) 500
18. An amount is lent out at $y\%$ p.a at S.I for 2 years. If it had been lent at $2y\%$ p.a at S.I for 'a' more years, then the interest would have been five times of the earlier interest. Find the value of 'a'. (in years)
 (a) 5 (b) 4 (c) 3
 (d) 2 (e) none of these
19. Ayush bought a laptop under the following scheme: Down payment of Rs.14,000 and the rest amount at 8% per annum S.I for 2 years. In this way, he paid Rs.29,080 in total. Find the actual price of the laptop.
 (a) 25500 rs (b) 27000 rs (c) 24000 rs
 (d) 26500 rs (e) 25000 rs
20. The difference between compound interest and simple interest on an amount of Rs. 50000 for 2 years is Rs. 320. What is the rate of interest p.a.?
 (a) 12 % (b) 8 % (c) 10 %
 (d) 6 % (e) 14 %
21. Anil invested Rs. 5600 at simple interest and after a year he got Rs. 6076. Find the rate of interest. (in %)
 (a) 8.5 (b) 9 (c) 8
 (d) 7.5 (e) 9.5
22. A sum of money invested at simple interest doubles itself in 3 yrs and 4 months. Find in how many years it will become 7 times of itself at the same rate? (in years)
 (a) 20 (b) 18 (c) 15
 (d) 21 (e) 24
23. Sohail invested Rs. 5000 in a scheme offering 10% simple interest. If the same sum is invested in another scheme for 2 more years offering 15% simple interest then it would have fetched Rs. 2000 more. Find time period (in years) of investment in first scheme.
 (a) 2.5 (b) 4 (c) 3
 (d) 1.5 (e) 2
24. A man invested Rs. 1600 on CI for two years at the rate of $R\%$ p.a. and gets amount of Rs. 2304. If man invested same sum on SI for same period of time at the rate of $(R - 8)\%$, then find interest he will get?
 (a) 384 Rs. (b) 324 Rs. (c) 316 Rs.
 (d) 372 Rs. (e) 306 Rs.
25. A certain amount was invested for certain time and at a certain rate at simple interest. After 2 years, amount obtained is Rs.24000 and after 5 years total amount obtained Rs.30000. Find the amount invested initially.
 (a) Rs.25000 (b) Rs.20000 (c) Rs.40000
 (d) Rs.30000 (e) Rs.35000
26. Gopal invested an amount in scheme which offer 20% C.I. for 2 year. He added 360 Rs. in interest earned and invested the resultant sum in same scheme for 2 more year. If he earns Rs. 352 after 2 years on this resultant sum. Then find his initial investment. (in Rs.)
 (a) 1000 Rs. (b) 1200 Rs. (c) 800 Rs.
 (d) 1600 Rs. (e) None of these
27. A man invested Rs. 6600 on SI for two years at the rate of 12 p.a and Rs. X on CI at the rate of 20% p.a. for two years. If ratio of SI to CI get by man after two years is 9 : 10, then find 'X'?
 (a) Rs.4,100 (b) Rs.4,000 (c) Rs.4,900
 (d) Rs.4,600 (e) Rs. 4,500
28. A man invested Rs. 1200 & Rs. 1600 in two schemes A & B at the rate of $(R + 5)\%$ & $R\%$ for two and three years respectively at S.I. If ratio between interest obtained from A to B is 3 : 4, then find $(R + 5)\%$?
 (a) 10% (b) 15% (c) 12.5%
 (d) 20% (e) 25%
29. A and B invested Rs $(P + 2400)$ and $(P + 4400)$ on CI at the rate of 10% and 20% respectively for two years and earned total interest of Rs 8680. Find the value of P?
 (a) Rs 9200 (b) Rs 6400 (c) Rs 8000
 (d) Rs 7200 (e) Rs 9600
30. Manoj invests Rs. 1800 in two parts at SI at 4% and $x\%$ for two years. When he invests larger part at $x\%$ and smaller part at 4% then he gets total of Rs. 164 as interest and when he invests larger part at 4% and smaller part at $x\%$ then he gets total of Rs. 160 as interest. Find value of $x\%$?
 (a) 5% (b) 6% (c) 3%
 (d) 7% (e) None of these

Mains Questions

Directions (1-2): A person invested Rs. 20000 in a bank which is offering 10% per annum simple interest. After two years he withdrew the money from the bank and deposited the total amount in another bank which gives an interest rate of $r\%$ p.a. compounded annually. After 2 years he

received an amount of Rs. 2460 more than what he had invested in that bank.

1. What is the value of r ?
 (a) 10% (b) 15% (c) 5%
 (d) 12% (e) None of these

2. If the person had invested Rs. 50,000 instead of 20000 in the bank that offered simple interest, what would have been his net profit after following the same procedure as given above?
 (a) Rs. 16,800 (b) Rs. 16,150 (c) Rs. 16,350
 (d) Rs. 16,000 (e) None of these
3. Abhishek invested a certain amount at the rate of 8 % per annum for 5 year and obtained a total SI of Rs. 3800, had he invested the same amount at the same rate for 2 years at C.I. , how much amount would he have obtained as CI at the end of 2 year ?
 (a) Rs. 1520 (b) Rs. 1550.5 (c) Rs. 1550
 (d) Rs. 1580.8 (e) Rs. 1560.5
4. If a sum is invested in scheme B at C.I, then amount obtained after 2 year from this scheme is 1.44 times the sum invested. Rate of simple interest for scheme A is half of the rate of compound interest for scheme B. Find out the interest earned when 8000 was invested in each scheme mentioned above for 2 years.
 (a) 5120 (b) 5000
 (c) 4800 (d) Can't be determined
 (e) None of these
5. Sameer borrowed 17500 Rs. from Divyaraj on compound interest annually at the rate of 20% per annum, if he paid 5000 Rs. at the end of every year to Divyaraj then find how much amount Sameer have to pay at the end of fourth year for complete his debt?
 (a) 14168 (b) 14648 (c) 14848
 (d) 14448 (e) 14248
6. Ankur invested X Rs. at the rate of 15% per annum on compound interest for two years and gets total interest of 5805 Rs. if Ankur invest (X + 7000) Rs. for another two year at additional rate of 5%, then what will be compound interest on that investment?
 (a) 10000 Rs. (b) 11000 Rs. (c) 12000 Rs.
 (d) 15000 Rs. (e) 18000 Rs.
7. A total of Rs 18,750 is invested by a man in the bank account of his two sons whose ages are 12 years and 14 years in such a way that they will get equal amount at the age of 18 years at a rate of 5% per annum simple interest. What is the share of the younger child?
 (a) Rs 7500 (b) Rs 9000 (c) Rs 8000
 (d) Rs 6500 (e) None of these
8. Veer Invested X Rs. in SBI at the rate of 18% for 2 year and obtained a total simple interest of 6750 Rs. If he invested 2250 Rs. more for same period time at the rate of $14\frac{2}{7}\%$ for first year and at $16\frac{2}{3}\%$ for 2nd year on compound annually. Then find the total compound interest obtained by Veer after 2 year ?
 (a) 6000 Rs. (b) 5000 Rs. (c) 3000 Rs.
 (d) 7000 Rs. (e) 5500 Rs.
9. Veer invested Rs 22500 for 2 year at the Rate of x% in scheme A at compound interest annually and gets a total amount of Rs 32400 If he added Rs 2600 in this amount and invested total amount in scheme B at S.I. for 3 year at same rate. Then find the total simple interest veer gets from scheme B?
 (a) Rs 22500 (b) Rs 22000 (c) Rs 17500
 (d) Rs 20000 (e) Rs 21000
10. A bank offers 10% p.a. at CI in scheme 'A', 20% p.a. at CI in scheme 'B' and 40% p.a. at CI in scheme 'C'. Veer have some amount in his hand. He invested 32% amount in scheme 'A', 20% in scheme 'B' and remaining in scheme 'C'. After two year he received 6600 as interest. Find the difference between amount invested by Veer on scheme 'C' to that of in scheme 'B'.
 (a) 5,000 (b) 4,000 (c) 2,000
 (d) 3,000 (e) 2,500
11. Satish borrowed education loan of Rs 75000 from SBI at the rate of 10% compounded annually, if after 2 year he paid an amount of 30750, then find how much more amount Satish have to pay for repaying his loan in next 2 years?
 (a) Rs 76200 (b) Rs 72600 (c) Rs 70600
 (d) Rs 72000 (e) Rs 72300
12. Veer invested Rs. 21000 in a scheme on compound interest, which offered interest at the rate $14\frac{2}{7}\%$ for first year, $12\frac{1}{2}\%$ of second year and $11\frac{1}{9}\%$ for third year. Then find how much interest will Veer get after three year on his principle?
 (a) 7500Rs. (b) 9000Rs. (c) 8000Rs.
 (d) 8500Rs. (e) 9500Rs.
13. Satish invested 16000 Rs. in simple interest for 2 years on certain rate and gets an interest of 4800 Rs, if he invested total amount (Principle + Interest) in a scheme, which offered compound interest on 5% more interest rate as earlier rate. Then find total interest gets by Satish after 2 years ?
 (a) 9252 Rs. (b) 9225 Rs. (c) 9512 Rs.
 (d) 925 Rs. (e) 9152 Rs.
14. Bhavya and Veer invested their principle in two different schemes, Bhavya invested X Rs. on compound interest for two year at rate of 20% annually and Veer invested 4000 Rs. more than Bhavya on simple interest for three year at 15% annually, if both gets total interest of Rs. 9632, then Find the amount invested by Veer?
 (a) 12900 (b) 12400 (c) 8800
 (d) 12800 (e) 12600

- 15.** P invested Rs. X in a scheme for 2 year which offered simple at the rate of 15% per annum and Q invested Rs. (X + 2500) in another scheme for same period of time, which offered compound interest at the rate of 20% per annum. If from both scheme P and Q got total interest of Rs. 32550, then find the value of X?
 (a) 41500 (b) 42500 (c) 40500
 (d) 40000 (e) 38250
- 16.** According to a census report, the population growth rate of Faridabad is going to be an increasing A.P. with first year's rate as 5% and common difference as 5%, but simultaneously the migration rate is an increasing G.P. with first term as 1% and common ratio of 2. If population on 31 December 2010 is 1 million, then find in which year will Faridabad witness its first fall in population?
 (a) 2016 (b) 2014 (c) 2013
 (d) 2019 (e) None of these
- 17.** Monica deposited a total of Rs. 10500 with a bank in two different deposit schemes at 10% p.a., interest being compounded annually. As per the schemes, she gets the same amount after 2 years on the first deposit as she gets after 3 years on the second deposit. How much money did she deposit for 3 years?

- (a) Rs. 4500 (b) Rs. 5000 (c) Rs. 6500
 (d) Rs. 7200 (e) None of these

- 18.** A part of Rs. 38800 is lent out at 72% for six months. The rest of the amount is lent out at 5% p.a. after one year. The ratio of interest after 3 years from the time when first amount was lent out is 5 : 4. Find the second part that was lent out at 5%.
 (a) Rs. 28800 (b) Rs. 29586 (c) Rs. 31776
 (d) Rs. 32846 (e) None of these
- 19.** Sapna borrowed a certain sum of money from Kavita under the following repayment scheme based on simple interest. 8% p.a. for the initial 2 years, 9.5% p.a. for the next 4 years, 11% p.a. for the next 2 years, 12% p.a. after the first 8 years. Find the amount which a sum of Rs. 9000 taken for 12 years becomes at the end of 12 years.
 (a) Rs. 20160 (b) Rs. 22350 (c) Rs. 23470
 (d) Rs. 24567 (e) None of these
- 20.** If the compound interest on a certain sum of money for 2 years is Rs. 164 whereas the simple interest for 3 years at the same rate is Rs. 240 on the same sum, find the sum.
 (a) Rs. 1200 (b) Rs. 1400 (c) Rs. 1600
 (d) Rs. 1800 (e) None of these

Previous Year Question

- 1.** 1500 rupees is invested in a scheme A at R% p.a. simple interest. Another amount (1500 - x) is invested in scheme B at 2R % p.a. simple interest. After 4 years, interest earned from scheme A is 25% less than that of scheme B. Find x.
 (a) 500 (b) 600 (c) 900
 (d) 1000 (e) 1200
- SBI PO Prelims 2019**
- 2.** A man borrowed Rs. Rs.12000 on compound interest at the rate of 20% per annum and at the end of first year man again borrowed Rs. 'X' more on compound interest at the same rate of interest. If at the end of second year, man paid total amount of Rs.20400, then find value of 'X'?
 (a) Rs.2400 (b) Rs.2000 (c) Rs.3600
 (d) Rs.2600 (e) Rs.4000
- SBI PO Prelims 2020**
- 3.** 'A' invested Rs. X in a scheme on simple interest at the rate of 20% p.a. for two years and 'B' invested Rs. Y in same scheme. If interest got by A is Rs. 480 more than that of B after two years. If X is 25% more than Y, then find value sum of amount invested by A & B?
 (a) 11400 Rs. (b) 10800 Rs. (c) 10200 Rs.
 (d) 10400 Rs. (e) 11800 Rs.
- SBI PO Prelims 2020**

- 4.** Rs 6000 when invested at a certain rate at SI for 2 years, it fetches Rs 1200. If same sum is invested at same rate for a year compounded half - yearly then find compound interest.
 (a) Rs 615 (b) Rs 600 (c) Rs 1200
 (d) Rs 585 (e) Rs 1260
- SBI Clerk Prelims 2020**
- 5.** A man invested a sum at a certain rate of interest on simple interest and he got 60% more amount after eight year. If he invests Rs. 9600 at the same rate of interest on SI, then find the total interest he would get after four years?
 (a) 3840 Rs. (b) 2880 Rs. (c) 2520 Rs.
 (d) 2160 Rs. (e) 2260 Rs.
- IBPS PO Prelims 2020**
- 6.** A man invested an amount in two schemes in the ratio of 2 : 3 at the rate of 20% p.a. and 10% p.a. on compound interest respectively. If the man gets a total interest of Rs. 1208 after two years from both the schemes, the find amount invested by man?
 (a) 6000 Rs. (b) 4800 Rs. (c) 5000 Rs.
 (d) 4500 Rs. (e) 4000 Rs.
- IBPS Clerk Prelims 2020**

7. If a man invests equal sum at the same rate of interest on simple interest for T and T+4 years and the respective ratio of interest gets by man is 1:2 respectively, then find 'T'?
- (a) 6 (b) 2
(c) 5 (d) 3 (e) 4

RRB Clerk Prelims 2020

8. The difference between total SI earned on Rs. 'P' at 12% p.a for 3 years and total CI earned on same sum at 15% p.a for 2 years when compounded annually is Rs. 375. Find P ? (in Rs.)
- (a) 10000 (b) 15000 (c) 20000
(d) 5000 (e) 8000

RBI Assistant Prelims 2020

9. Difference of the compound interest received in first year and second year at 20% per annum at CI is Rs 1200 then find the sum?
- (a) Rs 25,000 (b) Rs 36,000 (c) Rs 35,000
(d) Rs 24,000 (e) Rs 30,000

SBI Clerk Prelims 2019

10. Ayush invested Rs.75000 in a scheme offering R% p.a. SI for 5 years and Rs.50000 in another scheme offering 12%p.a. CI compounding annually for 2 years. If difference in 2nd year CI and 2nd year SI is Rs.2220, then find value of R%.
- (a) 4% (b) 8% (c) 6%
(d) 12% (e) 14%

SBI Clerk Mains 2019

11. A man received Rs.3456 when he invested Rs.P at 12% p.a. at SI for 3 years. If he invested Rs. (P + 4400) at 15% p.a. at CI compounding annually for 2 years, then find the interest received by him.
- (a) Rs.4515 (b) Rs.4960 (c) Rs.4725
(d) Rs.4185 (e) Rs.4345

IBPS Clerk Prelims 2019

12. A man invested Rs.X at 15% p.a. at SI for 4 years and Rs. (1.35X) at 18% p.a. at SI for 3 years. If total interest received by man is Rs.15948, then find value of Rs. (3.12X).
- (a) Rs.50544 (b) Rs.42764 (c) Rs.32580
(d) Rs.47372 (e) Rs.37440

IBPS Clerk Prelims 2019

13. Difference between total CI and total SI on a certain sum at 20% per annum for 2 years is Rs 420. What will be the simple interest earned on same sum at 25% per annum for 3 years?
- (a) Rs 5725 (b) Rs 7875 (c) Rs 6525
(d) Rs 7000 (e) Rs 7375

IBPS Clerk Mains 2019

14. If a person invested 6000 at T% S.I for 3 year and same amount at (T + 5)% CI for 2 year and difference between both interest is 60 Rs. then find T ?(in %)
- (a) 15 (b) 18 (c) 20
(d) 24 (e) 25

IBPS RRB PO Prelims 2019

15. At what rate will a sum of Rs. 1000 amounts to Rs. 1102.50 in 2 years at compound interest?
- (a) 6.5% (b) 6% (c) 5%
(d) 5.5% (e) None of these

RRB Clerk Prelims 2019

16. A, B & C invested their respective savings in a scheme, which offered CI at 20% p.a. for two years and received total interest of Rs. 1694. If A & C invested double of their respective saving in another scheme, which offered SI at 10% p.a. for two years and received total interest of Rs. 1100, then find difference between saving of A & C together & saving of B?
- (a) 1250 Rs. (b) 1650 Rs. (c) 1150 Rs.
(d) 1050 Rs. (e) 750 Rs.

RRB Clerk Mains 2019

17. A man invested Rs. 1600 on CI for two years at the rate of R% p.a. and gets amount of Rs. 2304. If man invested same sum on SI for same period of time at the rate of (R - 8)%, then find interest he will get?
- (a) 384 Rs. (b) 324 Rs. (c) 316 Rs.
(d) 372 Rs. (e) 306 Rs.

RBI Grade B Phase I 2019

18. Shivam invested Rs 3 lac in a scheme which is providing interest rate of 'r'% per annum at CI and this scheme doubles the sum invested in $\frac{72}{r}$ years which is two times of rate of interest provided by the scheme. Find the total amount received by Shivam at the end of 48 years (in lac)?
- (a) 45 (b) 50 (c) 64
(d) 32 (e) 48

IBPS Clerk Mains 2019

19. If A invested Rs. 12000 at some rate of interest of S.I and B joined him after 3 months investing 16000 at same rate of interest if A leaves before 2 month of completion, then what will be the share of B's profit after 1 year if total profit is 22000 Rs. ?
- (a) 10000 (b) 14000 (c) 12000
(d) 8000 (e) 11000

IBPS RRB PO Prelims 2019

20. The simple interest accrued on an amount of Rs. 2500 at the end of six years is Rs. 1875. What would be the simple interest accrued on an amount of Rs. 6875 at the same rate and same period?
- (a) Rs. 4556.5 (b) Rs. 5025.25 (c) Rs. 4895.25
(d) Rs. 5245.5 (e) None of these

21. Manish borrowed a sum of Rs. 1150 from Anil at the simple rate of 6 p.c.p.a. for 3 years. He then added some more money to the borrowed sum and lent it to Sunil for the same time at 9 p.c.p.a. at simple interest. If Manish gains Rs. 274.95 by way of interest on borrowed sum as well as his own amount from the whole transaction, then what is the sum lent by him to Sunil?
 (a) Rs. 1290 (b) Rs. 1785 (c) Rs. 1285
 (d) Rs. 1200 (e) None of these
22. Suhit borrowed a sum of Rs. 6300 from Vikas at the rate of 14% for 3 years, He then added some more money to the borrowed sum and lent it to Mohit at the rate of 16% of simple interest for the same time. If Suhit gained Rs. 618 in the whole transaction, then what sum did he lend to Mohit?
 (a) Rs. 7000 (b) Rs. 6800 (c) Rs. 7200
 (d) Cannot be determined (e) None of these
23. Arun invested a sum of money at a certain rate of simple interest for a period of 4 years. Had he invested the same sum for a period of 6 years the total interest earned by him would have been 50 per cent more than the earlier interest amount. What was the rate of interest per cent per annum?
 (a) 4 (b) 8 (c) 5
 (d) Cannot be determined (e) None of these
24. Mayuri took a loan at simple interest rate of 6 p.c.p.a. in the first year and it increased by 1.5 p.c.p.a. every year. If she pays Rs. 8190 as interest at the end of 3 years, what was her loan amount?
 (a) Rs. 36000 (b) Rs. 35400 (c) Rs. 36800
 (d) Cannot be determined (e) None of these
25. Asmita invests an amount of Rs, 9535 at the rate of 4 per cent per annum to obtain a total amount of Rs. 11442 on simple interest after a certain period. For how many years did she invest the amount to obtain the total sum?
 (a) 10 years (b) 2 years (c) 5 years
 (d) 4 years (e) None of these
26. A person invests Rs. 2 lakhs at 12% p.a. for 1 year. If he invests Rs. 500 more, he is eligible for 13% p.a. interest. How much more interest would he receive, if he accepted the second option?
 (a) Rs. 2155 (b) Rs. 2045 (c) Rs. 2165
 (d) Rs. 2065 (e) None of these
27. The rate of interest for the first 2 years is 3% per annum, for the next 3 years is 8% per annum and for the period beyond 5 years 10% per annum, If a man gets Rs. 1520 as a simple interest for 6 years, how much money did he deposit?
 (a) Rs. 2500 (b) Rs. 2800 (c) Rs. 3500
 (d) Rs. 3800 (e) Rs. 4200
28. With a given rate of simple interest, the ratio of principal and amount of a certain period of time is 4 : 5. After 3 years, with the same rate of interest, the ratio of the principal and amount becomes 5 : 7. The rate of interest per annum is:
 (a) 4% (b) 5% (c) 6%
 (d) 7% (e) None of these
29. The simple interest accrued on an amount of Rs. 19800 at the end of 3 years is Rs. 7128. What would be the compound interest accrued on the same amount at the same rate in the same period?
 (a) Rs. 8934.6784 (b) Rs. 8017.5744
 (c) Rs. 7861.8754 (d) Rs. 6871.6734
 (e) None of these
30. The compound interest on a certain sum for 2 years at 12% per annum, compounded annually is Rs. 1272. The simple interest for that sum at the same rate and for the same period will be?
 (a) Rs. 1296 (b) Rs. 1196 (c) Rs. 1220
 (d) Rs. 1200 (e) None of these

Solutions

Basic Solutions

1. (a); $SI = \frac{PRT}{100} = \frac{800 \times 5 \times 3}{100} = \text{Rs. } 120$

2. (c); $T = \frac{SI \times 100}{PR} = \frac{120 \times 100}{600 \times 10} = 2 \text{ years}$

3. (d); $R = \frac{SI \times 100}{PT} = \frac{4500 \times 100}{15000 \times 5} = 6\%$

4. (a); Total SI difference = 1400 - 1100 = Rs. 300
 Total Time = 6 - 2 = 4 years

$$SI = \frac{300}{4} = \text{Rs. } 75$$

For 2 year SI = 75 × 2 = Rs. 150

So, P = 1100 - 150 = Rs. 950

$$R = \frac{75}{950} \times 100 = 7\frac{17}{19}\%$$

5. **(b);** $CI = P \left[\left(1 + \frac{R}{100} \right)^n - 1 \right]$
 $= 17500 \left[\left(1 + \frac{12}{100} \right)^2 - 1 \right] = \text{Rs. } 4452$

6. **(c);** $CI = P \left[\left(1 + \frac{R}{100} \right)^n - 1 \right]$
 Here, $P = \text{Rs. } 12000$, $R = 9\%$ p.a, $n = 3$ years
 $= 12000 \left[\left(\frac{109}{100} \right)^3 - 1 \right] = \text{Rs. } 3540$ (Appx.)

7. **(d);** $CI = P \left[\left(1 + \frac{R}{100} \right)^n - 1 \right]$
 $= 4800 \left[\left(1 + \frac{5}{100} \right)^3 - 1 \right] = \text{Rs. } 756.6$

8. **(a);** $CI = P \left[\left(1 + \frac{R}{100} \right)^n - 1 \right]$
 $= 12500 \left[\left(1 + \frac{12}{100} \right)^2 - 1 \right] = \text{Rs. } 3180$

9. **(a);** Difference between CI and SI for 2 years $= \frac{PR^2}{100^2}$
 $64 = \frac{10000 \times R^2}{100 \times 100} \Rightarrow R^2 = 64 \Rightarrow R = 8\%$

10. **(a);** Difference between CI and SI for 2 years $= \frac{PR^2}{100^2}$
 $\Rightarrow \frac{P \times 16}{100^2} = 1 \Rightarrow P = \text{Rs. } 625$

11. **(e);** Because amount compound quarterly
 So, Year = year $\times 4$, Rate $= \frac{\text{rate}}{4}$
 $\therefore \text{year} = \frac{9}{12} \times 4 = 3$ years, rate $= \frac{8}{4} = 2\%$
 $\therefore CI = 12500 \left[\left(1 + \frac{2}{100} \right)^3 - 1 \right] = \text{Rs. } 765$

12. **(b);** Because the amount is compounded half-yearly
 So, year = year $\times 2$, rate =
 $\therefore \text{year} = 2$ years, rate = 10%

$\Rightarrow CI = P \left[\left(1 + \frac{R}{100} \right)^n - 1 \right]$
 $= 32000 \left[\left(1 + \frac{10}{100} \right)^2 - 1 \right] = \text{Rs. } 6720$

13. **(e);** Difference between CI and SI for 2 years $= \frac{PR^2}{100^2}$
 $= \frac{700 \times 5 \times 5}{100 \times 100} = \text{Rs. } 1.75$

14. **(c);** Difference between CI and SI for 2 years $= \frac{PR^2}{100^2}$
 Here, Difference = Rs. 10, $R = \frac{25}{4}\%$ per annum
 $\Rightarrow 10 = P \times \left[\frac{25}{4 \times 100} \right]^2 \Rightarrow P = \text{Rs. } 2560$

15. **(b);** Here, amount = 2P (Where P = Principal)
 Hence, $SI = P$, Rate $= \frac{100 \times SI}{P \times T} = \frac{P \times 100}{P \times 8} = 12.5\%$

16. **(b);** Amount $= P + \frac{P \times R \times T}{100}$
 $450 = P + \frac{P \times 2 \times 10}{100} \Rightarrow P = \text{Rs. } 375$

17. **(b);** Amount $= P + \frac{P \times R \times T}{100}$
 $= 22400 + \frac{22400 \times 12 \times 7}{100} = \text{Rs. } 41216$

18. **(b);** Amount $= P + \frac{P \times R \times T}{100}$
 $10500 = 7000 + \frac{7000 \times 5 \times T}{100} \Rightarrow T = 10$ years

19. **(d);** $SI = \frac{PRT}{100} \Rightarrow 4016.25 = \frac{P \times 9 \times 5}{100} \Rightarrow P = \text{Rs. } 8925$

20. **(c);** Year = 2 years,
 $R = \frac{10}{2} = 5\%$ [CI is compounded half-yearly]
 Difference between CI and SI for 2 years $= \frac{PR^2}{100^2}$
 $25 = \frac{P \times 25}{100 \times 100}; P = \text{Rs. } 10000$

Prelims Solutions

Level - 1

1. (a): $SI = 24000 - 20000 = \text{Rs. } 4000$
 $4000 = \frac{20000 \times 2 \times R}{100}$
 $R = 10\%$
 Required amount = $20000 + \frac{20000 \times 12 \times 3}{100} = \text{Rs. } 27200$
2. (a): ATQ,
 $\frac{x \times 14 \times 3}{100} - \frac{x \times 10 \times 3}{100} = 120$
 $\frac{(42-30)x}{100} = 120$
 $x = \text{Rs. } 1000$
 Required answer = $5x = 5 \times 1000 = \text{Rs. } 5000$
3. (c): ATQ, $\frac{P \times 10 \times 2}{100} + 200 = \frac{P \times 20 \times x}{100}$
 $\frac{20Px}{100} - 200 = \frac{20P}{100}$
 $\frac{20P}{100} = \frac{20 \times 5000}{100} - 200 = 800$
 $P = \text{Rs. } 4000$
 $x = \frac{5000}{4000} = \frac{5}{4}$ years or 15 months
4. (c): Total interest received in 8 yrs = $2408 - 1400 = \text{Rs. } 1008$
 Interest for 1st 4 years = $\frac{1400 \times 4 \times 12}{100} = \text{Rs. } 672$
 So, interest for last 4 years = $1008 - 672 = \text{Rs. } 336$
 Interest rate for last 4 years = $\frac{336 \times 100}{1400 \times 4} = 6\%$
5. (b): let rate of interest be R%
 $SI = 15000 - 12000 = \text{Rs. } 3000$
 $3000 = \frac{12000 \times R \times 18}{12 \times 100}$
 $R = \frac{100}{6} \%$
 Required amount = $5000 + \frac{5000 \times 100 \times 30}{100 \times 6 \times 12} = \text{Rs. } 7083.33$
6. (a): Overall rate for 2 yrs at the rate of 10% compounded yearly = $10 + 10 + \frac{10 \times 10}{100} = 21\%$
 According to the question,
 $21\% = 672$
 $100\% = \frac{672}{21} \times 100 = 3200 \text{ rs}$
 Simple interest = $\frac{3200 \times 14 \times 4}{100} = \text{Rs. } 1792$
7. (c): let rate of interest be R% & principal be Rs. P
 $SI = 2P - P = \text{Rs. } P$
 $P = \frac{P \times R \times 5}{100}$
 $R = 20\%$
 To become 12 times, $SI = 12P - P = \text{Rs. } 11P$
 $11P = \frac{P \times 20 \times T}{100}$ where T is time period in years
 $T = 55$ years
8. (a): Let R be effective interest and P be principal amount
 So, $R = \frac{20}{2} = 10\%$
 And, period of time = $2 \times 2 = 4$
 (as it is compounded half-yearly)
 $C.I. = P \left(1 + \frac{R}{100}\right)^4 - P$
 $= 4000 \left(1 + \frac{10}{100}\right)^4 - 4000$
 $= \text{Rs. } 1856.4$
9. (c): let sum be Rs. P
 When compounding half-yearly, rate = $\frac{20}{2} = 10\%$
 Effective interest rate for a year when compounding half-yearly
 $= 10 + 10 + \frac{10 \times 10}{100} = 21\%$
 ATQ, $P \left(1 + \frac{21}{100}\right) - P \left(1 + \frac{20}{100}\right)^1 = 10$
 $\frac{P}{100} = 10$
 $P = \text{Rs. } 1000$
10. (b): S.I. = $\frac{P \times R \times T}{100}$
 $= \frac{10000 \times 12.5 \times 2}{100} = 2500 \text{ Rs.}$
11. (c): Total amount that shikhar have at the end of 1st year = $\text{Rs. } (15000 \times 1.1) = \text{Rs. } 16500$
 Amount withdrawn at the end of 1st year = $\text{Rs. } 12000$
 Principal amount for 2nd year on which shikhar will get interest = $\text{Rs. } (16500 - 12000) = \text{Rs. } 4500$
 Hence, total amount shikhar will get at the end of 2nd year = $\text{Rs. } (4500 \times 1.1) = \text{Rs. } 4950$
12. (d): amount after 2 years = $1500 + \frac{1500 \times 10 \times 2}{100} = \text{Rs. } 1800$
 Let he reinvested Rs X, so amount he kept = $\text{Rs. } (1800 - X)$
 ATQ, $\frac{X \times 10 \times 3}{100} = 300$
 $X = \text{Rs. } 1000$
 Required amount = $1800 - 1000 = \text{Rs. } 800$

13. (a): Total amount at the end of 1st year = 15000 + 15000 × $\frac{15}{100}$
 = Rs 17250
 Due to some emergency, he withdrew 10000 rs from the scheme
 Amount left in the scheme = 17250 - 10000
 = Rs 7250
 Total amount ravi got at the end of 2nd year = 7250 + 7250 × $\frac{15}{100}$
 = Rs 8337.5

14. (b): When interest is compounded half-yearly, r = 5%, time = 4 years
 Amount = 10000 $\left[1 + \frac{5}{100}\right]^4$
 = $\frac{441 \times 441}{16} = 12155.0625 = 12155$ Rs.

15. (a): Let the investment in A, B and C be 2x, x and 3x respectively.
 Cumulative interest rate for A, B and C is
 10% × 2, $\left(5 + 5 + \frac{25}{100}\right)\%$, $\left(3 + 3 + \frac{9}{100}\right)\%$
 = 20%, 10.25%, 6.09%
 ATQ, $2x \times \frac{20}{100} + x \times \frac{10.25}{100} + \frac{3x \times 6.09}{100} = 6852$
 $\Rightarrow \frac{68.52x}{100} = 6852$
 $\Rightarrow x = 10000$
 So, Total amount invested is 60000 Rs.

16. (b): Interest received after 3 yrs is Rs 7560 at simple interest
 Interest received after 1 yrs on S.I = $\frac{7560}{3}$
 = Rs 2520
 Rate of interest (r) = $\frac{2520}{16800} \times 100$
 = 15%
 Interest received on C.I at (r+5)% after 2 yrs
 = 16800 $\left[\left(1 + \frac{20}{100}\right)^2 - 1\right]$
 = 16800 $\left(\frac{36}{25} - 1\right)$
 = 16800 $\left(\frac{11}{25}\right)$
 = Rs 7392

17. (d): sum left at the end of first year = $\left(400 + 400 \times \frac{10}{100}\right) - 200 = Rs. 240$
 Sum left at the end of 2nd year = $\left(240 + 240 \times \frac{10}{100}\right) - 64 = Rs. 200$
 Sum paid at the end of 3rd year to clear his debt. = $\left(200 + 200 \times \frac{10}{100}\right) = Rs. 220$

18. (a): Rate of interest (x) = $\frac{910 - 845}{845} \times 100 = \frac{65}{845} \times 100 = 7\frac{9}{13}\%$
 Total CI = 910 + 845 = Rs. 1755
 Let 'p' amount was invested
 C.I. = $P \left[\left(1 + \frac{R}{100}\right)^T - 1\right]$
 1755 = $P \left[\left(1 + \frac{1}{13}\right)^2 - 1\right]$
 1755 = $P \times \frac{27}{169}$
 $P = \frac{1755 \times 169}{27} = Rs. 10985$

19. (b): Let the sum and rate of interest be Rs P and R% respectively.
 Second year C.I. = 2 years S.I. + interest of one year on first year S.I.
 2-year S.I. = Rs.500
 1-year S.I. = Rs.250
 So, interest on first year S.I. = 550 - 500 = Rs. 50
 Rate of interest = $\frac{50}{250} \times 100 = 20\%$

20. (a): Let the sum be Rs P and rate of interest is R% per annum.
 Simple interest for first year and second year is Rs 140 and Rs 140 respectively.
 For first year compound interest and simple interest are same.
 So, Compound interest for second year = 308 - 140 = Rs 168
 Rate of interest = $\frac{168 - 140}{140} \times 100 = 20\%$
 So, sum = $\frac{280 \times 100}{20 \times 2} = Rs 700$

21. (d): Let rate of interest be R% per annum and sum be Rs P.
 ATQ
 $868 - P = \frac{P \times R \times 4}{100} \dots \dots (i)$
 Now,
 $910 - P = \frac{P \times \frac{125}{100} \times R \times 4}{100} \dots \dots (ii)$
 By dividing (i) from (ii)
 $\frac{868 - P}{910 - P} = \frac{P \times R \times 4}{P \times \frac{125}{100} \times R \times 4}$
 $\frac{868 - P}{910 - P} = \frac{4}{5}$
 $4340 - 5P = 3640 - 4P$
 $P = Rs 700$

22. (c): ATQ
 Amount received by Akash = 48000 $\left[\left(1 + \frac{15}{200}\right)^2\right]$
 = Rs 55470

23. (a): Required probability = $\frac{{}^7C_1 \times {}^9C_2}{{}^{16}C_3} = \frac{7 \times \frac{9 \times 8}{2}}{16 \times 15 \times 14} = \frac{9}{3 \times 2}$

24. (c): Second year C.I = $P \left[\left(1 + \frac{R}{100} \right)^2 - 1 \right] - P \times \frac{R}{100}$
 $= 6875 \times \frac{11}{25} - 6875 \times \frac{20}{100} = \text{Rs. } 1650$
 Required difference = $1650 \times \frac{20}{100} = \text{Rs. } 330$

25. (d): Let sum be Rs P and time be T months.
 ATQ
 $\frac{P \times 6 \times T}{100} = \frac{P \times 5 \times (T+8)}{100}$
 $T = 40 \text{ months}$
 Now, equivalent interest for 40 months at 6% per annum = $6 \times \frac{40}{12} = 20\%$
 So, $120\% = 3240$
 $100\% = \frac{3240}{120} \times 100 = \text{Rs } 2700$
 \therefore the sum be Rs 2700.

26. (a): Let rate be R% and principle is Rs P.
 Then, equivalent rate of interest at SI for 3 year = 3R%
 Equivalent rate of interest at CI for 2 years
 $= R + R + \frac{R \times R}{100}$
 $= \left(2R + \frac{R^2}{100} \right) \%$
 Atq,
 $\frac{3 \times P \times R}{100} = 720$
 $PR = \text{Rs } 24000 \quad \dots(i)$
 And,
 $P \left[2R + \frac{R^2}{100} \right] \times \frac{1}{100} = 528$
 $PR \left[2 + \frac{R}{100} \right] = 52800 \quad \dots(ii)$
 From (i) and (ii)
 $2 + \frac{R}{100} = 2.2$
 $R = 0.2 \times 100$
 $R\% = 20\%$
 Or,
 3year SI = Rs 720
 2year SI = $\frac{720}{3} \times 2$
 $= 480$
 1year SI = Rs 240
 $R\% = \frac{528-480}{240} \times 100$
 $= \frac{48}{240} \times 100$
 $= 20\%$

27. (c): let amount lent at 20% per annum = Rs. x
 ATQ
 $x \times \frac{20}{100} + (8000 - x) \times \frac{10}{100} = 1150$
 $\frac{x}{5} + 800 - \frac{x}{10} = 1150$
 $x = \text{Rs. } 3500$

28. (c): Let amount invested by Deepak at C.I. be 'Rs.x'.
 So, amount invested by Deepak at S.I. = Rs (47000 - x)
 Now,
 Equivalent rate of interest of 15% C.I. for 2 years
 $= 15 + 15 + \frac{15 \times 15}{100} = 32.25\%$
 ATQ,
 $\frac{x \times 32.25}{100} - \frac{(47000 - x) \times 2 \times 12}{100} = 532.5$
 $32.25x + 24x = 1181250$
 $x = 21000 \text{ Rs.}$

29. (e): Let amount invested in one scheme be Rs. x
 So, amount invested in another scheme = Rs. (10000 - x)
 ATQ,
 $\frac{x \times R \times 2}{100} - \frac{(10000 - x) \times R \times 2}{100} = 480 \quad \dots (i)$
 And
 $\frac{\frac{x \times R \times 2}{100}}{(10000 - x) \times R \times 2} = \frac{3}{2}$
 $\Rightarrow \frac{x}{(10000 - x)} = \frac{3}{2}$
 $\Rightarrow x = \text{Rs. } 6000$
 Put value of x in (i)
 $\frac{6000 \times R \times 2}{100} - \frac{(10000 - 6000) \times R \times 2}{100} = 480$
 $\Rightarrow 120R - 80R = 480$
 $R = 12\%$
 Alternate,
 Let interest earned in scheme first and second be 3s and 2s respectively.
 ATQ,
 $3s - 2s = 480$
 $s = 480$
 \therefore total interest earned = $5s = 480 \times 5 = \text{Rs. } 2400$
 Now, $2400 = \frac{10000 \times R \times 2}{100}$
 $R = 12\%$

30. (d): Let sum of money be P Rs and rate of interest be 'r%'.
 ATQ -
 $P \left(1 + \frac{r}{100} \right)^2 = 2880 \quad \dots (i)$
 Also,
 $P \left(1 + \frac{r}{100} \right)^4 = 4147.2 \quad \dots (ii)$
 From $\frac{(i)^2}{(ii)}$ we get -
 $P = \frac{2880 \times 2880}{4147.2}$
 $P = 2000 \text{ Rs.}$
 Required amount = $2000 + 2000 \times \frac{12 \times 5}{100} = 3200 \text{ Rs.}$

Level - 2

1. (d): let each invested Rs P

Let Jaddu invested for X years

$$\text{ATQ, } \frac{P \times 10 \times X}{100} = P \left(1 + \frac{10}{100}\right)^2 - P$$

$$\frac{X}{10} = \frac{21}{100}$$

$$X = 2.1 \text{ years}$$

2. (d): Interest earned in 1st half of the year = $30000 \times \frac{1}{2} \times \frac{20}{100} = \text{Rs } 3000$

Similarly, during 2nd half, interest earned = 10% of 33000 = Rs 3300

During 2nd year, interest earned = $(30000 + 3000 + 3300) \times \frac{20}{100} = \text{Rs } 7260$

Total interest earned at the end of 2 yrs = $3000 + 3300 + 7260 = \text{Rs } 13560$

3. (e): Let the sum be Rs P and rate of interest be R% per annum

ATQ

$$\frac{P \left[\left(1 + \frac{R}{100}\right)^2 - 1 \right]}{P \left[\left(1 + \frac{R}{100}\right)^4 - 1 \right]} = \frac{252}{556.92}$$

$$\text{Let } \left[1 + \frac{R}{100}\right]^2 = x$$

$$\text{Then } \frac{x-1}{x^2-1} = \frac{100}{221}$$

$$\frac{x-1}{(x-1)(x+1)} = \frac{100}{221}$$

$$\Rightarrow x = \frac{121}{100} \quad \text{i.e. } \left[1 + \frac{R}{100}\right]^2 = \frac{121}{100}$$

$$\Rightarrow R = 10\%$$

$$P \left[\left(1 + \frac{R}{100}\right)^2 - 1 \right] = 252$$

$$P \left[\left(1 + \frac{10}{100}\right)^2 - 1 \right]$$

$$\text{And } P \times \frac{21}{100} = 252 \Rightarrow P = \text{Rs } 1200$$

4. (a): Let percentage rate of interest per year and principle amount be 'r%' and Rs 'P' respectively. So, rate of interest at compounded half yearly become half.

ATQ,

$$8P = P \times \left[1 + \frac{r}{2 \times 100}\right]^3$$

$$2 = 1 + \frac{r}{200}$$

$$\Rightarrow r = 200\%$$

Now, let time period in which it becomes 81 times be 'T' years.

$$81P = P \times \left[1 + \frac{200}{100}\right]^T$$

$$81 = 3^T$$

$$T = 4 \text{ years}$$

5. (d): First year Interest = $12000 \times \frac{20}{100} = 2400 \text{ Rs.}$

For second year —

$$(12000 + 2400 + x) \times \frac{120}{100} = 20400$$

$$x = 2600 \text{ Rs.}$$

6. (b): Let sum of money lent be Rs. P.

$$\text{C.I. at the end of two years} = P \left[1 + \frac{25}{100}\right]^2 - P$$

$$= \text{Rs. } P \left[\left(\frac{5}{4}\right)^2 - 1 \right] = \text{Rs. } \frac{9P}{16}$$

$$\text{C.I. at the end of a year} = \frac{P \times 25 \times 1}{100} = \text{Rs. } \frac{P}{4}$$

ATQ,

$$\frac{9P}{16} - \frac{P}{4} = 3750$$

$$\frac{5P}{16} = 3750$$

$$P = \text{Rs. } 12000$$

7. (b): ATQ,

$$R\% = \frac{3\text{rd year C.I.} - 2\text{nd year C.I.}}{2\text{nd year C.I.}} \times 100$$

$$= \frac{3967.5 - 3450}{3450} \times 100$$

$$= \frac{517.5}{3450} \times 100 = 15\%$$

Now,

$$\left[P \left(1 + \frac{R}{100}\right)^2 - P \right] - \left[\frac{P \times R \times 1}{100} \right] = 3450$$

$$P \left(1 + \frac{15}{100}\right)^2 - P - \frac{P \times 15}{100} = 3450$$

$$\Rightarrow P \left(\frac{23}{20}\right)^2 - P - \frac{3P}{20} = 3450$$

$$\Rightarrow \frac{529P - 400P - 60P}{400} = 3450$$

$$\frac{69P}{400} = 3450$$

$$\Rightarrow P = \text{Rs. } 20000$$

8. (b): ATQ,

$$\left[(X + 2500) \left(1 + \frac{20}{100}\right)^2 - (X + 2500) \right] - \frac{X + 30 \times 2}{100} = 60$$

$$\left[(X + 2500) \times \frac{36}{25} - (X + 2500) \right] - \frac{3X}{5} = 60$$

$$\Rightarrow \left[\frac{36X + 90000 - 25X - 62500}{25} \right] - \frac{3X}{5} = 60$$

$$\Rightarrow \frac{11X + 27500 - 15X}{25} = 60$$

$$\Rightarrow -4X + 27500 = 1500$$

$$\Rightarrow X = \text{Rs. } 6500$$

OR

Equivalent C.I. for two years at 20% per annum =

$$20 + 20 + \frac{20 \times 20}{100} = 44\%$$

ATQ

$$(X + 2500) \times \frac{44}{100} - X \times 30 \times \frac{2}{100} = 60$$

$$44X + 110000 - 60X = 6000$$

$$X = \text{Rs. } 6500$$

9. (a): ATQ,

$$[2X(1.08)^2 - 2X] - \frac{X \times 15 \times 2}{100} = 820$$

$$[2.3328X - 2X] - \frac{3X}{10} = 820$$

$$\Rightarrow \frac{3328X}{10000} - \frac{3X}{10} = 820$$

$$\Rightarrow \frac{328X}{10000} = 820$$

$$X = 25000 \text{ Rs.}$$

10. (b): 1st year interest = $10000 \times \frac{20}{100} = \text{Rs. } 2000$

$$2\text{nd year interest} = (10000 + 2000) \times \frac{21}{100} = \text{Rs. } 2520$$

$$3\text{rd year interest} = 14520 \times 0.20 = \text{Rs. } 2904$$

$$\text{Total Interest} = 2000 + 2520 + 2904 = \text{Rs. } 7424$$

11. (c): Let the money invested be x , let rate be $R\%$

It becomes $\frac{7}{4}$ th of itself in 6 years.

$$\text{So interest} = \frac{7}{4}x - x = \frac{3x}{4}$$

So, ATQ,

$$\frac{3x}{4} = \frac{x \times R \times 6}{100}$$

$$R \Rightarrow \frac{25}{2}\% = 12.5\%$$

12. (a): Let the rate be $r\%$

Given

$$X \left(1 + \frac{r}{100}\right)^2 - X = \frac{X \times r \times 4}{100}$$

We get $r = 200\%$

13. (d): Let Veer invested = Rs. P

So, interest got by Veer after 10 years = Rs. P

ATQ -

$$\frac{P \times 10 \times R}{100} = P$$

$$R = 10\%$$

$$\text{Required amount} = X \times \left(1 + \frac{10}{100}\right)^3 = 5324$$

$$1.331X = 5324$$

$$X = \text{Rs. } 4000$$

14. (c): Amount = $\frac{10000 \times 10 \times 2}{100} + 10000 = \text{Rs. } 12000$

$$\text{Units of share purchased} = 12000/5 = 240$$

$$\text{Selling price of share} = 240 \times 52 = \text{Rs. } 12480$$

$$\text{Profit percent} = \frac{12480 - 12000}{12000} \times 100 = \frac{480}{120} = 4\%$$

15. (a): ATQ,

$$P \left(1 + \frac{R}{100}\right)^2 - P = \frac{2 \times 1100 \times 10 \times 2}{100} = 440$$

$$P \frac{36}{25} - P = 440$$

$$P = \text{Rs. } 1000$$

16. (a): Let rate be $R\%$ and principal be Rs. P.

$$\text{ATQ, } \frac{P \left(1 + \frac{R}{100}\right)^2 - P \left(1 + \frac{R}{100}\right)^1}{P \left(1 + \frac{R}{100}\right)^3 - P \left(1 + \frac{R}{100}\right)^2} = \frac{5}{6}$$

$$\text{Let } x = \left(1 + \frac{R}{100}\right)$$

$$\Rightarrow \frac{x^2 - x}{x^3 - x^2} = \frac{5}{6}$$

On solving $x = 6/5$

$$1 + \frac{R}{100} = \frac{6}{5}$$

$$R = 20\%$$

$$\text{Required amount} = 10000 \left(1 + \frac{20}{100}\right)^2 = \text{Rs. } 14400$$

17. (d): let amount lent at 10% rate is Rs. X

$$\text{ATQ, } \frac{x \times 10 \times 3}{100} + \frac{(1000 - x) \times 15 \times 3}{100} = 390$$

$$\frac{30x}{100} + \frac{45000 - 45x}{100} = 390$$

$$X = \text{Rs. } 400$$

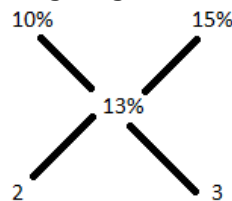
Alternatively,

$$390 =$$

$$\frac{1000 \times 3 \times R}{100} \text{ where } R\% \text{ is effective rate of interest}$$

$$R = 13\%$$

Using allegation



Amount lent in the ratio 2:3

$$\text{Amount lent at } 10\% \text{ rate} = \frac{2}{5} \times 1000 = \text{Rs. } 400$$

18. (c): Let the amount lent be Rs 'x'.

Then ATQ

$$5 \left(\frac{x \times y \times 2}{100}\right) = \left(\frac{x \times 2y \times (2+a)}{100}\right)$$

So $a = 3$ years.

19. (b): Let the actual price of laptop be Rs. 'x'.

ATQ

$$\frac{((x - 14000) \times 8 \times 2)}{100} = 29080 - x$$

$$0.16(x - 14000) = 29080 - x$$

$$1.16x = 29080 + 2240$$

$$x = \text{Rs. } 27000$$

So the actual price of laptop be Rs. 27000

20. (b): Let the principal be P Rs and rate of interest be $r\%$

$$\text{Simple interest} = \frac{2 \times P \times r}{100}$$

$$\text{Compound interest} = P \left[\left(1 + \frac{r}{100}\right)^2 - 1 \right] = \frac{P r^2}{(100)^2} + \frac{2Pr}{100}$$

$$\text{Difference between SI and CI} = P \left(\frac{r}{100}\right)^2$$

$$50000 \left(\frac{r}{100}\right)^2 = 320$$

$$\left(\frac{r}{100}\right)^2 = 0.0064$$

$$\frac{r}{100} = 0.08$$

$$r = 8\%$$

21. (a): let rate of interest be $R\%$

$$SI = 6076 - 5600 = \text{Rs. } 476$$

$$\text{ATQ, } 476 = \frac{5600 \times R \times 1}{100}$$

$$R = 8.5\%$$

22. (a): Given, a sum of money get doubles itself in $3\frac{1}{3}$ yrs.

let the sum of money be Rs x, rate be r%. p.a.

Atq,

$$x = \frac{x \times r \times 3\frac{1}{3}}{100}$$

$$r = 30\%$$

$$\text{So, required time} = 6x = \frac{x \times 30 \times t}{100}$$

$$t = 20 \text{ yrs.}$$

23. (e): let time period in first scheme is x years

$$\frac{5000 \times 15 \times (x+2)}{100} - \frac{5000 \times 10 \times x}{100} = 2000$$

$$250x + 1500 = 2000$$

$$x = 2 \text{ years}$$

24. (a): ATQ -

$$2304 = 1600 \left(1 + \frac{R}{100}\right)^2$$

$$\frac{48}{40} = \left(1 + \frac{R}{100}\right)$$

$$R = 20\%$$

$$\text{New rate} = (20 - 8) = 12\%$$

$$\text{Required interest} = \frac{1600 \times 12 \times 2}{100} = 384 \text{ Rs.}$$

25. (b): ATQ,

$$1 \text{ year interest} = \frac{30000 - 24000}{3} = \text{Rs. } 2000$$

$$\text{Now, required principal} = 24000 - 2 \times 2000 = \text{Rs. } 20000$$

26. (a): Let initial investment of Gopal = 100P

$$\text{Interest after 2 years} = 100P \times \left(20 + 20 + \frac{20 \times 20}{100}\right) = 44P$$

ATQ -

$$(44P + 360) \times \left(20 + 20 + \frac{20 \times 20}{100}\right) = 352$$

$$100P = 1000 \text{ Rs.}$$

$$27. (b): \text{Simple interest} = 6600 \times \frac{12 \times 2}{100} = 1584$$

$$\text{Compound interest} = 1584 \times \frac{10}{9} = 1760$$

$$X \times \frac{44}{100} = 1760$$

$$X = 4000 \text{ Rs.}$$

28. (b): ATQ -

$$\frac{1200 \times (R + 5) \times 2}{1600 \times R \times 3} = \frac{3}{4}$$

$$R = 10\%$$

$$(R + 5)\% = 10 + 5 = 15\%$$

$$29. (e): \text{After two years CI with } 10\% = 10 + 10 + \frac{10 \times 10}{100} = 21\%$$

$$\text{After two years CI with } 20\% = 20 + 20 + \frac{20 \times 20}{100}$$

$$= 44\%$$

Interest earned

$$(P + 2400) \times \frac{21}{100} + (P + 4400) \times \frac{44}{100} = 8680$$

$$21P + 44P = 868000 - (50400 + 193600)$$

$$65P = 868000 - 244000$$

$$P = \frac{624000}{65} = 9600$$

30. (a): Let larger part is = Rs y.

Then smaller part = Rs. (1800 - y)

ATQ,

$$\frac{y \times x \times 2}{100} + (1800 - y) \times \frac{4 \times 2}{100} = 164$$

$$2xy + 14400 - 8y = 16400 \quad \dots (i)$$

and

$$\frac{y \times 4 \times 2}{100} + (1800 - y) \times \frac{x \times 2}{100} = 160$$

$$8y + 3600x - 2xy = 16000 \quad \dots (ii)$$

Adding (i) and (ii)

$$3600x = 16400 + 16000 - 14400$$

$$x = 5 \quad x\% = 5\%$$

Mains Solutions

1. (c): Amount withdrawn from bank which offered simple interest = $20000 + \frac{20000 \times 10 \times 2}{100} = 24000$

Compound interest accrued from another bank = 2460

$$2460 = 24000 \left[\left(1 + \frac{R}{100}\right)^2 - 1 \right] \Rightarrow r = 5$$

%

2. (b): Amount withdrawn after 2 years from bank

$$\text{offering S.I.} = 50000 + \frac{5000 \times 10 \times 2}{100} = 60000$$

Amount withdrawn after another 2 years from another bank offering C.I.

$$= 60000 \left(1 + \frac{5}{100}\right)^2 = 66150$$

$$\text{New profit} = 66150 - 50000 = 16,150$$

3. (d): Principle invested by Abhishek

$$= \frac{3800 \times 100}{8 \times 5} = 9500$$

CI after two years

$$CI = 9500 \left[\left(1 + \frac{8}{100}\right)^2 - 1 \right] = \text{Rs } 1580.8$$

4. (a): Let sum invested in B with C.I. = x

$$\text{Acc. to question} = 1.44x = x \left(1 + \frac{r}{100}\right)^2$$

r = rate of interest of C.I. in B = 20%

Rate of interest of S.I. in A = 10%

$$\text{Interest} = \frac{8000 \times 2 \times 10}{100} + 8000$$

$$\left[\left(1 + \frac{20}{100}\right)^2 - 1 \right] = 5120$$

5. (d): After first year = $17500 \times \frac{120}{100} - 5000$
 = $21000 - 5000 = 16000$
 After 2nd year = $16000 \times \frac{120}{100} - 5000$
 = $19200 - 5000 = 14200$
 After 3rd year = $14200 \times \frac{120}{100} - 5000 = 12040$
 After 4th year = $12040 \times \frac{120}{100} = 14448$

6. (b): ATQ, $5805 = X \left[\left(1 + \frac{15}{100} \right)^2 - 1 \right]$
 $129X = 5805 \times 400$
 $X = 18000$ Rs.
 Now
 Total Interest = $(18000 + 7000)$
 $\times \left[\left(1 + \frac{(15+5)}{100} \right)^2 - 1 \right]$
 = $25000 \times \left(\frac{11}{25} \right) = 11000$ Rs.

7. (b): Let principal for younger child is Rs x and for elder child be Rs y
 ATQ,
 $x + \frac{x \times 5 \times 6}{100} = y + \frac{y \times 5 \times 4}{100}$
 $\frac{130x}{100} = \frac{120y}{100}$
 $\frac{x}{y} = \frac{12}{13}$
 25 unit = 18750
 \therefore Share of younger child = $\frac{18750}{25} \times 12 = \text{Rs } 9000$

8. (d): Principle = $\frac{X \times 18 \times 2}{100} = 6750$
 $\Rightarrow X = \frac{6750 \times 100}{18 \times 2}$
 $X = 18750$ Rs.
 According to question —
 1st year CI = $(18750 + 2250) \times \frac{1}{7} = 3000$
 2 year CI = $(21000 + 3000) \times \frac{1}{6}$
 = $24000 \times \frac{1}{6} = 4000$
 Total CI after 2 year = $3000 + 4000 = 7000$ Rs.

9. (e): ATQ,
 $32400 = 22500 \left(1 + \frac{R}{100} \right)^2$
 $\frac{324}{225} = \left(\frac{100+R}{100} \right)^2$
 $\frac{18}{15} = \frac{100+R}{100}$
 $15R = 300$
 $R = 20\%$
 Simple interest = $(32400 + 2600) \times \frac{20 \times 3}{100}$
 = 21000 Rs

10. (d): Let, Total amount Veer have = 'x'
 ATQ,
 $0.32x \left[\frac{11}{10} \times \frac{11}{10} - 1 \right] + 0.20x \left[\frac{12}{10} \times \frac{12}{10} - 1 \right] +$
 $.48x \left[\frac{14}{10} \times \frac{14}{10} - 1 \right] = 6600$

$$0.32x \left[\frac{21}{100} \right] + 0.20x \left[\frac{44}{100} \right] + 0.48x \left[\frac{96}{100} \right] = 6600$$

$$\frac{6.72x}{100} + \frac{8.8x}{100} + \frac{46.08x}{100} = 6600$$

$$\Rightarrow x = \frac{6600 \times 100}{61.6}$$

Required difference
 = $\frac{6600 \times 100}{61.6} \times [0.48 - 0.20] = 3,000$

11. (b): CI rate for 2 year
 = $10 + 10 + \frac{10 \times 10}{100} = 21\%$
 Total amount after 2 year
 = $75000 \times \frac{121}{100} = 90750$
 ATQ, Principle for third year
 = $90750 - 30750 = 60000$
 Satish paid total amount after next 2 year
 = $60000 \times \frac{121}{100} = 72600$ Rs

12. (b): 1st year amount = $21000 \times \frac{8}{7} = 24000$ Rs.
 2nd year amount = $24000 \times \frac{9}{8} = 27000$ Rs.
 3rd year amount = $27000 \times \frac{10}{9} = 30000$ Rs.
 Interest = $30000 - 21000 = 9000$ Rs.

13. (e): Rate = $\frac{4800 \times 100}{16000 \times 2}$
 $R = 15\%$
 New rate = $15 + 5 = 20\%$
 2 year CI on 20% = $20 + 20 + \frac{20 \times 20}{100} = 44\%$
 Interest gets Satish = $(16000 + 4800) \times \frac{44}{100}$
 = 9152 Rs.

14. (d): ATQ,
 $\frac{(X+4000)45}{100} + \frac{44X}{100} = 9632$
 $0.45X + 1800 + 0.44x = 9632$
 $0.89X = 9632 - 1800$
 $X = \frac{7832}{0.89}$
 $X = 8800$
 Veer principle = $8800 + 4000 = 12800$ Rs.

15. (b): ATQ
 $\frac{15 \times 2x}{100} + (x + 2500) \left[\left(1 + \frac{20}{100} \right)^2 - 1 \right] = 32550$
 $0.3x + 0.44x + 1100 = 32550$
 $0.74x = 31450$
 $x = \frac{31450}{0.74}$
 $x = 42500$

16. (a): Here from 2010 on wards we would determine the population of Faridabad. Here, we would be creating 2 tables, one for population growth rate and another for decrease due to migration. On comparing both the tables, if the migration rate would become greater than

population growth rate, then there would be a fall in population.

Year	Growth rate (A.P. where a = 5%, d = 5%)	Migration rate (G.P. where a = 1%, r = 2%)
2011	5%	1%
2012	10%	2%
2013	15%	4%
2014	20%	8%
2015	25%	16%
2016	30%	32%

From 2016 on wards, Migration rate > Growth rate

- 17. (b):** Let the amount invested by Monica in first scheme be Rs. x and in another be Rs. $(10500 - x)$
 Rate of interest = 10% p.a.
 According to CI
 The amount in 1st scheme after 2 years = Rs. $1.21x$
 The amount in 2nd scheme after 3 years = Rs. $1.331(10500 - x)$
 Now since, she got same amount from both scheme. Hence,
 $\Rightarrow 1.21x = 1.331(10500 - x)$
 $\Rightarrow 1.21x + 1.331x = 10500 \times 1.331$
 $\Rightarrow 2.541x = 13975.5$
 $x = \frac{13975.5}{2.541} = 5500$
 \Rightarrow Hence, her amount in 3 years scheme is $\Rightarrow (10500 - 5500) = \text{Rs. } 5000$

- 18. (a):** Let the first part be x . Then the second part be $(38800 - x)$

$$\text{Now, } \frac{x \times 0.72 \times \frac{1}{2}}{(38800 - x) \times 0.05 \times 2} = \frac{5}{4}$$

$$1.44x = 19400 - 0.5x \Rightarrow x = 10000$$

$$\text{The second part} = 38800 - 10000 = \text{Rs. } 28800$$

- 19. (a):** The SI obtained after 12 years would be:

$$\Rightarrow \frac{9000 \times 8 \times 2}{100} + \frac{9000 \times 9.5 \times 4}{100} +$$

$$\frac{9000 \times 11 \times 2}{100} + \frac{9000 \times 12 \times 4}{100}$$

$$\Rightarrow 90 [16 + 38 + 22 + 48] = \text{Rs. } 11160$$

$$\Rightarrow \text{Final amount} = P + \text{SI}$$

$$= \text{Rs. } (9000 + 11160) = \text{Rs. } 20160$$

- 20. (c):** Here, SI for 3 years = Rs. 240

$$\text{SI for 1 year} = \text{Rs. } \frac{240}{3}$$

$$\text{SI for 2 years} = \text{Rs. } \frac{240}{3} \times 2 = \text{Rs. } 160$$

$$\Rightarrow 160 = \frac{P \times R \times 2}{100} \Rightarrow PR = 8000$$

$$\text{Hence, } (164 - 160) = P \left(\frac{R}{100} \right)^2$$

$$\Rightarrow 4 = P \left[\frac{8000}{P \times 100} \right]^2 \Rightarrow 4 = \frac{P \times 8000 \times 8000}{P^2 \times (10000)}$$

$$\Rightarrow P = \text{Rs. } 1600$$

Previous Year Question

- 1. (a):** Interest earned from scheme A = $\frac{1500 \times R \times 4}{100} = 60R$
 Interest earned from scheme B
 $= \frac{(1500 - x) \times 2R \times 4}{100} = \frac{2R(1500 - x)}{25}$
 $A/q, 60R = \frac{3}{4} \times \frac{2R(1500 - x)}{25}$
 $1500 - x = 1000$
 $x = 500$
- 2. (d):** First year total Interest = $12000 \times \frac{20}{100} = 2400 \text{ Rs.}$
 For second year total amount = $(12000 + 2400 + X)$
 $(12000 + 2400 + X) \times \frac{120}{100} = 20400$
 $X = 2600 \text{ Rs.}$
- 3. (b):** Given, $X = 1.25Y$
 ATQ -
 $\frac{1.25Y \times 2 \times 20}{100} - \frac{Y \times 2 \times 20}{100} = 480$

$$Y = 4800$$

$$X = 1.25 \times 4800$$

$$X = 6000 \text{ Rs.}$$

$$\text{Required sum} = 4800 + 6000 = 10800 \text{ Rs.}$$

- 4. (a):** let rate of interest be $R\%$

$$\text{ATQ, } 1200 = \frac{6000 \times R \times 2}{100}$$

$$R = 10\%$$

Since compounding is done half-yearly, rate of interest = 5%

$$\text{Effective rate of interest} = 5 + 5 + \frac{5 \times 5}{100} = 10.25\%$$

$$\text{Required interest} = \frac{6000 \times 10.25 \times 1}{100} = \text{Rs } 615$$

- 5. (b):** Let sum invested by man = $100x$

$$\text{And amount he got} = 100x \times \frac{160}{100} = 160x$$

Let rate of interest be 'r' % p.a.

ATQ -

$$100x \times r \times \frac{8}{100} = 160x - 100x$$

$$r = 7.5$$

$$\text{Required interest} = 9600 \times 7.5 \times \frac{4}{100} = 2880 \text{ Rs.}$$

6. (e); Let amount invested by man = $10x$ Rs.
 Equivalent CI for two years at the rate of 20% p.a. = $20 + 20 + \frac{20 \times 20}{100} = 44\%$
 Equivalent CI for two years at the rate of 20% p.a. = $10 + 10 + \frac{10 \times 10}{100} = 21\%$
 ATQ
 $10x \times \frac{2}{5} \times \frac{44}{100} + 10x \times \frac{3}{5} \times \frac{21}{100} = 1208$
 $\frac{176x}{100} + \frac{126x}{100} = 1208$
 $x = 400$ Rs.
 Required amount = 4000 Rs.

7. (e); Let sum invested by man = Rs. X
 And, rate of interest = $r\%$
 ATQ- $\frac{X \times r \times T}{X \times r \times (T+4)} = \frac{1}{2}$
 $\frac{T}{T+4} = \frac{1}{2} \Rightarrow T = 4$

8. (a); Total SI = $P \times 12 \times \frac{3}{100} = \frac{36P}{100}$ Rs.
 Effective rate of interest for CI at 15% p.a. compounding annually for 2 years
 = $15 + 15 + \frac{(15 \times 15)}{100} = 32.25\%$
 Total CI = $P \times \frac{32.25}{100} = \frac{32.25P}{100}$ Rs.
 ATQ, $\frac{36P}{100} - \frac{32.25P}{100} = 375$
 $P = 10000$ Rs.

9. (e); Let the sum be Rs $100x$
 CI in first year = Rs $20x$
 CI in two years = 44% of $100x = 44x$
 CI in 2nd year = $44x - 20x = 24x$
 ATQ
 $24x - 20x = 1200$
 $x = 300$
 Required sum = Rs 30,000

10. (c); 2nd year CI
 = $\left(50000 \left(1 + \frac{12}{100}\right)^2 - 50000\right) - \left(50000 \times \frac{12}{100}\right)$
 = $12720 - 6000 = \text{Rs. } 6720$
 Now, 2nd year SI = $6720 - 2220 = \text{Rs. } 4500$
 Now, $R = \frac{4500}{75000} \times 100 = 6\%$

11. (a); ATQ,
 $\frac{P \times 12 \times 3}{100} = 3456$
 $P = \text{Rs. } 9600$
 Required amount
 = $\left((9600 + 4400) \left(1 + \frac{15}{100}\right)^2 - (9600 + 4400)\right)$
 = $18515 - 14000$
 = Rs. 4515

12. (e); ATQ,
 $\frac{X \times 15 \times 4}{100} + \frac{1.35X \times 18 \times 3}{100} = 15948$
 $0.60X + 0.729X = 15948$
 $X = 12000$
 Required value = 3.12×12000
 = Rs. 37440

13. (b); let sum be Rs P
 ATQ, $P \left(\frac{20}{100}\right)^2 = 420$
 $P = \text{Rs } 10500$
 Required simple interest = $\frac{10500 \times 25 \times 3}{100} = \text{Rs } 7875$

14. (a); By going with the options
 Interest received at SI = $\frac{6000 \times 3 \times 15}{100} = 2700$ Rs
 $\therefore T + 5 = 20\%$
 Interest received after 2 yrs at CI = $\frac{6000 \times 44}{100} = 2640$
 \therefore Difference = $2700 - 2640 = 60$ Rs
 $T = 15\%$

15. (c); ATQ, $\frac{1102.50}{1000} = \left(1 + \frac{r}{100}\right)^2$
 or, $\left(1 + \frac{r}{100}\right)^2 = \left(\frac{105}{100}\right)^2$
 or, $\left(1 + \frac{r}{100}\right)^2 = \left(1 + \frac{5}{100}\right)^2$
 Thus, on comparing, $r = 5\%$

16. (b); Let saving of A, B & C be Rs. X , Rs. Y & Rs. Z respectively
 ATQ -
 Equivalent CI of two years at the rate of 20% =
 $20 + 20 + \frac{20 \times 20}{100} = 44\%$
 $\frac{44}{100} (X + Y + Z) = 1694$
 $X + Y + Z = 1694 \times \frac{100}{44}$
 $X + Y + Z = 3850$ ----- (i)
 And, when A & C invested double of their respective saving -
 $\frac{20}{100} \times (2X + 2Z) = 1100$
 $X + Z = 2750$ ----- (ii)
 Saving of B = $3850 - 2750 = 1100$ Rs.
 Required difference = $2750 - 1100 = 1650$ Rs.

17. (a); ATQ -
 $2304 = 1600 \left(1 + \frac{R}{100}\right)^2$
 $\frac{48}{40} = \left(1 + \frac{R}{100}\right)$
 $R = 20\%$
 New rate = $(20 - 8) = 12\%$
 Required interest = $\frac{1600 \times 12 \times 2}{100} = 384$ Rs.

18. (e); Here,
 $\frac{72}{r} = 2r$
 $r = 6\%$ p. a.
 Time in which invested sum becomes double of itself = 12 years
 ATQ
 $6,00,000 = 3,00,000 \left[1 + \frac{r}{100}\right]^{12}$
 $\left[1 + \frac{r}{100}\right]^{12} = 2 \dots \dots \dots (i)$
 Required amount = $3,00,000 \left[1 + \frac{r}{100}\right]^{48}$
 $= 3,00,000 \times (2)^4 = 48 \text{ lac}$

19. (c);

A	B
12000	16000
$\times 10$	$\times 9$
120	: 144
5	: 6

\therefore B's share = $22000 \times \frac{6}{11} = 12000$

20. (e); Let the rate of interest = R%
 $\Rightarrow SI = \frac{P \times R \times T}{100}$
 $1875 = \frac{2500 \times R \times 6}{100}$ or $R = 12.5\%$
 Required SI on Rs. 6875
 $= \frac{6875 \times 12.5 \times 6}{100} = \text{Rs. } 5156.25$

21. (b); Let the sum lent by Manish to Sunil be Rs. x
 SI received when Manish borrowed from Anil earlier = $\frac{1150 \times 6 \times 3}{100} = \text{Rs. } 207$
 Now Manish added some money to borrowed sum and gave it to Sunil. Hence, he gains Rs. 274.95
 According to question:
 $\Rightarrow \frac{x \times 9 \times 3}{100} = \text{Rs. } [207 + 274.95]$
 On solving, it $x = \text{Rs. } 1785$

22. (b); Let the money given to Mohit be Rs. x
 $[SI (\text{Suhit} \rightarrow \text{Mohit})] - [SI (\text{Vikas} \rightarrow \text{Suhit})] = \text{Rs. } 618$
 $\Rightarrow \frac{x \times 16 \times 3}{100} - \frac{6300 \times 14 \times 3}{100} = 618 \Rightarrow x = \text{Rs. } 6800$

23. (d); At 1st case,
 Let SI be x
 $\Rightarrow x = \frac{P \times R \times 4}{100} \dots (i)$
 $1.5x = \frac{P \times R \times 6}{100} \dots (ii)$
 From (i) and (ii), we can not determine the rate of interest. Hence, information given is incomplete.

24. (e); According to question:

$$8190 = \frac{P \times 6 \times 1}{100} + \frac{P \times 7.5 \times 1}{100} + \frac{P \times 9 \times 1}{100}$$

1st year 2nd year 3rd year

$$8190 = \frac{6P}{100} + \frac{7.5P}{100} + \frac{9P}{100} \Rightarrow P = \text{Rs. } 36400$$

25. (c); Let the required time = t years
 Simple interest = Rs. (11442 - 9535) = Rs. 1907
 $SI = \frac{PRT}{100} \Rightarrow 1907 = \frac{9535 \times 4 \times t}{100}$
 $\therefore t = \frac{1907 \times 100}{9535 \times 4} = 5 \text{ years}$

26. (d); Simple interest (I) = $\frac{\text{Principal} \times \text{Time} \times \text{Rate}}{100}$
 I for 1st case = $\frac{200000 \times 12 \times 1}{100} = \text{Rs. } 24000$
 I for 2nd case = $\frac{200500 \times 13 \times 1}{100} = \text{Rs. } 26065$
 He would receive (26065 - 24000) = Rs. 2065 more as interest

27. (d); Let his deposit = Rs. 100
 Interest for first 2 years = Rs. 6
 Interest for next 3 years = Rs. 24
 Interest for the last years = Rs. 10
 Total interest = Rs. 40
 When interest is Rs. 40, deposited amount is Rs. 100
 When interest is Rs. 1520, deposited amount = $\frac{100}{40} \times 1520 = \text{Rs. } 3800$

28. (b); After t years, let P = Rs. 4x and Amount = Rs. 5x.
 $P + SI \text{ for } t \text{ years} = \text{Rs. } 5x \dots (i)$
 $P : [P + SI \text{ for } (t + 3) \text{ years}] = 5 : 7$
 $= 1 : \frac{7}{5} = 4x : \left(\frac{7}{5} \times 4x\right) = 4x : \frac{28x}{5}$
 $P + SI \text{ for } (t + 3) \text{ years} \dots (ii)$
 On subtracting (i) from (ii), we get:
 $SI \text{ for } 3 \text{ years} = \text{Rs. } \left(\frac{28x}{5} - 5x\right) = \frac{3x}{5}$
 $SI \text{ on Rs. } 4x \text{ for } 3 \text{ years} = \frac{3x}{5}$
 $\Rightarrow \text{Rate} = \left(\frac{100 \times \frac{3x}{5}}{4x \times 3}\right) \% \text{ p.a.} = 5\% \text{ p.a.}$

29. (b); Initially the SI was Rs. 7128

$$\Rightarrow SI = \frac{P \times R \times T}{100} \Rightarrow 7128 = \frac{19800 \times R \times 3}{100}$$

$$\Rightarrow R = 12\%$$

$$\begin{aligned} \Rightarrow CI &= P \left[\left(1 + \frac{R}{100} \right)^T - 1 \right] \\ &= 19800 \left[\left(1 + \frac{12}{100} \right)^3 - 1 \right] \text{ (Time = 3 years)} \end{aligned}$$

$$\begin{aligned} &= 19800 [(1.12)^3 - 1] = 19800 [1.4049 - 1] \\ &= \text{Rs. } 8017.5744 \end{aligned}$$

30. (d); Here, CI = Rs. 1272, t = 2 years, r = 12%

By the Formula

$$\Rightarrow CI = P \left[\left(1 + \frac{r}{100} \right)^t - 1 \right]$$

$$\Rightarrow 1272 = P \left[\left(1 + \frac{12}{100} \right)^2 - 1 \right]$$

$$\Rightarrow 1272 = P \left[\left(\frac{112}{100} \right)^2 - 1 \right]$$

$$\Rightarrow 1272 = P \times 0.2544 \Rightarrow P = \text{Rs. } 5000$$

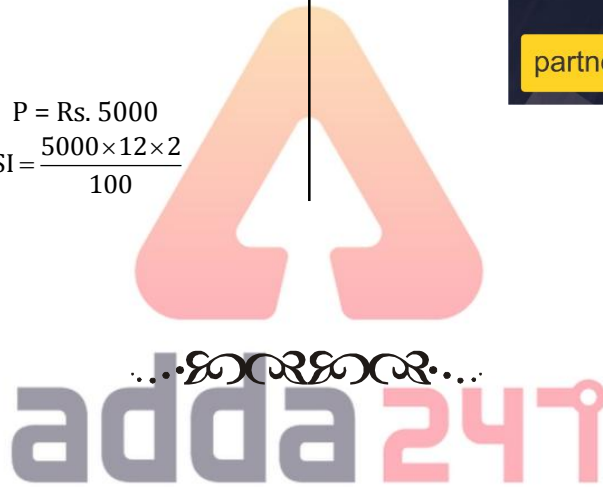
$$\Rightarrow \text{Now, } SI = \frac{P \times r \times t}{100} \Rightarrow SI = \frac{5000 \times 12 \times 2}{100}$$

$$\therefore SI = \text{Rs. } 1200$$

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Average and Ages

Average

Average: Average is defined as the sum of different data (terms) divided by total number of terms

$$\text{Average} = \frac{\text{Sum of given terms}(S)}{\text{Total number of terms}(N)}$$

Example: Find the average of given terms 2, 3, 4, 5, 6

Sol. Total number of terms = 5

$$\text{Average} = \frac{2+3+4+5+6}{5} = 4$$

Some Basic Formulae

1. Average of 'n' natural number = $\frac{(n+1)}{2}$
2. Average of 'n' even numbers = $(n + 1)$
3. Average of 'n' odd numbers = n
4. Average of 'n' consecutive natural numbers = $\frac{\text{First number} + \text{Last number}}{2}$
5. Average of sum of squares of first 'n' natural numbers = $\frac{(n+1)(2n+1)}{6}$

Some Important Points:

1. If the value of each number is increased by the same value 'a', then the average of all numbers will also increase by 'a'.
2. If the value of each number is decreased by the same value 'a', then the average of all numbers will also decrease by 'a'.
3. If the value of each number is multiplied by the same value 'a', then the average of all numbers will also get multiplied by 'a'.
4. If the value of each numbers is divided by the same value 'a', then the average of all numbers will also get divided by 'a'.

Some useful Formulae

1. If the average of 'x' numbers is a and that of 'y' numbers is b, then the average of (x + y) numbers = $\frac{xa + yb}{x + y}$

Example: The average of 10 numbers is 15 and that of 15 numbers is 20. Find the average of all 25 numbers?

Sol. Average = $\frac{10 \times 15 + 15 \times 20}{10 + 15} = \frac{150 + 300}{25} = \frac{450}{25} = 18$

2. If the average of 'n' quantities is equal to 'x' when a quantity is removed the average becomes 'y'. Then the value of the removed quantity is = $[n(x - y) + y]$

Example: The average age of 24 men and 1 woman is equal to 35 years. If 1 woman left, the average becomes 34 years. Find the age of woman who left the class?

Sol: Age of women = $[25(35 - 34) + 34] = 59$ years

3. If the average of marks obtained by 'n' students in an exam is 'M'. If the average marks of passed students in 'P' and that of failed students is 'F'. Then the number of students who failed in exam is $\frac{n(P - M)}{P - F}$.

$$\text{No. of failed students} = \frac{\text{Total students}(\text{Passed average} - \text{Total average})}{\text{Passed average} - \text{Failed average}}$$

Example: The average marks obtained by 125 students in an exam is 29. If the average marks of passed students is 36 and that of failed students is 11. Find the numbers of failed students?

Sol. No of failed students = $\frac{125(36-29)}{36-11} = \frac{125 \times 7}{25} = 35$

4. If a batsman in his n th innings makes a score of 's' and thereby increased his average by 't' then the average after 'n' innings is 's - t(n - 1)']

Example: A batsman in his 44th innings makes a score of 86 and thereby increases his average by 1. Find the average after 44 innings?

Sol. Average after 44th innings = $(86 - 1(44 - 1)) = 86 - 43 = 43$

AGES

Age is defined as the period of time that a person has lived. Age can be measured in month, year, day etc.

Problem based on ages generally consists of information of ages of two or more persons and a relation between their ages in present /future/past.

Important terms

Hence/Later - It shows the age of person in future

Thence/Ago - It shows the age of person in past

Important Properties

1. If the present average age of a family or a group of persons is 'x' years then 'n' years ago the average age of a family or group of persons was (x-n) years.
2. If the present average age of a family or a group of persons is 'x' years then 'n' years later the average age of a family or a group of persons will be (x+n) years.
3. Difference between ages of two person remains same at any point of time.

Example

4 yrs ago A is four yrs younger than B. 6 yrs hence ratio of ages of A to B will be 16 : 17. Find the sum of ages of both 4 yrs ago.

Sol. Let age of A and B 6 yrs hence be $16x$ & $17x$ respectively.
 Difference of age of A & B remains same at any time
 So,
 $17x - 16x = 4$
 $x = 4$
 Sum of ages of both, 4 yrs ago = $(16 + 17) \times 4 - 10 \times 2 = 132 - 20$
 $= 112$ yrs

4. When a child is born in the family then average age of the family is calculated by including the newly born child in the number of members of the family.

Example

Average age of a family of three members 4 years ago is 20 years. A child was born in the family during this period. If average age of the family three years hence is 21.5 years then find the present age of the child.

Sol. Sum of age of all members including child 3 years hence = $21.5 \times 4 = 86$ yr.
 Sum of age of all members excluding child 3 years hence = $(20 + 4 + 3) \times 3 = 81$ yr
 Present age of child = $86 - 81 - 3 = 2$ yrs

Solved Example

1. A batsman scores 34, 36, 38, 40, 42, in his five innings respectively. Find the average runs in the five innings?

Sol. Average runs = $\frac{34+36+38+40+42}{5} = \frac{190}{5} = 38$.

2. The average of 10 quantities is 12. The average of 6 of them is 8. What is the average of remaining four numbers.

Sol. The required average = $\frac{10 \times 12 - 6 \times 8}{10 - 6} = 18$.

3. Average of marks obtained by 120 candidates in a certain examination is 35. If the average marks of passed candidates is 39 and that of the failed candidates is 15, what is number of candidates who passed the examination?

Sol. Let the number of passed candidates be x.
Then, total marks = $120 \times 35 = 39x + (120 - x) \times 15$
or, $4200 = 39x + 1800 - 15x$
or, $24x = 2400$
 $\therefore x = 100$
 \therefore number of passed candidates = 100.

4. The average salary of the entire staff in a office is Rs. 120 per month. The average salary of officers is Rs. 460 and that of non-officers is Rs 110. If the number of officers is 15, then find the number of non-officers in the office.

Sol. Let the required number of non-officers = x
Then, $110x + 460 \times 15 = 120 (15 + x)$
or, $120x - 110x = 460 \times 15 - 120 \times 15 = 1 (460 - 120)$
or, $10x = 15 \times 340$; $\therefore x = 15 \times 34 = 510$
No. of non-officers = No. of officers \times
 $\left(\frac{\text{Av. salary of officers} - \text{Mean average}}{\text{Mean average} - \text{Av. Salary of non-officers}} \right)$
 $= 15 \left(\frac{460 - 120}{120 - 110} \right) = 510$.

5. The average of the first and the second of three numbers is 10 more than the average of the second and the third of these numbers. What is the difference between the first and third of these three numbers?

Sol. Average of the first and the second numbers
 $= \frac{\text{First} + \text{Second}}{2}$
Average of the second and the third numbers
 $= \frac{\text{Second} + \text{Third}}{2}$
According to the question,
 $\frac{\text{First} + \text{second}}{2} - \frac{\text{Second} + \text{Third}}{2} = 10$
 \therefore First - Third = 20

6. The average height of 50 students of a class is 152 cm. If 10 among them whose average height is 148 cm left the class and 10 new boys of average height 150 cm are included in the class, then what will be the new average height of the students of the class?

Sol. The total height of 50 students = $152 \times 50 = 7600\text{cm}$
Total decrease in the height when 10 students left the class
 $= 148 \times 10 = 1480\text{ cm}$
Total increase in the height after 10 new students came
 $= 10 \times 150 = 1500\text{ cm}$
Now, Total height of 50 students = $7600 - 1480 + 1500 = 7620\text{cm}$
New average = $\frac{7620}{50} = 152.4\text{ cm}$

7. The sum of the present ages of Hari and Mohan is double the difference of their present ages. Four years ago this ratio was one and half times. Find the ratio of their ages after 12 years.

Sol. Let the present ages of Hari and Mohan be respectively x years and y years then
 $x + y = 2(x - y)$, $x = 3y$... (i)
From the question, $(x - 4 + y - 4) = \frac{3}{2} \{(x - 4) - (y - 4)\}$
or, $2x + 2y - 16 = 3x - 3y$
or, $5y - x = 16$... (ii)
Solving eqn (i) and (ii),
 $x = 24$ and $y = 8$
Hari's age after 12 years = $24 + 12 = 36$ years
Mohan's age after 12 years = $8 + 12 = 20$ years
The ratio of their ages = $36 : 20 = 9 : 5$

8. The present age of Geeta is 5 year more than the present age of his brother Mahesh. The present age of their father is twice the sum of their ages. At the time of Mahesh's birth their father's age was 8 times of the age of Geeta. Find their present ages.

Sol. Let the present age of Mahesh is x years then the present age of Geeta will be $x + 5$ and the present age of their father will be $2(x + x + 5) = 4x + 10$ years.
The age of Geeta at the time of Mahesh's birth will be $x + 5 - x = 5$ years while the age of the father will be $4x + 10 - x = 3x + 10$ years
From the question,
 $3x + 10 = 5 \times 8$
or, $3x = 40 - 10 = 30$ or, $x = 10$ years
and $x + 5 = 15$ and $4x + 10 = 50$ years
So, the ages of Mahesh, Geeta and their father are 10, 15 and 50 years respectively.

Basic Questions

1. The mean of 19 observations is 4. If one more observation of 24 is added to the data, the new mean will be:
(a) 4 (b) 5 (c) 6
(d) 7 (e) None of these
2. A student bought 4 books for Rs. 120 from one book shop and 6 books for Rs. 150 from another. The average price (in rupees), he paid per book was :
(a) 27 (b) 27.50 (c) 135
(d) 138 (e) None of these
3. The average weight of a group of 20 boys was calculated to be 89.4 kg and it was later discovered that one weight was misread as 78 kg instead of the correct one of 87 kg. The correct average weight is :
(a) 88.95 kg (b) 89.25 kg (c) 89.55 kg
(d) 89.85 kg (e) None of these
4. A class has 20 boys and 30 girls. The average age of boys is 11 years and that of girls is 12 years. What is the average age of the whole class
(a) 11.6 years (b) 12 years (c) 10 years
(d) 11.2 years (e) None of these
5. What will be the average of even numbers between 11 to 63?
(a) 37.5 (b) 47 (c) 42
(d) 37 (e) None of these
6. The average age of 30 girls is 13 yr. The average of first 18 girls is 15 yr. Find out the average age of remaining 12 girls?
(a) 12 yr (b) 10 yr (c) 16 yr
(d) 10.5 yr (e) None of these
7. The average of nine numbers is 50. The average of the first five numbers is 54 and that of the last three numbers is 52. Then, the sixth number is?
(a) 34 (b) 24 (c) 44
(d) 30 (e) None of these
8. A cricketer scored some runs in his continuous 9 innings. He scored 100 runs in his 10th innings and this increased his average by 8 runs. What was the average of his runs at the end of 10th innings?
(a) 20 (b) 24 (c) 28
(d) 32 (e) None of the above
9. 10 kg of rice priced at Rs. 12 per kg is mixed with 6 kg of rice priced at Rs. 16 per kg. Find the average price of the whole mixture?
(a) Rs. 14 per kg (b) Rs. 14.50 per kg
(c) Rs. 13 per kg (d) Rs. 13.50 per kg
(e) None of these
10. The average temperature from Monday to Thursday is 48°C and from Tuesday to Friday, the average temperature is 52°C. If the temperature on Monday is 42°C, what was it on Friday?
(a) 46°C (b) 58°C (c) 50°C
(d) 45°C (e) None of these
11. The average of 6 numbers is 8. What is the 7th number so that average becomes 10?
(a) 22 (b) 18 (c) 21
(d) 20 (e) None of these
12. The average expenditure of a man for the first five months is Rs. 120 and for the next seven months is Rs. 130. His monthly average income if he saves Rs. 290 in that year, is
(a) Rs. 160 (b) Rs. 170 (c) Rs. 150
(d) Rs. 140 (e) None of these
13. The average salary of 20 workers in an office is Rs. 1900 per month. If the manager's salary is added, the average becomes Rs. 2000 per month. The manager's annual salary (in Rs) is:
(a) Rs. 24000 (b) Rs. 25200 (c) Rs. 45600
(d) Rs. 48000 (e) None of these
14. A club has 15 men and 25 women. The average age of men is 10 years and the average age of women is 12 year. What is the average age of the whole club?
(a) 11.40 years (b) 11.60 years (c) 11.25 years
(d) 12.25 years (e) None of these
15. The average of 12 results is 15, and the average of the first two is 14. What is the average of the rest?
(a) 15.2 (b) 13.2 (c) 15
(d) 16 (e) None of these

Prelims Questions

Level - 1

- Of three numbers, second is thrice the first while third is six times the second. If their average is 66. A new number 4 more than the average of other 3 is included then Find average of first and fourth number.
(a) 38.5 (b) 38 (c) 39
(d) 39.5 (e) 40
- Rohit scores 84 in Maths while 79 in Science. Karan scores 85 in Maths. If average score of Karan is 6 more than average score of Rohit in both the subjects. Find the marks scored by Karan in Science.
(a) 90 (b) 85 (c) 87.5
(d) 81.5 (e) 85.5
- Average of sum of four consecutive even numbers is 10 more than the average of sum of three consecutive odd numbers. If largest even number is twice the smallest odd number. Find average of all seven numbers.
(a) $22\frac{5}{7}$ (b) $20\frac{5}{7}$ (c) $18\frac{2}{7}$
(d) $24\frac{3}{7}$ (e) $23\frac{5}{7}$
- B is twice as old as A. Average of present age of A and B is 24 years and average of present age of B and C is 38 years. Find present age of C is what percent less than present age of A and B together?
(a) $4\frac{2}{9}\%$ (b) $11\frac{6}{11}\%$ (c) $5\frac{1}{5}\%$
(d) $13\frac{2}{7}\%$ (e) $8\frac{1}{3}\%$
- A cricketer had a certain average of runs in 80 innings. In his 81st inning, he is bowled out for no score, due to which his average falls by 1 run. Then, find his new average of runs?
(a) 50 (b) 60 (c) 70
(d) 80 (e) 90
- Average of four numbers is 45.5. Third number is 250% more than the second number and fourth number is 41 less than third number. If first number is 15, then find the sum of second and fourth number.
(a) 76 (b) 81 (c) 60
(d) 67 (e) 71
- 3 years ago, ratio of age of A and B is 3:1. If the present age of B is $37\frac{1}{2}\%$ of the present age of A then what is the difference between their present ages (in years)?
(a) 25 (b) 30 (c) 35
(d) 40 (e) 45
- If average of a 10 term A.P is 112.5% more than its first term then second term of A.P is what % of the sum of the series?
(a) $2\frac{5}{17}\%$ (b) $4\frac{10}{17}\%$ (c) $5\frac{15}{17}\%$
(d) $3\frac{16}{17}\%$ (e) $5\frac{7}{17}\%$
- The average of 'x' numbers is 24. If $\frac{1}{4}$ of the numbers are increased by 6 each and remaining are decreased by 4 each then what is the new average?
(a) 21.5
(b) 22.5
(c) can't be determined
(d) 23
(e) none of these
- The average weight of ten students of class is 40 kg. If the lightest and heaviest student are not taken into account then average weight of remaining students is 41 kg. If the weight of heaviest student is 50 kg, find the weight of lightest student. (in Kg)
(a) 21 (b) 22 (c) 23
(d) 24 (e) 25
- Three years ago, average age of 'Amit', 'Bittu' and 'Chitu' is 27 years. Four years hence, ratio of Amit and Chitu's age is 7 : 10. If Bittu is 6 years younger than Chitu, then find present age of 'Amit'?
(a) 24 years (b) 27 years (c) 30 years
(d) 28 years (e) 36 years
- The age of Ayush is 25% less than that of Veer. The age of Veer is 24 years more than the average age of his two sons whose total age is 40 years. Then find the difference of age of Ayush and Veer ?
(a) 14 years (b) 6 years (c) 12 years
(d) 8 years (e) 11 years
- Shivam's age is $\frac{4}{5}$ th of Avinash's age while age of Avinash after 5 years will be equal to twice the present age of Pradeep. If the sum of ages of all three is 37 years. Find the present age (in years) of Shivam.
(a) 15 (b) 10 (c) 12
(d) 17 (e) 20
- Four years ago, age of Veer is six years more than half of the age of Neeraj at that time. If eight years hence average age of Veer & Neeraj will be 42 years, then find ratio between present age of Veer to Neeraj?
(a) 5 : 12 (b) 7 : 12 (c) 7 : 10
(d) 7 : 9 (e) 3 : 4

15. S_1 is the series of five consecutive numbers and average of first three terms is 9. T_1 is series of four consecutive even number and second lowest term of T_1 is six more than largest term of S_1 . Find the average of T_1 series?
 (a) 19 (b) 17 (c) 15
 (d) 21 (e) 23
16. Average of present age of P & R is 33 years. Q is 18 years older than R and Q is 6 years younger than S. If present age of P is $33\frac{1}{3}\%$ less than present age of S, then find average of present age of Q, R & S.
 (a) 44 years (b) 42 years (c) 45 years
 (d) 41 years (e) 43 years
17. B's age is 6 years more than A. If the ratio of B's age 9 years hence to C's present age is 9 : 8 & the present age of C is twice of A's present age then what will be the age of B after 5 years.
 (a) 18 years (b) 25 years (c) 23 years
 (d) 24 years (e) 48 years
18. Ratio between age of priya and Swati is 3 : 4. If shikha is 6 year younger than swati and average age of all three is 31 years, then find Shikha's age?
 (a) 36 yrs (b) 32 yrs (c) 20 yrs
 (d) 24 yrs (e) 30 yrs
19. Four year ago average age of P, Q and R is 33 years. At present, age of R is three year less than Q and P is three year older than Q. then find the age of P one year hence?
 (a) 36 years (b) 38 years (c) 40 years
 (d) 41 years (e) 36 years
20. Ratio of age of A and B, 6 years ago was 3: 4. Sum of the present age of B and C is 80 years. C is 12 years elder to A. Find the difference of B and C's age five years later?
 (a) 3 years (b) 7 years (c) 6 years
 (d) 5 years (e) 4 years
21. Ratio of present age of A and B is 3:2 and four years later age of B will be $56\frac{1}{4}\%$ of age of C. If the average of the present age of A and C is 54 year then find the present age of B.
 (a) 29 year (b) 27 year (c) 25 year
 (d) 32 years (e) 36 year
22. Average of present age of A, B and C is 31 years and C is one year older than A. If ratio between present age of B and C is 19 : 14 then find age of B ?
 (a) 35 years (b) 38 years (c) 34 years
 (d) 32 years (e) 42 years
23. Sum of age of Ayush & Anurag is 24 years more than sum of age of Anurag, Veer & Shivam. Average age of Veer & Shivam is 59 years. Find average age of Ayush & Shivam, if Shivam is 24 years older than Veer.
 (a) 106.5 years (b) 102.5 years (c) 108.5 years
 (d) 110.5 years (e) 116.5 years
24. Rahul's present age is $\frac{4}{7}$ th of his father's present age and four times his sons age three years ago. If the average of the present age of all three is 33 years then, what is the difference between the Rahul's son's present age and Rahul's father's present age?
 (a) 43 (b) 45 (c) 40
 (d) 32 (e) 41
25. 5 years ago, age of A is 3 times of the age of B at that time. Ratio of age of B, 5 year hence, and age of C, 5 year ago, is 3 : 5. If difference between age of C and A is 10 years(C is younger than A), then find the age of B.
 (a) 20 years (b) 15 years (c) 18 years
 (d) 10 years (e) 25 years
26. Suman is 25 yrs elder to his son. If 7 yrs hence, the ratio of ages of suman and his son will be 2:1, then how many years back from present suman's son was born?
 (a) 20 yrs (b) 24 yrs (c) 15 yrs
 (d) 18 yrs (e) None of these
27. Average of 8 consecutive odd numbers is 10. What will be the average of smallest 4 numbers out of 8 numbers?
 (a) 7 (b) 8 (c) 6
 (d) 4 (e) 5
28. Mahesh has two sons named Karan and Arjun. The ratio of present age of Mahesh and Karan is 5 : 2 and that of Karan and Arjun is 4 : 3. Also, Karan is 5 years elder than Arjun. Find the ratio of their ages 10 years ago.
 (a) 10 : 4 : 3 (b) 7 : 2 : 1 (c) 8 : 2 : 1
 (d) 8 : 3 : 1 (e) 12 : 6 : 5
29. A person is 16 yrs older than his son. After 2 yrs, the person's age will be double the age of his son. Then find the age of his son 8 yrs hence?
 (a) 24 yrs (b) 20 yrs (c) 22 yrs
 (d) 18 yrs (e) 28 yrs
30. At present, Suresh is six times his son's age. 13 years from now, the ratio of ages of Suresh and his son will be 11:4 respectively. Find Suresh's present age ?
 (a) 36 yrs (b) 48 yrs (c) 30 yrs
 (d) 42 yrs (e) None of these

31. In a 10 overs match, a team has scored runs at rate 7.5 in first 6 overs and 8.5 in next 2 over and scored 42 runs in last 2 over. Find overall run rate of the team in the match.
 (a) 10.40 (b) 10.89 (c) 10.04
 (d) 10.43 (e) 10.23
32. The present age of a son is one-third of that of his father and 4 yrs hence, the ratio of ages of the father and the son is 5:2, then find the father's age 3 yrs ago?
 (a) 36 yrs (b) 33 yrs (c) 39 yrs
 (d) 30 yrs (e) 27 yrs
33. The average expenditure of Nandu & Bandu on rent is Rs. 2000 while that on travel is Rs. 1500. Nandu spends Rs. 800 on food while Bandu spends Rs. 900. What is average of total expenditure of both? (no one spends on any other thing than given)
 (a) 4400 (b) 4350 (c) 4300
 (d) 4750 (e) 4800
34. The sum of Ravi's and Shivam's age 4 years ago was 80 years. Ravi's age 14 years ago was equal to Shivam's age 4 years ago, then find the present age of Ravi? (in years)
 (a) 39 (b) 49 (c) 40
 (d) 47 (e) 55
35. The average age of 25 men are 60 yrs. If another 5 men are added whose average age is 30 yrs, then find the average age of total men?
 (a) 50 yrs (b) 55 yrs (c) 60 yrs
 (d) 45 yrs (e) 52 yrs

Level - 2

1. Present age of C is 9 less than the sum of present age of A & B and 6 years hence, age of B will be twice of age of A. If C is 15 years older than B, then find present age of D (present age of D is 4 less than the average of present age of A, B & C).
 (a) 41 years (b) 45 years (c) 52 years
 (d) 59 years (e) 61 years
2. Average age of Sohan, Mohini and their twin's daughter is 22.5 years and average age of Mohini, and her twin's daughter is $\frac{52}{3}$ years. If average age of Sohan and Mohini is 37 years, then find average age of Sohan and his twin's daughter?
 (a) 24 years (b) 16 years (c) 19 years
 (d) 18 years (e) 21 years
3. Average marks of class XI are 'X' and when average marks of 15 students reduced by 6, then average marks of class reduced by 1.875. If number of students in class XII is 16 more than that of in class XI and total marks of class XII is 5120, then find average marks of class XII?
 (a) 60 (b) 90 (c) 96
 (d) 80 (e) 84
4. Average weight of a family of X members is 18 kg. When three men of this family get married, average weight increases by 1kg and when an old man having weight 18kg more than total weight of wife of these three men died, average weight become 16 kg. Find the value of X?
 (a) 24 (b) 28 (c) 26
 (d) 22 (e) 25
5. Average of four numbers is 64. If 3 is added to first number, multiplied to second, subtracted from the third and divided to last one then all the values are same. Find the difference between 2nd highest and the smallest number?
 (a) 45 (b) 35 (c) 42
 (d) 39 (e) 32
6. Ratio of present age of Rahul to present age of Gopal is 7 : 8 and ratio of Puneet age four years ago to Rahul age four years hence is 2 : 3. If present age of Puneet is 75% of present age of Gopal, then find the average of present ages of Rahul, Gopal and Puneet (in years)?
 (a) 37 (b) 40 (c) 35
 (d) 42 (e) 44
7. Gurdeep chhabra joined 'Adda 247' with the work experience of 26 years due to which average work experience of all employees of 'Adda 247' was increased by one year. If initial average work experience of all employees of 'Adda 247' was five years, then find the new number of employees in 'Adda 247'?
 (a) 23 (b) 19 (c) 25
 (d) 21 (e) 27
8. Amit's present age is 75% of Binny's present age where as present age of Chintu is $\frac{5}{8}$ th of Binny's present age. If difference between difference of Chintu and Binny age and difference of Binny and Amit age is 6 years then find the average of their age two years later?
 (a) 44 years (b) 42 years (c) 36 years
 (d) 40 years (e) 38 years

9. Ratio of age of Ravi to Vicky, 4 years ago was 5: 6, while ratio of present age of Rocky to that of Vicky is 5: 4. If 2 years later sum of age of Ravi and Rocky will be 63 years, then find the difference between present age of Ravi and Vicky?
 (a) 4 years (b) 2 years (c) 8 years
 (d) 6 years (e) 5 years
10. Sum of ages of A and B is 12 years more than twice the age of C and Sum of ages of A & D is twice the age of C. If the average age of B&D is 50 years and average age of all four is also 50 years, then find the difference between the age of A and C?
 (a) 6 years (b) 1 years (c) 3 years
 (d) 4 years (e) 2 years
11. Ram's age is $(3x+2y)$ years and his only son's age is 'x' years while his only daughter's age is 'y' years. Ram's son is 3 years elder than her sister. Find average age of family of Ram, if Ram's wife age who is 5 years younger than her husband is 29 years (in years).
 (a) 14.5 (b) 19.0 (c) 16.5
 (d) 22.5 (e) 20.5
12. My sister was born 26 yrs after my mother was born and I was born 28 yrs after my father was born. The present average age of my family is 32.5 yrs. After 3 yrs from now my sister will get married and will leave the family, then average age of family will become 41 yrs. What is the present age of my mother?(in yrs)
 (a) 40 (b)50 (c) 45
 (d)41 (e)42
13. Average salary of Mark & John is Rs. 25000 while that of John & Shane is Rs. 30000. If the average salary of all 3 is Rs. 27000. Mac's salary is Rs. 4000 more than that of John. If all the 4 members salaries are included, what will be the new average salary? (in Rs.)
 (a) 27500 (b) 31000 (c) 28000
 (d) 28500 (e) 29000
14. Age of Shivam is twice of that of Dharam. Ratio of age of Shivam 6 years hence to age of Dharam 8 years hence is 17 : 11. If age of Deepak 6 years hence will be 4 years more than the age of Shivam 5 years hence, then find the present age of Deepak.
 (a) 35 years (b) 37 years (c) 42 years
 (d) 31 years (e) 38 years
15. Six years ago, average age of 8 family members was 27 years. Present average of 3 eldest members is 65 years and another 3 member's average age is 20 years. Out of remaining two one is 3 years elder. Find age of elder member out of remaining two?
 (a) 6 years (b) 5 years (c) 4 years
 (d) 7 years (e) 8 years
16. Average marks of class XI are 'X' and when average marks of 15 students reduced by 6, then average marks of class reduced by 1.875. If number of students in class XII is 16 more than that of in class XI and total marks of class XII is 5120, then find average marks of class XII?
 (a) 60 (b) 90 (c) 96
 (d) 80 (e) 84
17. Present age of Amit is 50% more than Manish's present age while 5 years ago Amit's age was twice than that of Manish's age at that time. Five years hence, sum of ages of Manish and Amit is equal to Lalit's age at that time, then find present age of Lalit?
 (a) 35 (b) 40 (c) 20
 (d) 25 (e) 30
18. If 6 years are subtracted from the present age of Veer and the remainder is divided by 18, then the present age of his grand-daughter Sneha is obtained. If Sneha is 2 years younger to his brother whose age is 5 years, then what is the ratio of the age of Veer and Sneha after 6 years?
 (a) 20 : 3 (b) 24 : 5 (c) 21 : 4
 (d) 22 : 3 (e) 28 : 3
19. Two years ago Raju's age was 75% of his sister, Rita's age at that time. After two years, Rita's age will be $33\frac{1}{3}\%$ of her father's age. Average age of Rita's father and mother is 31 yrs. If Rita's mother's age is 28 yrs then what is the present age of Raju?
 (a) 10 yrs (b) 6 yrs (c) 8 yrs
 (d)12 yrs (e) 14 yrs
20. Average age of Akshita, Sonakshi and Abhishek is 32 after 4 year. Ratio of present age of Askhita and Abhishek is 3 : 4. If sum of present age of Akshita and sonakshi is 52. Then find the difference between age of Sonakshi and Abhishek.
 (a) 6 (b) 8 (c) 3
 (d) 5 (e) 4

Mains Questions

Directions (1-2): Answer these questions based on the information given below.

There are five members A, B, C, D and E in a family. Ratio of ages of A and B five years ago was 3: 4. Sum of ages of D and E five years hence will be 90. If C were born four years later than his actual date of birth, present Age of C would be half to that of present age E.

1. What is the age of D four years ago, if the current age of C is 27 years?
 - (a) 36 years
 - (b) 34 years
 - (c) 38 years
 - (d) 30 years
 - (e) Cannot be determined
2. After 3 years, A will be 20 years old. What is the average of current ages of A, B, D and E together?
 - (a) 29 years
 - (b) 29.5 years
 - (c) 30 years
 - (d) 30.5 years
 - (e) Cannot be determined
3. $2n$ years ago, the age of Raju was four times that of his son and n years ago, the age of Raju was thrice that of his son. If n years later, the sum of the ages of Raju and his son will be 80 years, then the difference in the ages of Raju and his son is
 - (a) 20 years
 - (b) 40 years
 - (c) 24 years
 - (d) 30 years
 - (e) 34 years
4. The sum of the ages of father and son is 50 years. Eight years ago, the product of their ages was two time the father's age at that time, then the present ages (in years) of the father and son respectively are
 - (a) 39,6
 - (b) 35,10
 - (c) 36,9
 - (d) 40,10
 - (e) None of these
5. Sweta and Neha profess to tell their present ages as 25 and 20 years respectively. (Not original age). Ratio of their original ages 5 year ago is 5: 4. Sum of ages of both 5 years hence is $\frac{400}{9}$ % more than the sum of present ages of both professed by them. Find the sum of their present original age
 - (a) 25
 - (b) 35
 - (c) 55
 - (d) 40
 - (e) 50
6. Ratio of present age of P and Q is 3: 4. Sum of the present age of S and P is 41. R is 5 years younger than Q. Average of present age of Q, R and S is 22 years. Find the difference of S and R's age
 - (a) 3
 - (b) 2
 - (c) 1
 - (d) 5
 - (e) 4
7. Satish's age is 4 times the present age of his son's age. After 4 year the age of satish become 3 time the age of his son's age. If Satish's wife age is $\frac{7}{8}$ of his age then find out the average of present age of Satish's wife and his son.
 - (a) 18
 - (b) 20
 - (c) 14
 - (d) 16
 - (e) 21
8. In a company there are 252 employees, in which the ratio of the number of men and women is 2 : 1. Some more women are employed and the ratio of men and women becomes 1 : 1. The average age of all the employees is now 22 years and the average age of the women is 2 years less than the average age of the men. Find the average age (in years) of men and women.
 - (a) 22,20
 - (b) 23,21
 - (c) 24,22
 - (d) 21,23
 - (e) none of these
9. In an exam of Chemistry, three students (X, Y and Z) participated and got an average score 80. In another exam i.e. Maths , two students (X and Y) got 20% more marks then in Chemistry exam while Z got 10% less marks relative to Chemistry exam. Average mark in Maths exam is six more than average marks in Chemistry exam. If difference between score of X and Y in Maths exam is 24 then find the average of all the three students in Biology exam if X and Y got 25% more marks in Biology than Maths exam while Z got only 10% more marks than Maths exam ?
 - (a) 101
 - (b) 103
 - (c) 104
 - (d) 105
 - (e) 108
10. The average age (in years) of a group of people is twice the number of people in the group. A person, X, leaves the group and the average age is still twice the number of people in the group. Now another person, Y, leaves the group and the average age is still twice the number of people in the group. If the ratio of the ages of X and Y is 19: 17, then find the average age of the group, if one more person, Z, of age 16 years, leaves the group.
 - (a) 10
 - (b) 15
 - (c) 16
 - (d) 18
 - (e) None of these
11. The average age of a husband and wife, who were married 7 years ago, was 25 years at the time of their marriage, Now, the average age of the family, including husband, wife and a child, born during the interval, is 22 years. What is the present age of the child?
 - (a) 4 yrs.
 - (b) 2 yrs.
 - (c) 3 yrs.
 - (d) 5 yrs.
 - (e) None of these

12. The average age of mother, father and son was 42 yrs. at the time of the marriage of the son. After one year an infant was born in the family and after 6 yrs of marriage the average age of the family is 36 years. What was the age of the bride at the time of marriage.
 (a) 25 yrs. (b) 23 yrs. (c) 22 yrs.
 (d) 24 yrs. (e) None of these
13. 10 years ago the average age of all the 25 teachers of the Girls college was 45 years. 4 years ago, the principal has retired from her post at the age of 60 year. So after one year a new principal whose age was 54 years recruited from outside. The present average age of all the teachers is, if principal is also considered as a teacher:
 (a) $54\frac{18}{25}$ years (b) $55\frac{17}{25}$ years (c) $49\frac{1}{2}$ years
 (d) $49\frac{2}{3}$ years (e) None of these
14. The average price of 80 computers in an electronic shop is Rs. 30,000. If the highest and lowest price computers are sold out then the average price of the remaining 78 computers is Rs. 29,500. The cost of the highest price computer is Rs. 80,000. The cost of lowest price computer is:
 (a) Rs. 19,000 (b) Rs. 20,000 (c) Rs. 29,000
 (d) can't be determined (e) None of these
15. Eleven years earlier the average age of a family of 4 members was 28 years. Now the age of the same family with six members is yet the same, even when 2 children were born in this period. If they belong to the same parents and the age of the first child at the time of the birth of the younger child was same as there were total family members just after the birth of the youngest member of this family, then the present age of the youngest member of the family is :
 (a) 3 years (b) 5 years (c) 6 years
 (d) 4 years (e) None of these
16. Mr. Patel walked 6 km to reach the station from his house, then he boarded a train whose average speed was 60 km/hr and thus he reached his destination. In this way he took total of 3 hours. If the average speed of the entire journey was 32 km/hr then the average speed of walking is :
 (a) 3 km/hr (b) 4.5 km/hr (c) 4 km/hr
 (d) 5 km/hr (e) None of these
17. The average marks of Sameer decreased by 1, when he replaced the subject in which he has scored 40 marks by the other two subjects in which he has just scored 23 and 25 marks respectively. Later he has also included 57 marks of Computer Science, then the average marks increased by 2. How many subjects were there initially?
 (a) 6 (b) 12 (c) 15
 (d) can't be determined (e) None of these
18. The average age of Donald, his wife and their two children is 23 years. His wife is just 4 year younger than Donald himself and his wife was 24 years old when his daughter was born. He was 32 years old when his son was born. The average age of Donald and his daughter is :
 (a) 25 years (b) 22.5 years (c) 26 years
 (d) can't be determined (e) None of these
19. There are 6 consecutive odd numbers in increasing order. The difference between the average of the squares of the first 4 numbers and the last four numbers is 64. If the sum of the squares of the first and the last element (i.e., odd numbers) is 178, then the average of all the six numbers is:
 (a) 7 (b) 8 (c) 9
 (d) 10 (e) None of these
20. The average age of board of directors of a company, having 10 directors was 48 years. Coincidentally when a director aged 53 resigned from the board of directors, another director died on the same day. So a new director joined the board of directors aged 34. Next year in the same month the average age of all the 9 directors was found to be 46 years. The age of the late (i.e., dead) director at the time of his death was :
 (a) 56 years (b) 53 years (c) 57 years
 (d) 61 years (e) None of these

Previous Year Question

1. The ratio of ages of A and B 4 years ago was 5 : 3. The sum of present ages of A, B and C is 80 years. If present age of C is equal to sum of present ages of A and B. find the present age of A.
 (a) 17 years (b) 24 years (c) 20 years
 (d) 22 years (e) 18 years
2. Ratio of age of P 2 years ago to age of R 2 years hence is 1 : 2 and Q's present age is 25% more than P's present age. If average of present age of P & R is 39 years, then find difference between P's age 5 years hence and R's present age.
 (a) 12 years (b) 17 years (c) 21 years
 (d) 15 years (e) 14 years

IBPS PO Prelims 2019

IBPS Clerk Prelims 2019

3. Average weight of a class is 60kg and average weight of boys in the class is 80kg. Ratio of boys to girls in the class is 5 : 4. If there are 72 students in the class, then find the average weight of girls in the class.
 (a) 54 kg (b) 42 kg (c) 35 kg
 (d) 45 kg (e) 38 kg

IBPS Clerk Prelims 2019

4. Present age of Father and mother is in ratio of 12 : 11 and after 12 years, this ratio becomes 15 : 14. Age of father is 22 years more than his son and age of mother is 20 years more than that of her daughter. Find sum of present age of son & daughter.
 (a) 54 yrs (b) 48 yrs (c) 52 yrs
 (d) 46 yrs (e) 50 yrs

IBPS Clerk Mains 2019

5. Ravi and Sneha got married 10 years ago and at that time ratio of their ages was 5:4. Ratio of present age of Ravi and Sneha is 7:6. After marriage they had seven children including a triplet and a twin. The ratio of present age of triplet, twin, sixth and the seventh child is 4:3:2:1. Find the largest possible value of the present total age of the family.
 (a) 121 (b) 107 (c) 101
 (d) 93 (e) None of the above

IBPS Clerk Mains 2019

6. If ratio of ages of P and Q before 4 year ago is 5 : 4 and after 12 years sum of their ages will be 68 years, their what was P's age 2 years ago ?
 (a) 24 years (b) 22 years (c) 18 years
 (d) 26 years (e) 20 years

IBPS RRB PO Prelims 2019

7. Suresh was married 14 yrs ago and his present age is $\frac{3}{2}$ times of the age at the time of his marriage. If his son's age is $\frac{1}{3}$ rd of his present age, then find the age of his son.
 (a) 16 yrs (b) 18 yrs (c) 14 yrs
 (d) 12 yrs (e) 20 yrs

RRB PO Mains 2019

8. A is 6 years younger than B and ratio of present age of B to C is 12:5. If ratio of present age of A to C is 2:1 then find present age of B?
 (a) 20 years (b) 30 years (c) 24 years
 (d) 18 years (e) None of these

RRB Clerk Prelims 2019

9. Amit's present age is 75% of Binny's present age where as present age of Chintu is $\frac{5}{8}$ th of Binny's present age. If difference between difference of Chintu and Binny age and difference of Binny and Amit age is 6 years then find the average of their age two years later?
 (a) 44 years (b) 42 years (c) 36 years
 (d) 40 years (e) 38 years

RRB Clerk Mains 2019

10. My sister was born 26 yrs after my mother was born and I was born 28 yrs after my father was born. The present average age of my family is 32.5 yrs. After 3 yrs from now my sister will get married and will leave the family, then average age of family will become 41 yrs. What is the present age of my mother?(in yrs)
 (a) 40 (b) 50 (c) 45
 (d) 41 (e) 42

RBI Grade B Phase I 2019

11. Six years ago, the ratio of age of Kunal to Sagar was 6 : 5 and four years hence ratio of age of Kunal to Sagar will be 11 : 10. Find the present age of Sagar?
 (a) 15 years (b) 16 years (c) 14 years
 (d) 10 years (e) 12 years

SBI PO Prelims 2020

12. The ratio of the ages of Ram and Rahim 10 years ago was 1 : 3. The ratio of their ages five years hence will be 2 : 3. Then, the ratio of their present ages is :
 (a) 1 : 2 (b) 3 : 5 (c) 3 : 4
 (d) 2 : 5 (e) None of these

SBI Clerk Prelims 2020

13. Four years ago, ratio of age of A and B was 3 : 4. Average of present age of A, B and C is 26 years. C is 11 years younger than B. what is the present age of B?
 (a) 25 years (b) 21 years (c) 22 years
 (d) 32 years (e) 26 years

IBPS PO Prelims 2020

14. The ratio of the present age of A to B is 8: 5 and the average of the present age of B and C is 35 years. If five years ago, the sum of ages of A and B is 55 years, then find the difference between the present age of A and C.
 (a) 12 years (b) 5 years (c) 9 years
 (d) 8 years (e) 4 years

IBPS Clerk Prelims 2020

15. Ratio of ages of A and B, 4 years later is 8:9 respectively. If average of present ages of A & B is 47 years, then find difference in present ages of A & B.
 (a) 5 years (b) 6 years (c) 3 years
 (d) 2 years (e) 4 years

IBPS RRB PO Prelims 2020

16. The average weight of a class of 45 girls is 53 kg. It was later found that weight of two girls was read as 49 kg and 57 kg instead of 45 kg and 52 kg. Find the actual average weight of the class.
 (a) 54 kg (b) 53.40 kg (c) 50.6 kg
 (d) 52.80 kg (e) 51.5 kg

IBPS RRB PO Prelims 2020

17. If the difference between the present age of P and Q is three years and the ratio between the age of P and Q after two years will be 5 : 4, then find the age of P after two years (in years)?
 (a) 15 (b) 13
 (c) 18 (d) 16 (e) 14

RRB Clerk Prelims 2020

18. Average of 10 numbers is 35. If average of first 5 numbers is 40 and average of last 3 numbers is 22, then what is the average of remaining two numbers?
 (a) 36 (b) 32 (c) 40
 (d) 42 (e) 44

RBI Assistant Prelims 2020

19. Ratio of present age of A to B is 4 : 3. If C is 4 years younger to B and difference between present age of A and B is 4 years, then what is C's age 10 years hence?
 (a) 12 years (b) 22 years (c) 18 years
 (d) 20 years (e) 24 years

RBI Assistant Prelims 2020

20. Four years hence, sum of ages of A and B will be 16 years more than the sum of present age of B and C. Four years ago, sum of age of A and C is 32 years then find the present age of C?
 (a) 24 years (b) 20 years (c) 12 years
 (d) 16 years (e) 18 years

SBI PO Prelims 2019

21. 4 years ago, ratio of Shivam's age to Deepak's age was 2: 3 and ratio of Shivam's age 4 years ago to Deepak's age 5 years hence is 8: 15. Find present age of Shivam.
 (a) 32 years (b) 28 years (c) 40 years
 (d) 24 years (e) 36 years

SBI Clerk Prelims 2019

22. Ratio of present age of A to that of B is 2 : 5, ratio of present age of B to that of C is 25 : 18 and ratio of present age of C to that of D is 12 : 13. If D is 11 years younger than B, then find present age of A.
 (a) 24 years (b) 20 years (c) 28 years
 (d) 30 years (e) 18 years

SBI Clerk Mains 2019

23. The average of 6 numbers is 20. If one number is removed, the average becomes 15. What is the number removed?
 (a) 5 (b) 35 (c) 112
 (d) 45 (e) None of these

24. After replacing an old member by a new member, it was found that the average age of five members of a club is the same as it was 3 yr ago. The difference between the ages of the replaced and the new member is
 (a) 2 yr (b) 4 yr (c) 8 yr
 (d) 15 yr (e) None of these

25. The average of 5 consecutive integers starting with m is n. What is the average of 6 consecutive integers starting with (m + 2)?
 (a) $\frac{2n+5}{2}$ (b) (n + 2) (c) (n + 3)
 (d) $\frac{n+5}{2}$ (e) None of these

26. The mean of 100 items was 46. Later on, it was discovered that an item 16 was misread as 61 and another item 43 was misread as 34. It was also found that the number of items was 90 and not 100. Then, what is the correct mean?
 (a) 50 (b) 50.7 (c) 52
 (d) 52.7 (e) None of these

27. The average pocket-money of 3 friends A, B, C is Rs. 80 in a particular month. If B spends double and C spends triple of what A spends during that month and if the average of their unspent pocket-money is Rs. 60, then A spends (in Rs.)
 (a) 10 (b) 20 (c) 30
 (d) 40 (e) None of these

28. The batting average of a cricket player for 64 innings is 62 runs. His highest score exceeds his lowest score by 180 runs. Excluding these two innings, the average of remaining innings becomes 60 runs. His highest score was
 (a) 180 runs (b) 209 runs (c) 212 runs
 (d) 214 runs (e) None of these

29. The average weight of a group of 20 boys was calculated to be 89.4 kg and it was later discovered that one weight was misread as 78 kg instead of 87 kg. The correct average weight is
 (a) 88.95 kg (b) 89.25 kg (c) 89.55 kg
 (d) 89.85 kg (e) None of these

30. The average of a collection of 20 measurements was calculated to be 56 cm. But later, it was found that a mistake had occurred in one of the measurements which was recorded as 64 cm, but should have been 61 cm. The correct average must be?
 (a) 53 cm (b) 54.5 cm (c) 55.85 cm
 (d) 56.15 cm (e) None of these

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Solutions

Basic Questions

1. **(b):** New mean = $\left(\frac{19 \times 4 + 24}{20}\right) = \frac{100}{20} = 5$
2. **(a):** Cost of 10 books = Rs (120 + 150) = Rs 270
Average cost = Rs. $\left(\frac{270}{10}\right) = \text{Rs. } 27$
3. **(d):** Total weight of 20 boys = $89.4 \times 20 = 1788$ kg
Increase in weight due to misreading = $87 - 78 = 9$ kg
Correct weight of 20 boys = $1788 + 9 = 1797$ kg
Correct average weight = $\frac{1797}{20} = 89.85$ kg
- Shortcut:**
Increase in weight = 9 kg.
New average = $89.4 + \frac{9}{20} = 89.85$ kg
4. **(a):** Sum of the Age of 20 boys = $20 \times 11 = 220$ years
Sum of the Age of 30 girls = $30 \times 12 = 360$ years
Total age of 20 boys and 30 girls = $220 + 360 = 580$ years.
Average age of the whole class = $\frac{580}{50} = 11.6$ years
5. **(d):** Total even no = $\frac{63-11}{2} = \frac{52}{2} = 26$
Sum of the even number between is 11 to 63
 $= \frac{26}{2} [2 \times 12 + (26 - 1) \times 2] = 13 [24 + 50]$
 $= 13 \times 74 = 962$
Average of even numbers between 11 to 63
 $= \frac{962}{26} = 37$
6. **(b):** Total age of 30 girls = $30 \times 13 = 390$ years
Total age of 18 girls = $18 \times 15 = 270$ years
 \therefore Average age of remaining 12 girls = $\frac{390 - 270}{12}$
 $= \frac{120}{12} = 10$ years.
7. **(b):** The sum of 9 numbers = $9 \times 50 = 450$
Sixth number = sum of 9 numbers - (Sum of first 5 numbers + sum of last 3 numbers)
 $= 450 - (54 \times 5 + 52 \times 3) = 450 - (270 + 156)$
 $= 450 - 426 = 24$
8. **(c):** Let average of 9 innings = x, Total run = 9x
According to the question
 $\frac{9x + 100}{10} = x + 8$
 $9x + 100 = 10x + 80 \Rightarrow x = 20$
Average after 10 innings = $20 + 8 = 28$

Shortcut:

Average at the end of 10th innings
 $= (100 - 9 \times 8) = 28$ runs.

9. **(d):** Total price of 10 kg Rice = $12 \times 10 = 120$
Total price of 6 kg Rice = $16 \times 6 = 96$
 \therefore Average = $\frac{120 + 96}{16} = \frac{216}{16} = 13.50$ kg
10. **(b):** Total temp of mon + tues + wed + thus
 $= 4 \times 48^\circ\text{C} = 192^\circ\text{C}$
Temp on mon = 42°C
temp on Tue + Wed + Thus = $192^\circ - 42^\circ = 150^\circ\text{C}$
Total temp for tue + wed + thus + Fri
 $= 52^\circ \times 4 = 208^\circ\text{C}$
Tem on Friday = $208^\circ - 150^\circ = 58^\circ\text{C}$
11. **(a):** Let the 7th number be x.
According to the question
 $6 \times 8 + x = 7 \times 10 \Rightarrow x = 70 - 48 = 22$
12. **(c):** Total expenditure for first 5 months = $120 \times 5 = 600$ Rs.
Total expenditure for next 7 months = $130 \times 7 = 910$ Rs.
Total income = Total expenditure of the whole year + saving
 $= 600 + 910 + 290 = 1800$ Rs
Monthly average income = $\frac{1800}{12} = 150$ Rs.
13. **(d):** Total monthly salary of 20 workers in an office
 $= 1900 \times 20 = \text{Rs. } 38000$
Total monthly salary of 20 workers and manager
 $= 2000 \times 21 = \text{Rs. } 42000$
Manager monthly salary = $42000 - 38000 = \text{Rs. } 4000$
Manager annual salary = $12 \times 4000 = \text{Rs. } 48000$
14. **(c):** Total age of men = $15 \times 10 = 150$
Total age of women = $25 \times 12 = 300$
Average age of the whole club = $\frac{150 + 300}{40}$
 $= \frac{450}{40} = 11.25$ years.
15. **(a):** Let the average of rest results = x
According to the question
 $14 \times 2 + x \times 10 = 15 \times 12 \Rightarrow 10x = 180 - 28$
 $x = \therefore x = 15.2$
Hence average of the rest is 15.2

Prelims Solutions

Level - 1

1. **(d):** let numbers be a, b, c, d
 ATQ, $b = 3a$; $c = 6b$
 $a : b : c = 1 : 3 : 18$ or $x : 3x : 18x$
 $\frac{a+b+c}{3} = 66$
 $x = 9$
 $d = 4 + 66 = 70$
 Required average = $\frac{a+d}{2} = \frac{9+70}{2} = 39.5$
2. **(a):** average score of Rohit = $\frac{84+79}{2} = 81.5$
 Let score by Karan in Science be x .
 ATQ, $\frac{x+85}{2} = 6 + 81.5 = 87.5$
 $x = 175 - 85 = 90$
3. **(a):** let smallest even & odd number be a & b respectively.
 ATQ, $\frac{a+a+2+a+4+a+6}{4} = \frac{b+b+2+b+4}{3} + 10$
 $\frac{4a+12}{4} = \frac{3b+6}{3} + 10$
 $a = b + 9$
 Also, $a + 6 = 2(b) \Rightarrow a = 2b - 6$
 $2b - 6 = b + 9 \Rightarrow b = 15$
 $a = 24$
 Numbers are 24, 26, 28, 30 (even); 15, 17, 19 (odd)
 Required average = $\frac{[(24+26+28+30)+(15+17+19)]}{7} = \frac{159}{7} = 22\frac{5}{7}$
4. **(e):** Let present age of A be ' x ' years.
 So, present age of B = $2x$ years
 And let present age of C be ' y ' years.
 ATQ,
 $\frac{x+2x}{2} = 24$
 $3x = 48$
 $x = 16$ years
 Hence, Present age of B = $2x$
 = 32 years
 Now,
 $\frac{32+y}{2} = 38$
 $y = 44$ years.
 So, required % = $\frac{(32 + 16) - 44}{(32 + 16)} \times 100$
 = $\frac{4}{48} \times 100$
 = $8\frac{1}{3}\%$
5. **(d):** Let his average after 80 innings be ' x '
 Atq,
 $80 \times x + 0 = 81 \times (x - 1)$
 $80x = 81x - 81$
 $x = 81$
 So, his new average = $81 - 1 = 80$
6. **(a):** Let second, third and fourth number be 'B', 'C' & 'D' respectively.
 ATQ,
 $\frac{15+B+C+D}{4} = 45.5$
 $B + C + D = 182 - 15$
 $B + C + D = 167$... (i)
 Now,
 $C = \frac{350}{100} \times B$
 $C = 3.5 B$... (ii)
 Again,
 $D = C - 41$... (iii)
 Using (ii) & (iii), we get:
 $D = 3.5B - 41$... (iv)
 On solving (i), (ii) & (iv), we get :
 $B = 26$
 $C = 91$
 $D = 50$
 So, required sum = $26 + 50 = 76$
7. **(b):** Let the present age of A be $8x$ years
 Then present age of B = $3x$ years
 ATQ
 $\frac{8x-3}{3x-3} = \frac{3}{1}$
 $x = 6$
 Required difference = $8 \times 6 - 3 \times 6 = 30$ years
8. **(c):** Let first term = a
 Common difference = d
 Sum of 10 terms = $\frac{10}{2} [2a + (10-1)d]$
 Average of sum = $\frac{1}{2} [2a + (10-1)d]$
 Now,
 $a + \frac{112.5a}{100} = \frac{1}{2} [2a + (10-1)d]$
 Solving we get, $a = 4d$
 Sum of A.P = 85d
 Second term = 5d
 Required % = $\frac{5d}{85d} \times 100 = \frac{100}{17} \% = 5\frac{15}{17} \%$

9. (b): New average

$$= \frac{24 \times x + \frac{1}{4} \times x \times 6 - \frac{3}{4} \times x \times 4}{x}$$

$$= \frac{24x + 1.5x}{x} - 3$$

$$\Rightarrow 22.5$$

10. (b): ATQ,

Total weight = (40 × 10) kg = 400 kg
 When weight of heaviest and lightest student not taken into account then total weight = (41 × 8) = 328 kg
 So, weight of heaviest student + weight of lightest student = (400 - 328) = 72 kg
 ⇒ 50 + weight of lightest student = 72
 weight of lightest student = 22 Kg

11. (a): Three year ago, sum of age of Amit, Bittu and Chitu together = 27 × 3 = 81 years

Four years hence, sum of ages of Amit, Bittu and Chitu together = 81 + 7 × 3 = 102 years

Let Four years hence

Amit's age be 7x ⇒ Chitu's age be 10x and Bittu's age be 10x - 6

ATQ,

$$7x + 10x - 6 + 10x = 102$$

$$\Rightarrow 27x = 108 \Rightarrow x = 4$$

Four years hence, Amit's age = 7 × 4 = 28 years

Present age of Amit = 28 - 4 = 24 years

12. (e): Let age of Veer = 4x years

So, age of Ayush will be = 3x years

$$\text{Age of Veer (4x)} = \frac{40}{2} + 24 = 44 \text{ years}$$

$$x = 11$$

Age of Ayush = 3 × 11 = 33 years.

Required difference = 44 - 33 = 11 years.

13. (c): Let ages of Shivam, Avinash, Pradeep be S, A, P years respectively.

$$A + 5 = 2P$$

$$\frac{S}{A} = \frac{4}{5}$$

$$S + A + P = 37$$

$$4x + 5x + \frac{5x+5}{2} = 37$$

$$x = 3$$

present age of Shivam = 4x = 4 × 3 = 12 years

14. (c): Let four years ago age of Neeraj = 2a

So, age of Veer = a + 6

ATQ -

$$(2a + 12) + (a + 18) = 84$$

$$3a = 54$$

$$a = 18 \text{ years}$$

Age of Veer = (18 + 10) = 28 years

Age of Neeraj = 2 × 18 + 4 = 40 years

Required ratio = 28 : 40 = 7 : 10

15. (a): Let S_1 series be x, x+1, x+2, x+3 and x+4

ATQ -

$$3x + 3 = 27$$

$$x = 8$$

Second lowest term of $T_1 = 12 + 6 = 18$

T_1 series - 22, 20, 18, 16

$$\text{Required average} = \frac{22+20+18+16}{4} = 19$$

16. (a): Let present age of R be x years.

So, present age of Q = (x + 18) years

And, present age of S = (x + 18 + 6)

= (x + 24) years

And, present age of P = $\left[(x + 24) \times \frac{200}{300}\right]$ years

$$= \left(\frac{2x}{3} + 16\right) \text{ years}$$

ATQ,

$$\left(\frac{2x}{3} + 16\right) + x = 33 \times 2$$

$$\Rightarrow \frac{2x+3x}{3} = 66 - 16$$

$$\Rightarrow \frac{5x}{3} = 50$$

$$\Rightarrow x = 30 \text{ years}$$

$$\text{Required average} = \frac{(x+18)+x+(x+24)}{3}$$

$$= \frac{3x+42}{3}$$

$$= x + 14$$

$$= 44 \text{ years}$$

17. (c): B - A = 6(i)

{ Let A's age is → A
 Let B's age is → B
 Let C's age is → C

$$\frac{B+9}{C} = \frac{9}{8}$$

$$9C - 8B = 72 \quad \dots\text{(ii)}$$

$$C = 2A \quad \dots\text{(iii)}$$

(ii) & (iii)

$$\Rightarrow 18A - 8B = 72$$

$$\Rightarrow 18(B - 6) - 8B = 72 \quad [\because A = B - 6 \dots\text{(i)}]$$

$$10B = 180$$

$$B = 18 \text{ year}$$

After 5 years B's age = 23 years

18. (e): Let age of priya and Swati be 3x and 4x respectively.

Age of Shikha = (4x - 6) years

Atq,

$$\frac{3x+4x+4x-6}{3} = 31$$

$$11x = 31 \times 3 + 6$$

$$x = \frac{99}{11} = 9$$

Age of shikha = (4 × 9 - 6) = 30 years

19. (d): Let present age of Q be x

Present Age of P = x + 3

Present Age of R = x - 3

ATQ—

$$\frac{(x+3+x+x-3)-4 \times 3}{3} = 33$$

$$3x - 12 = 99$$

$$3x = 111$$

$$x = 37 \text{ years}$$

$$\text{Age of P after 1 year} = 37 + 3 + 1 = 41 \text{ years}$$

20. (e): Let age of A and B is 3x and 4x years respectively

ATQ,

C's age = (80 - (4x + 6)) years

And, (74 - 4x) - (3x + 6) = 12

$$x = 8$$

Required difference = 4 years

21. (d): Let the present age of A and B be 3x years and 2x years respectively

$$\text{Present age of C} = (2x + 4) \times \frac{16}{9} - 4 = \left(\frac{32x}{9} + \frac{28}{9}\right) \text{ years}$$

ATQ

$$3x + \left(\frac{32x}{9} + \frac{28}{9}\right) = 108$$

$$x = 16$$

Present age of B = 32 years

22. (b): Let present age of A, B & C be A years, B years & C years respectively.

$$\frac{A+B+C}{3} = 31$$

$$A + B + C = 93 \dots (i)$$

$$A = C - 1 \dots (ii)$$

$$B = \frac{19C}{14} \dots (iii)$$

From (i), (ii) and (iii)—

$$C - 1 + \frac{19C}{14} + C = 93$$

$$47C = (93 \times 14 + 14)$$

$$C = \frac{1316}{47}$$

$$C = 28$$

$$\text{Age of B} = \frac{19 \times 28}{14}$$

$$= 38 \text{ years}$$

23. (a): Veer + Shivam = 118 years

$$\text{Veer} + \text{Veer} + 24 = 118$$

$$\text{Veer} = 47 \text{ years}$$

$$\text{Shivam} = 71 \text{ years}$$

Also,

$$(\text{Ayush} + \text{Anurag}) - (\text{Anurag} + \text{Veer} + \text{Shivam}) = 24$$

$$\text{Ayush} = 142 \text{ years}$$

$$\text{So, Ayush} + \text{Shivam} = 142 + 71 = 213$$

$$\text{Required average age} = \frac{213}{2} = 106.5 \text{ Years}$$

24. (b): 8

Let age of Rahul's father = 7x

$$\text{So, Age of Rahul} = 7x \times \frac{4}{7} = 4x$$

$$\text{Age of Rahul' son 3 year ago} = 4x \times \frac{1}{4} = x$$

Present age of Rahul's son = x + 3

$$\Rightarrow \frac{7x+4x+x+3}{3} = 33$$

$$\Rightarrow 12x = 99 - 3 = 96$$

$$x = 8$$

$$\text{Required difference} = (7 \times 8) - (8 + 3) = 45$$

25. (e): Let present age of B be x years

5 years ago, Age of B = x - 5

5 years ago, age of A = 3(x - 5)

B's age 5 year hence = x + 5

So,

$$\text{C's age 5 year ago} = \frac{(x+5)}{3} \times 5$$

$$= \frac{5x+25}{3}$$

ATQ

$$\Rightarrow 3(x - 5) - \frac{5x+25}{3} = 10$$

$$= 9x - 45 - 5x - 25 = 30$$

$$4x = 100$$

$$x = 25$$

26. (d): Let present age of suman's son be x yr

Hence, age of suman = (x + 25) yr

According to the question, $\frac{x+7}{(x+25)+7} = \frac{1}{2}$

$$2x + 14 = x + 32$$

$$x = 32 - 14 = 18 \text{ yrs}$$

27. (c): let the smallest odd number be 'a' so next odd number be 'a+2' and so on

8th number = a + (8 - 1) × 2 = a + 14 (using AP,

nth term = a + (n-1)d)

$$\text{ATQ, } \frac{a+a+2+\dots+a+14}{8} = 10$$

$$8a + 56 = 80 \text{ (using sum of AP)}$$

$$a = \frac{80-56}{8} = 3$$

Since 'a' is smallest number, so smallest 4 numbers will be = 3, 5, 7, 9

$$\text{Required average} = \frac{3+5+7+9}{4} = 6$$

28. (c): Let present ages of Karan and Arjun be 4x & 3x years respectively

$$4x = 3x + 5$$

$$x = 5$$

Present age of Karan = 4x = 20 years

Present age of Arjun = 3x = 15 years

Present age of Mahesh = $\frac{20}{2} \times 5 = 50 \text{ years}$

$$\text{Required ratio} = (50 - 10) : (20 - 10) : (15 - 10) = 40 : 10 : 5 = 8 : 2 : 1$$

29. (c): Let son's present age = x years
 Then, person's present age = $(x+16)$ year
 After 2 yrs, $(x+16)+2=2(x+2)$
 $x+18=2x+4$
 $x=14$ years
 Hence, son's age after 8 years = $14+8=22$ yrs

30. (d): Let present age of Suresh's son be x yrs
 Present age of Suresh = $6x$
 $\frac{6x+13}{x+13} = \frac{11}{4}$
 $24x+52=11x+143$
 $13x=91$
 $x=7$
 Present age of suresh = $6x=42$ yrs

31. (a): required average = $\frac{7.5 \times 6 + 8.5 \times 2 + 42}{10} = 10.40$ run/over

32. (b): Let father present age be $3x$
 So, the son's present age will be x yrs
 $\frac{3x+4}{x+4} = \frac{5}{2}$
 $6x+8=5x+20$

$x=12$
 Father's age 3 yrs ago = $3x-3$
 $=36-3$
 $=33$ yrs

33. (b): required average = $\frac{2000 \times 2 + 1500 \times 2 + 800 + 900}{2} =$
 Rs. 4350

34. (b): Let present age of ravi and shivam be m years and n years respectively
 4 years ago, $m-4+n-4=80$
 $m+n=88$(1)
 Also, $m-14=n-4$
 $m-n=10$(2)
 Solving eqn (1) & (2), we get $m=49$ years and $n=39$ years
 Present age of ravi = 49 years

35. (b): Total age of 25 men = $60 \times 25 = 1500$
 Total age of another 5 men = $30 \times 5 = 150$
 Average age of total 30 men = $\frac{1500+150}{30} = \frac{1650}{30} = 55$ yrs

Level - 2

1. (b): Let present age of A be x years and present age of B be y years.
 So, present age of C = $(y+15)$ years
 ATQ,
 $(y+15) = (x+y) - 9$
 $x=24$ years
 Now,
 $2(x+6) = y+6$
 $60 = y+6$
 $y=54$ years
 Hence, present age of C = $y+15=69$ years
 So, present age of D = $\frac{24+54+69}{3} - 4 = 49 - 4 = 45$ years

2. (d): Total age of Sohan, Mohini and their twin's daughter = $22.5 \times 4 = 90$ years
 Total age of Mohini and her twin's daughter = $\frac{52}{3} \times 3 = 52$ years
 Age of Sohan = $90 - 52 = 38$ years
 Total age of Sohan and Mohini = $37 \times 2 = 74$ years
 Age of twin's daughter = $90 - 74 = 16$ years
 Average age of Sohan and his twin's daughter = $\frac{38+16}{3} = 18$ years

3. (d): Let total number of students in class XI be 'N'
 Total marks of class XI = NX
 Total marks of class after reduction in marks of 15 students = $(NX - 15 \times 6) = (NX - 90)$
 ATQ -
 $(NX - 90) = (X - 1.875)N$
 $1.875N = 90$
 $N = 48$
 Total students in class XII = $48 + 16 = 64$
 Required average = $\frac{5120}{64} = 80$

4. (e): ATQ,
 Total weight of all the members of the family = 18X kg
 When three men got married
 Total weight = $19(X+3)$ kg
 Weight of wives of all three = $(X+57)$ kg
 Weight of old man who died = $(X+75)$ kg
 ATQ,
 $19(X+3) - (X+75) = (X+3-1) \times 16$
 $X=25$

5. (b): Let four numbers are a, b, c, d
 ATQ,
 $a+b+c+d=256$ (i)
 And,
 $a+3=3b=c-3=\frac{d}{3}$ (ii)

By solving (i) & (ii)

$$a = 45, b = 16, c = 51, d = 144$$

$$\text{Required difference} = 51 - 16 = 35$$

6. (c): Let present age of Rahul, Gopal and Puneet be 'r', 'g' & 'p' respectively

ATQ -

$$r = \frac{7g}{8} \text{ ----- (i)}$$

$$\text{And, } \frac{(p-4)}{(r+4)} = \frac{2}{3}$$

$$3p - 12 = 2r + 8$$

$$3p - 2r = 20 \text{ ----- (ii)}$$

$$\text{And given, } p = \frac{3g}{4} \text{ ----- (iii)}$$

From (i), (ii) and (iii) we get -

$$3 \times \frac{3g}{4} - 2 \times \frac{7g}{8} = 20$$

$$9g - 7g = 80$$

$$g = 40 \text{ years}$$

$$p = 30 \text{ years}$$

$$\text{And } r = 7 \times \frac{40}{8} = 35 \text{ years}$$

$$\text{Required average} = \frac{40+30+35}{3} = 35 \text{ years}$$

7. (d): Let number of employees in 'Adda 247' initially = n

ATQ -

$$\frac{(5n+26)}{(n+1)} = (5 + 1)$$

$$5n + 26 = 6n + 6$$

$$n = 20$$

$$\text{New number of employees in 'Adda 247' } = 20 + 1 = 21$$

8. (d): Let present age of Chintu be 5x years

Then present age of Binny = 8x years

And present age of Amit = 6x years

ATQ

$$8x - 5x - (8x - 6x) = 6$$

$$x = 6$$

$$\text{Required average} = 40 \text{ years}$$

9. (a): Let age of Ravi and Vicky, 4 years ago was 5x years and 6x years respectively

2 years later, age of Ravi = (5x+6) years

Age of Rocky, 2 years later = $\left(\frac{6x+4}{4} \times 5\right) + 2 \text{ years}$

ATQ

$$(5x+6) + \left(\frac{6x+4}{4} \times 5\right) + 2 = 63$$

$$x = 4$$

$$\text{required difference} = 4 \text{ years}$$

10. (d): Let age of A, B, C & D be a, b, c & d years respectively

ATQ -

$$a + b = 2c + 12 \text{ ----- (i)}$$

$$a + d = 2c \text{ ----- (ii)}$$

$$\text{Given, } \frac{b+d}{2} = 50$$

$$b + d = 100 \text{ ----- (iii)}$$

$$\text{And, } \frac{a+b+c+d}{4} = 50$$

$$a + b + c + d = 200 \text{ ----- (iv)}$$

From (i) & (ii) -

$$b - d = 12 \text{ ----- (v)}$$

From (iii) & (v) -

$$2b = 112$$

$$b = 56 \text{ years}$$

$$d = 44 \text{ years}$$

From (i) (iii) & (iv) -

$$a + b + c + d = 200$$

$$c = 48 \text{ years}$$

$$a = 200 - (56 + 48 + 44)$$

$$a = 52 \text{ years}$$

$$\text{Required difference between age of A and C} = 52 - 48 = 4 \text{ years.}$$

11. (b): ATQ,

$$\text{Ram's age} = 29 + 5 = 34 \text{ years}$$

$$\Rightarrow 3x + 2y = 34 \text{ ----- (1)}$$

$$\text{Also, } x - y = 3 \text{ ----- (2)}$$

Solving (1) & (2),

$$x = 8, y = 5$$

$$\text{required average age} = \frac{34+29+8+5}{4} = 19 \text{ years}$$

12. (e): Let the current age of father and mother be 'x' yrs and 'y' yrs respectively.

Then son's present age = (x - 28) yrs

Then daughter's present age = (y - 26) yrs

Atq

$$(x + y + x - 28 + y - 26) = 130$$

$$(x + y) = 92 \text{ (i)}$$

Again after 3 yrs

$$(x + 3 + y + 3 + x - 25) = 123$$

$$(2x + y) = 142 \text{ (ii)}$$

On solving the above equation we get y = 42 years.

$$\text{Mother's present age} = 42 \text{ yrs.}$$

13. (d): Total salary of John & Mark = 2 × 25000 = Rs. 50000

$$\text{Total Salary of John & Shane} = 2 \times 30000 = \text{Rs. 60000}$$

$$\text{Total Salary of John, Mark, Shane} = 3 \times 27000 = \text{Rs. 81000}$$

$$\text{So, Salary of John} = (50000 + 60000) - 81000 = \text{Rs. 29000}$$

$$\text{So, Salary of Mac} = 29000 + 4000 = \text{Rs. 33000}$$

$$\text{Total salary (all 4 members)} = 81000 + 33000 = \text{Rs. 114000}$$

$$\text{Required average} = \frac{114000}{4} = \text{Rs. 28500}$$

14. (d): Let present age of Dharam be 'x years.'

So, present age of Shivam = 2x years

$$\text{ATQ, } \frac{2x+6}{x+8} = \frac{17}{11}$$

$$22x + 66 = 17x + 136$$

$$5x = 70$$

$$x = 14 \text{ years}$$

Now, let present age of Deepak be 'y years'.

$$\text{So, } y + 6 = 2x + 5 + 4$$

$$y = 37 - 6$$

$$y = 31 \text{ years}$$

15. (a): Present average age of family = 27 + 6 = 33 years

Let age of elder member out of remaining two members = x years

ATQ

$$x + x - 3 + 3 \times 65 + 3 \times 20 = 33 \times 8$$

$$2x = 264 - 60 - 195 + 3$$

$$2x = 12$$

$$x = 6 \text{ years}$$

16. (d): Let total number of students in class XI be 'N'

Total marks of class XI = NX

Total marks of class after reduction in marks of 15 students = (NX - 15 × 6) = (NX - 90)

ATQ -

$$(NX - 90) = (X - 1.875)N$$

$$1.875N = 90$$

$$N = 48$$

$$\text{Total students in class XII} = 48 + 16 = 64$$

$$\text{Required average} = \frac{5120}{64} = 80$$

17. (e): Let present age of Manish = x

$$\Rightarrow \text{Present age of Amit} = 1.5x$$

$$\text{Manish's age five years ago} = x - 5$$

$$\text{Amit's age five years ago} = 2(x - 5) = 2x - 10$$

$$\text{But amit's age five years ago also equals to } (1.5x - 5)$$

$$\Rightarrow 2x - 10 = 1.5x - 5$$

$$\Rightarrow 0.5x = 5$$

$$\Rightarrow x = 10$$

$$\text{Lalit's age five years hence} = 10 + 5 + 1.5 \times 10 + 5$$

$$= 15 + 15 + 5$$

$$= 35$$

$$\text{Lalit's present age} = 35 - 5 = 30$$

18. (d): Let the present age of veer be x yr.

$$\text{Age of Sneha} = \frac{x-6}{18} \text{ yr.}$$

ATQ,

$$\frac{x-6}{18} + 2 = 5$$

$$\Rightarrow x - 6 = 3 \times 18$$

$$\Rightarrow x = 60 \text{ yrs.}$$

$$\text{Age of veer after 6 years} = 66 \text{ years}$$

$$\text{Age of Sneha after 6 years} = 3 + 6 = 9 \text{ years}$$

$$\text{Required ratio} = 22 : 3$$

19. (c): Rita's father's age = 31 × 2 - 28

$$= 34 \text{ yrs}$$

$$\text{Rita's age after two yr} = \frac{100}{300} \times (36)$$

$$= 12 \text{ yr}$$

$$\therefore \text{Rita's present age} = 10 \text{ yr}$$

$$\therefore \text{Raju's present age} = (10 - 2) \times \frac{75}{100} + 2$$

$$= 8 \text{ yr}$$

20. (e): Let present age of Akshita, Sonakshi and Abhishek is 3x, y & 4x respectively

ATQ,

$$3x + y + 4x = 84$$

$$7x + y = 84 \quad \dots(i)$$

$$3x + y = 52 \quad \dots(ii)$$

Solving (i) & (ii)

$$y = 28$$

$$3x = 24$$

$$4x = 32$$

$$\text{Required difference} = 32 - 28 = 4$$

Mains Solutions

1. (d); (A - 5) : (B - 5) = 3 : 4(i)

D + E + 10 = 90(ii)

C - 4 = $\frac{1}{2}$ E(iii)

Current age of C = 27 years

According to equation (iii),

$$27 - 4 = \frac{1}{2}E$$

$$E = 46 \text{ years}$$

According to equation (ii),

$$D + 46 + 10 = 90$$

$$D = 34 \text{ years}$$

$$\therefore \text{Age of D four years ago was } 30 \text{ years}$$

2. (b); (A - 5) : (B - 5) = 3 : 4(i)

D + E + 10 = 90(ii)

C - 4 = $\frac{1}{2}$ E(iii)

Current age of A = 17 years

According to equation (i),

$$\frac{17-5}{B-5} = \frac{3}{4}$$

$$B = 21 \text{ years}$$

According to equation (ii),

$$D + E = 80 \text{ years}$$

$$\therefore \text{Required Average} = \frac{A+B+D+E}{4}$$

$$= \frac{118}{4} = 29.5 \text{ years}$$

3. **(d);** Let, the present ages of Raju and his son be x and y respectively.
 $2n$ years ago,
 $x - 2n = 4(y - 2n)$
 $x = 4y - 6n$ (i)
 n years ago,
 $x - n = 3(y - n)$
 $\Rightarrow x = 3y - 2n$ (ii)
- Solving (i) and (ii),
 $y = 4n$
 And, $x = 4 \times 4n - 6n = 10n$
 N years later,
 $x + n + y + n = 80$
 $\Rightarrow 4n + n + 10n + n = 80$
 $\Rightarrow 16n = 80 \Rightarrow n = 5$
 Difference in their ages = $10n - 4n$
 $= 50 - 20 = 30$
4. **(d);** F: S=x: (50 - x)
 Eight years ago, $x - 8: 42 - x$
 From question $\rightarrow (x - 8)(42 - x) = 2(x - 8)$
 $x = 40$, So father's age = 40, son = 10
5. **(c);** Let age of Sweta 5 years ago = $5x$
 Let age of Neha 5 years ago = $4x$
 According to question
 $(5x + 10) + (4x + 10)$
 $= \left(100\% + \frac{400}{9}\%\right)(25 + 20)$
 $9x + 20 = \frac{13}{9} \times 45 \Rightarrow x = 5$
 Sum of their present age = $(5 + 4) \times 5 + 10$
 $= 45 \text{ year} + 10 \text{ years} = 55 \text{ years}$
6. **(e);** Let present age of P and Q is $3x$ and $4x$
 Now
 ATQ,
 R's present age = $4x - 5$
 S's present age = $41 - 3x$
 Now average of Q, R and S age
 $\rightarrow \frac{4x + 4x - 5 + 41 - 3x}{3} = 22$
 $x = 6$
 Required difference = $41 - 3(6) - (4(6) - 5) = 4$
7. **(a);** Let Son's Age = x
 Satish's Age = $4x$
 After 4 year
 $4x + 4 = 3(x + 4)$
 $4x + 4 = 3x + 12 \Rightarrow x = 8$
 Satish's Age = $8 \times 4 = 32$
 His wife's Age = $\frac{32 \times 7}{8} = 28$
 Required Average = $\frac{28 + 8}{2} = 18$

8. **(b);** the initial ratio of the number of men and women is not important. Finally, it is 1 : 1. The average age of all the employees is 22.
 Let avg. age of men is 'x' years . so avg. age of women is $(x - 2)$ years.
 ATQ,
 $x + (x - 2) = 22 \times 2$
 \therefore The average age of boys and girls is 23 and 21 years respectively.
9. **(b);** Let score of X, Y and Z = x, y and z respectively.
 ATQ,
 $x + y + z = 80 \times 3 = 240$... (i)
 $1.2x + 1.2y + 0.9z = 86 \times 3 = 258$... (ii)
 On solving (i) & (ii)
 $0.3z = 30 \Rightarrow z = 100$
 & $x + y = 140$
 $1.2x - 1.2y = 24$
 $\Rightarrow x - y = 20$
 $\Rightarrow x = 80$ and $y = 60$
 X marks in Biology = $80 \times 1.2 \times 1.25 = 120$
 Y marks in Biology = $60 \times 1.2 \times 1.25 = 90$
 Z marks in Biology = $100 \times 0.9 \times 1.1 = 99$
 Required average = $\frac{120 + 90 + 99}{3} = 103$
10. **(c);** Let, initial no. of people in the group be 'n'.
 Let $19x$ and $17x$ be ages of X and Y respectively,
 A.T.Q.,
 $2n^2 - 19x = 2(n - 1)^2$ (i)
 And $2n^2 - 19x - 17x = 2(n - 2)^2$
 $2n^2 - 36x = 2(n - 2)^2$ (ii)
 Solving (i) and (ii),
 $x = 2, n = 10$
 Average age of group after Z leaves the group
 $= \frac{2 \times 10^2 - 19 \times 2 - 17 \times 2 - 16}{10 - 3}$
 $= \frac{112}{7} \Rightarrow = 16$
11. **(b);** Present age of Husband and wife = $25 \times 2 + 7 \times 2$
 $= 64$ years
 Present age of Husband wife and child
 $= 22 \times 3 = 66$ years
 Age of a child is = $66 - 64 = 2$ years.
12. **(a);** Sum of the present age of Mother, Father and Son
 $= 42 \times 3 + 6 \times 3 = 126 + 18 = 144$ years.
 Sum of present age of the family = $36 \times 5 = 180$
 Present age of the bride = $180 - 144 - 5 = 31$ years.
 Age of the bride at the time of marriage
 $= 31 - 6 = 25$ years.

13 (a); 10 years ago average age of 25 teachers = 45 years.
 4 years ago (just before the retirement of principal) average age of 25 teachers = 45 + 6 = 51 and at the same time total age of 25 teachers = 51 × 25 = 1275
 and the total age of remaining 24 teachers when just principal has retired = 1275 - 60 = 1215 years
 1 year later (i.e. 3 years ago from present) total age of 25 teacher (just before the recruitment of new principal) = 1215 + (1 × 24) = 1239 years.
 and the total age of 24 teacher including new principal just after the recruitment = 1239 + 54 = 1293 years.
 Thus the present age of all the 25 teachers = 1293 + 3 × 25 = 1368 years.
 Hence the present average age of the 25 teacher.

$$= \frac{1368}{25} = 54\frac{18}{25}$$
 years.

14. (a); The price of the costliest and cheapest computers = (80 × 30,000) - (78 × 29,500) = 99,000
 Therefore the price of cheapest computer = 99,000 - 80,000 = 19,000

15. (a);

	No. of family member	Average	Total
Eleven years Earlier	4	28	112
Presently	if 4	39	156
	6	28	168

Since it is obvious that the youngest member (i.e. child) was the 6th family member in the family. Therefore at the time of the birth of the youngest child the elder child's age was 6 years.
 Now the sum of their ages
 Let age of the youngest member = x
 $x + x + 6 = (168 - 156) \Rightarrow 2x + 6 = 12 \Rightarrow x = 3$
 Then the present age of the youngest member of the family is = 3 years.

16. (c); let the average of walking = x km/hr
 Total distance = 32 × 3 = 96
 $\therefore \frac{6}{x} + \frac{90}{60} = 3, \therefore \frac{6}{x} + \frac{3}{2} = 3$
 $\frac{12 + 3x}{2x} = 3 \Rightarrow 3x = 12 \Rightarrow x = 4$ km/hr.

17. (c); Let the number of subjects be n and average marks be x, the total marks = nx
 Again (n + 1) (x - 1) = (nx - 40) + (23 + 25)
 $x - n = 9$... (i)
 Further (n + 2) (x + 1) = (nx - 40) + (23 + 25) + 57

$nx + 2x + n + 2 = nx + 65$
 $2x + n = 63$... (ii)
 Solving equation I and II we get
 $n = 15 \Rightarrow x = 24$

18. (a); Let Donald be denoted by H (Husband)
 His wife be denoted by W, His daughter be denoted by D, His son be denoted by S
 The average age of 4 persons

$$= \frac{H + W + D + S}{4} = 23$$

$$H + W + D + S = 92 \Rightarrow H = W + 4$$

	H	W	D	S
At the time when daughter is born	28	←(+4) 24	0	×
	↓			
At the time when Son is born	→ 32	←(-4) 28	4	0

So at the time of birth of his Son, total age of his family = 64 years. (32 + 28 + 4 + 0 = 64) and presently the total age of his family = 92 years.
 It means total increase in age of the whole family = 28 years.

Thus average increase in age = $\frac{28}{4} = 7$ years.

It means the age of Donald = 39 years

and age of his daughter = 11 years

Therefore the average age of Donald and his Daughter is 25 years.

19. (b); let the number be (a - 5), (a - 3), (a - 1), (a + 1), (a + 3), (a + 5)
 Then the average of all six consecutive odd no.

$$= \frac{(a - 5) + (a - 3) + (a - 1) + (a + 1) + (a + 3) + (a + 5)}{6} = a$$

The value of 'a' can be found by using the last statement

$$(a - 5)^2 + (a + 5)^2 = 178 \Rightarrow a^2 = 64 \Rightarrow a = 8$$

Average of all six number is 8.

20. (a);

	No of Directors	Average Age	Total age
Just before death and resignation	10	48	480
Just after death and resignation	9		(480 - (53 + x) + 34)
one year later	9	46	414

So one year later, after the incident
 total age = {480 - (53 + x) + 34} + 9 × 1 = 414
 $x = 56$

where x is the age of the dead person at the time of his death.

Previous Year Question

1. (b); let present age of A & B be x & y years respectively

$$\frac{x-4}{y-4} = \frac{5}{3}$$

$$3x - 12 = 5y - 20$$

$$3x = 5y - 8 \dots\dots\dots (i)$$

Let present age of C be z years

$$x + y + z = 80$$

$$x + y = z$$

$$x + y = 40 \dots\dots\dots (ii)$$

On solving (i) & (ii)

$$x = 24 \text{ years}$$

Present age of A = 24 years

2. (b); Let present age of P be 4x years.

$$\text{So, present age of Q} = \frac{125}{100} \times 4x$$

$$= 5x \text{ years}$$

$$\text{Now, present age of R} = (4x - 2) \times 2 - 2$$

$$= (8x - 6) \text{ years}$$

ATQ,

$$\frac{4x+8x-6}{2} = 39$$

$$x = 7$$

$$\text{Required difference} = (8 \times 7 - 6) - (4 \times 7 + 5) = 50 - 33 = 17 \text{ years}$$

3. (c); Number of boys in the class = $72 \times \frac{5}{9} = 40$

$$\text{Number of girls in the class} = 72 \times \frac{4}{9} = 32$$

Required average

$$= \frac{(60 \times 72) - (40 \times 80)}{32} = \frac{4320 - 3200}{32} = 35 \text{ kg}$$

4. (e); Let present age of father & mother be 12x years & 11x years respectively

$$\text{ATQ, } \frac{12x + 12}{11x + 12} = \frac{15}{14} \Rightarrow x = 4$$

$$\text{present age of son} = 12x - 22 = 26 \text{ yrs}$$

$$\text{present age of daughter} = 11x - 20 = 24 \text{ yrs}$$

$$\text{required sum} = 50 \text{ yrs}$$

5. (b); Let present age Ravi and Sneha be 7x and 6x years respectively

ATQ

$$\frac{7x-10}{6x-10} = \frac{5}{4}$$

$$x = 5$$

$$\text{Present age of Ravi} = 35 \text{ yr}$$

$$\text{And present age of Sneha} = 30 \text{ yr}$$

For maximum value of present total age of the family

$$\text{Present age of triplet} = 8 \text{ yr}$$

$$\text{Present age of twins} = 6 \text{ yr}$$

$$\text{Present age of sixth child} = 4 \text{ yr}$$

$$\text{And present age of seventh child} = 2 \text{ yr}$$

$$\begin{aligned} \text{Maximum present age of that family} &= 35 + 30 + 8 \times 3 + 6 \times 2 + 4 + 2 \\ &= 107 \text{ yr} \end{aligned}$$

6. (b); P Q

$$-4 \quad 5 \quad 4$$

$$+12 \quad P + Q = 68$$

$$\text{Age increased in 16 year} = 32 \text{ years}$$

$$\text{Sum of Age of P and Q before 4 years} = 36$$

$$\therefore 5x + 4x = 36$$

$$X = 4$$

$$\text{P's age 2 years ago} = 5x + 2 = 22 \text{ years}$$

7. (c); Let suresh's age at the time of his marriage be x yrs

$$\text{Therefore, Suresh's present age} = \frac{3}{2}x \text{ yrs}$$

$$\text{Also, Suresh's present age} = (x + 14) \text{ yr}$$

$$\frac{3}{2}x = x + 14$$

$$\frac{3}{2}x - x = 14$$

$$x = 28 \text{ years}$$

$$\text{His son's age} = \frac{1}{3} \text{ of } \frac{3}{2}x = \frac{x}{2} = \frac{28}{2} = 14 \text{ yrs}$$

8. (e); Let present age of B and C be 12x years and 5x years respectively.

$$\text{Then present age of A} = 10x \text{ years}$$

ATQ

$$12x - 10x = 6$$

$$x = 3$$

$$\text{Present age of B} = 36 \text{ years}$$

9. (d); Let present age of Chintu be 5x years

$$\text{Then present age of Binny} = 8x \text{ years}$$

$$\text{And present age of Amit} = 6x \text{ years}$$

ATQ

$$8x - 5x - (8x - 6x) = 6$$

$$x = 6$$

$$\text{Required average} = 40 \text{ years}$$

10. (e); Let the current age of father and mother be 'x' yrs and 'y' yrs respectively.

$$\text{Then son's present age} = (x - 28) \text{ yrs}$$

$$\text{Then daughter's present age} = (y - 26) \text{ yrs}$$

Atq

$$(x + y + x - 28 + y - 26) = 130$$

$$(x + y) = 92 \dots\dots (i)$$

Again after 3 yrs

$$(x + 3 + y + 3 + x - 25) = 123$$

$$(2x + y) = 142 \dots\dots (ii)$$

On solving the above equation we get y = 42 years.

$$\text{Mother's present age} = 42 \text{ yrs.}$$

- 11. (b):** Let six years ago age of Kunal and Sagar was $6x$ and $5x$ respectively
 ATQ -

$$\frac{6x+10}{5x+10} = \frac{11}{10}$$

$$60x + 100 = 55x + 110$$

$$5x = 10$$

$$x = 2 \text{ years}$$
 So, present age of Sagar = $5x + 6 = 10 \times 2 + 6 = 16 \text{ years}$
- 12. (b):** Let 10 years ago, ages of Ram and Rahim were x years and $3x$ years, respectively.
 Then, present age of Ram = $(x + 10)$
 and present age of Rahim = $(3x + 10)$
 According to the question,

$$\frac{x+10+5}{3x+10+5} = \frac{2}{3}$$

$$\Rightarrow 3x + 45 = 6x + 30$$

$$\Rightarrow 3x = 15$$

$$\therefore x = 5$$
 Hence, required ratio = $\frac{5+10}{3 \times 5 + 10}$

$$= \frac{15}{25} = 3 : 5$$
- 13. (d):** Let present age of A, B and C be x , y and z years respectively.
 ATQ,

$$\Rightarrow \frac{x-4}{y-4} = \frac{3}{4}$$

$$4x - 3y = 4 \dots\dots (i)$$

$$\Rightarrow x + y + z = 26 \times 3 = 78 \dots\dots (ii)$$

$$\Rightarrow z = y - 11 \dots\dots (iii)$$
 From (i), (ii) and (iii)
 $x = 25, y = 32, z = 21$
 So, present age of B = $y = 32 \text{ years}$
- 14. (b):** Let present age of B be $5x$ years.
 So, present age of A = $5x \times \frac{8}{5} = 8x$ years
 Now, present age of C = $35 \times 2 - 5x = (70 - 5x)$ years
 ATQ,

$$(8x - 5) + (5x - 5) = 55$$

$$x = 5$$
 Required difference = $(70 - 5x) - 8x = 5 \text{ years}$
- 15. (b):** Let ages of A & B, 4 years later be $8x$ years & $9x$ years respectively.
 ATQ,

$$(8x - 4) + (9x - 4) = 47 \times 2$$

$$17x = 102$$

$$x = 6 \text{ years}$$
 Required difference = $9x - 8x = 6 \text{ years}$
- 16. (d):** Required average = $53 - \frac{[(49+57)-(45+52)]}{45}$

$$= 53 - \frac{9}{45} = 52.80 \text{ kg}$$

- 17. (a):** Let present age of Q = t years
 So, present age of P = $(t + 3)$ years
 ATQ -

$$\frac{t+2}{(t+3)+2} = \frac{4}{5}$$

$$t = 10 \text{ years}$$
 So, Age of P after two years = $(10 + 3) + 2 = 15 \text{ year}$
- 18. (d);** Sum of 10 numbers = $35 \times 10 = 350$
 Average of remaining 2 number

$$= \frac{\{350 - (200 + 66)\}}{2} = 42$$
- 19. (c);** Let Present age of A and B be $4x$ years and $3x$ years respectively.
 ATQ, $4x - 3x = 4$
 $x = 4$
 Present age of B = $4 \times 3 = 12 \text{ years}$
 Present age of C = $12 - 4 = 8 \text{ years}$.
 10 years hence Age of C = $8 + 10 = 18 \text{ years}$.
- 20. (d);** Let the present age of A, B and C be x , y and z years respectively
 ATQ

$$(x + 4) + (y + 4) = (y + z) + 16$$

$$x - z = 8 \dots\dots (i)$$
 And $(x - 4) + (z - 4) = 32$

$$x + z = 40 \dots\dots (ii)$$
 From (i) and (ii)
 $z = 16 \text{ years}$
- 21. (b);** Let age of Shivam and Deepak 4 years ago be ' $2x$ years' and ' $3x$ years' respectively.
 ATQ,

$$\frac{2x}{3x+4+5} = \frac{8}{15}$$

$$\frac{2x}{3x+9} = \frac{8}{15}$$

$$30x = 24x + 72$$

$$6x = 72$$

$$x = 12$$
 So, present age of Shivam = $2x + 4$
 $= 28 \text{ years}$
- 22. (b);** Let present age of A and B be $20x$ years and $50x$ years respectively.
 So, present age of C = $50x \times \frac{18}{25}$
 $= 36x \text{ years}$
 And, present age of D = $36x \times \frac{13}{12}$
 $= 39x \text{ years}$
ATQ,

$$50x - 39x = 11$$

$$x = 1$$
 Hence, present age of A = $20x = 20 \text{ years}$
- 23. (d):** Removed number = $20 \times 6 - 15 \times 5 = 45$

24. (d): Let the average of 5 person be 10 year.
 Then, sum of their age = $5 \times 10 = 50$ year
 Average age of 5 member 3 year ago
 $= \frac{50 - 3 \times 5}{5} = 7$ year.
 So after Adding the new member average become 7 year.
 Difference in the age of old member and New member
 $= 5 \times 10 - 7 \times 5 = 15$ year.

25. (a): Let the 5 consecutive integers be
 $m, m + 1, m + 2, m + 3, m + 4$
 $m + m + 1 + m + 2 + m + 3 + m + 4 = 5n$
 $5m + 10 = 5n \Rightarrow n = m + 2$
 Now, the average of 6 consecutive number starting with $(m + 2)$
 $[m + 2 + m + 3 + m + 4 +$
 $= \frac{m + 5 + m + 6 + m + 7}{6} = \frac{6m + 27}{6}$
 $= \frac{2m + 9}{2} = \frac{2(n - 2) + 9}{2} = \frac{2n + 5}{2}$

26. (b): Given average of 100 items = 46
 Sum of 100 items = $46 \times 100 = 4600$
 According to the question
 When 16 was misread as 61 and 43 was misread 34, then total sum = $4600 + 16 - 61 - 34 + 43 = 4564$

$$\text{Average} = \frac{4564}{90} = 50.7$$

27. (a): Total pocket money of A, B, C
 i.e. $A + B + C = 80 \times 3 = 240$
 Total money unspent = $60 \times 3 = 180$
 Now let A spend Rs x the B spends 2x and C spend 3x
 Then, $x + 2x + 3x = (240 - 180)$
 $6x = 60 \Rightarrow x = 10$
 \therefore A spends Rs. 10

28. (d): Sum of the highest and the lowest score
 $H + l = 64 \times 62 - 62 \times 60 = 62(4) = 248$
 given, $H - l = 180$
 $\therefore 2H = 248 + 180 \Rightarrow H = 214$
 Therefore, Highest score = 214

29. (d): Sum of the weight of 20 boys = $89.4 \times 20 = 1788$ kg
 According to the question.
 New Average = $1788 - 78 + 87 = \frac{1797}{20} = 89.85$ kg.

30. (c): Given average of 20 measurements = 56 cm
 \therefore Sum = $56 \times 20 = 1120$ cm
 correct average = $\frac{1120 + 61 - 64}{20}$
 $= \frac{1117}{20} = 55.85$ cm



Time and Work & Pipe and Cistern

Time and Work

Concept 1:

(1) If a person can complete a work in 'D' days, then the work done by him in 1 day is $\frac{1}{D}$

Efficiency is inversely proportional to the time taken (T) when the work done is constant.

$$E \propto \frac{1}{T}$$

(2) If P is 'n' times more efficient than Q, then P will take $\frac{1}{n}$ time of the total time taken by Q to complete the same amount of work.

Example: Ram can do a work in 40 days. Hari is 4 times more efficient than Ram. In how many days Hari can finish the work?

Sol. Ram can do a work in 40 days

Hari can complete the work in $= \frac{1}{4}$ days = 10 days

Concept 2:

If M_1 persons can do W_1 work in D_1 days working H_1 hours and M_2 person can do W_2 work in D_2 days working H_2 hours, then relation between them is

$$\frac{M_1 D_1 H_1}{W_1} = \frac{M_2 D_2 H_2}{W_2}$$

Example: 24 men working 8 hours a day make a road in 15 days. In how many days 48 men working 6 hours a day will make the three times long road?

Sol. $\frac{M_1 D_1 H_1}{W_1} = \frac{M_2 D_2 H_2}{W_2} \Rightarrow \frac{24 \times 15 \times 8}{1} = \frac{48 \times D_2 \times 6}{3} \Rightarrow D_2 = \frac{24 \times 15 \times 8 \times 3}{48 \times 6} = 30$ days

Concept 3:

If A does a work in 'a' days and B in 'b' days then both can complete the work in $\frac{ab}{a+b}$ days.

Example: A complete the work in 10 days and B in 15 days. In how many days A + B can complete the work?

Sol. (A + B) complete the work is $\frac{10 \times 15}{10 + 15} = \frac{150}{25} = 6$ days

Concept 4:

If A and B can complete a work in x days and A alone can finish that work in y days, then number of days B takes to complete the work is $= \frac{xy}{y-x}$ days

Example: A and B can complete a work in 20 days and A alone can finish that work in 30 days. In how many days B can complete the work?

Sol. B complete the work $= \frac{20 \times 30}{30 - 20} = \frac{600}{10} = 60$ days

Concept 5:

A, B, C can do a work in x, y and z days respectively. They will finish the work in $\frac{xyz}{xy + yz + zx}$ days

Example: A, B and C can do a work in 10, 12 & 15 days respectively. In how many days all of them together will finish the work?

Sol. (A + B + C) complete the work in $= \frac{10 \times 12 \times 15}{10 \times 12 + 12 \times 15 + 15 \times 10} = \frac{1800}{120 + 180 + 150} = 4$ days

Concept 6:

If A and B can do a piece of work in x days, B and C can do the same work in y days and A and C can do it in z days, then, working together they can complete that work in $\frac{2xyz}{xy + yz + zx}$ days

Example: A and B can complete a work in 20 days. B and C can complete the same work in 30 days. C and A can complete the same work in 40 days. In how many days they working together to complete the work?

Sol. (A + B + C) complete the work in $\frac{2 \times 20 \times 30 \times 40}{20 \times 30 + 30 \times 40 + 20 \times 40} = \frac{48000}{600 + 1200 + 800} = \frac{48000}{2600} = \frac{240}{13} = 18\frac{6}{13}$ days

Concept 7:

If A takes 'a' days more to complete a work than the time taken by (A+B) to do some work and B takes 'b' days more than the time taken by (A+B) to do same work. Then (A + B) do the work in \sqrt{ab} days .

Example: A takes 4 days more to complete a work than the time taken by (A + B) to do the same work and B takes 9 days more than the time taken by (A + B) to do the same work. In how many days A + B complete the work?

Sol. (A + B) complete the work in $\sqrt{4 \times 9} = \sqrt{36} = 6$ days

Concept 8:

A can do a certain piece of work in d_1 days and B in d_2 days. Then, the ratio of wages of A and B are:

$$\text{A's share : B's share} = \frac{1}{d_1} : \frac{1}{d_2} = d_2 : d_1$$

A, B and C can do a piece of work in d_1, d_2 and d_3 days. Then the ratio of wages of A, B and C are

$$\text{A's share : B's Share : C's share} = \frac{1}{d_1} : \frac{1}{d_2} : \frac{1}{d_3}$$

Multiplying each equation by ($d_1 d_2 d_3$)

Then the ratio is A's share : B's share : C's share = $d_2 d_3 : d_1 d_3 : d_1 d_2$

Concept 9:

If A, B and C can do a piece of work in x, y and z days respectively. The contract for the work is Rs. r and all of them work together.

Then,

$$\text{Share of, A} = \text{Rs.} \left(\frac{ryz}{xy + yz + zx} \right) \quad \text{Share of, B} = \text{Rs.} \left(\frac{rZX}{xy + yz + zx} \right) \quad \text{Share of C} = \text{Rs.} \left(\frac{rxy}{xy + yz + zx} \right)$$

Example: A, B and C can do a work in 20 days, 25 days and 30 days respectively. They finished together that work and gained Rs. 3700 as wage. Find the wages of A, B and C respectively.

Sol. Share of A = $\text{Rs.} \left(\frac{3700 \times 25 \times 30}{20 \times 25 + 25 \times 30 + 20 \times 30} \right) = \text{Rs.} \frac{2775000}{500 + 750 + 600} = \text{Rs.} \frac{2775000}{1850} = \text{Rs.} 1500$

Share of B = $\text{Rs.} \left(\frac{3700 \times 20 \times 30}{500 + 750 + 600} \right) = \text{Rs.} \frac{2220000}{1850} = \text{Rs.} 1200$

Share of C = $\text{Rs.} \left(\frac{3700 \times 20 \times 25}{500 + 750 + 600} \right) = \text{Rs.} \frac{1850000}{1850} = \text{Rs.} 1000$

Concept 10:

A can do a piece of work in x days. With the help of B, A can do the same work in y days. If they get Rs. a for that work Then,

$$\text{Share of A} = \text{Rs.} \left(\frac{ay}{x} \right), \quad \text{And Share of B} = \text{Rs.} \left(\frac{1500 \times 5}{20} \right)$$

Example: A can do a piece of work in 20 days. With the help of B, A can do the same work in 15 days. If A + B gets Rs. 1500 for the work, find the share of A and B respectively?

Sol. Share of A = $\text{Rs.} \left(\frac{1500 \times 15}{20} \right) = \text{Rs.} 1125$, Share of B = $\text{Rs.} \left(\frac{1500 \times 5}{20} \right) = \text{Rs.} 375$

Pipe and Cistern

Pipes and Cistern problems generally consist of a cistern (tank) to which one or more pipes fill the cistern or empty the cistern. These problems of pipes and cisterns can be solved by using the same method used in time and work. And we change our formulae according to the requirement of the pipes and cisterns.

- (i) A pipe connected with a tank or a cistern that fill the tank is known as inlet.
 (ii) A pipe connected with a tank that empty it is known as outlet.

Important Points:

1. If a pipe can fill a tank in x hours, then the part filled in 1 hour $= \frac{1}{x}$
2. If a pipe can empty a tank in y hours, then the part of the full tank emptied in 1 hour $= \frac{1}{y}$
3. If a pipe can fill a tank in x hours and another pipe can empty the full tank in y hours ($y > x$), then the net part filled in 1 hour, when both the pipes are opened $= \left(\frac{1}{x} - \frac{1}{y} \right) = \frac{y-x}{xy}$

$$\text{Time taken to fill the tank} = \frac{xy}{y-x}$$

4. If a pipe can fill a tank in x hours and another pipe can fill the same tank in y hours, the part of the tank filled in 1 hour when both pipes are opened simultaneously $= \left(\frac{1}{x} + \frac{1}{y} \right) = \frac{x+y}{xy}$

$$\therefore \text{Time taken to fill completely the tank when both pipes are open simultaneously} = \frac{xy}{x+y}$$

5. If three pipes can fill a tank separately in x , y and z h respectively, then time taken to fill the tank by working together $= \frac{xyz}{xy + yz + zx}$ h.
6. If a pipe fills a tank in x hours and another fills the same tank in y hours, but a third pipe empties the full tank in z hours and all of them are opened together, the net part filled in 1 hour $= \left(\frac{1}{x} + \frac{1}{y} - \frac{1}{z} \right)$.

$$\text{Time taken to fill the tank} = \frac{xyz}{yz + xz - xy} \text{ hours}$$

Example: Pipe A can fill a water tank in 25 minutes, Pipe B can fill the tank in 40 minutes and Pipe C can empty the tank in 30 minutes. If all the 3 pipes are opened together, then in how many minutes will the tank be completely filled?

Sol. Time taken to fill the tank $= \frac{25 \times 40 \times 30}{40 \times 30 + 25 \times 30 - 25 \times 40} = \frac{600}{19} = 31 \frac{11}{19}$ minutes

7. Two pipes A and B can fill a tank in x minutes and y minutes respectively. If both the pipes are opened simultaneously, Then the time after which pipe B should be closed, so that the tank is full in 't' minutes is $\left[y \left(1 - \frac{t}{x} \right) \right]$ minutes.

Example: Two pipes A and B can fill a tank in 12 minutes and 16 minutes respectively. If both the pipes are opened simultaneously, after how much time should B be closed so that the tank is full in 9 minutes?

Sol. Pipe B should be closed after $= \left(1 - \frac{9}{12} \right) \times 16 = \frac{3}{12} \times 16 = 4$ min.

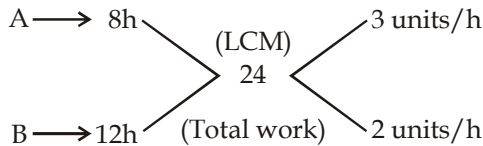
Solved Example

1. A can do a piece of work in 8 hours and B can do the same work in 12 hours. In how much time both can finish the whole work working together?

Sol. Work done by A in 1 hour = $\frac{1}{8}$
 Work done by B in 1 hour = $\frac{1}{12}$
 Work done by (A + B) in 1 hour = $\frac{1}{8} + \frac{1}{12} = \frac{5}{24}$
 Time taken to finish the work = $\frac{24}{5} = 4\frac{4}{5}$ hours

Direct formula $\rightarrow \frac{ab}{a+b} \times \frac{8 \times 12}{8+12}$
 $= \frac{8 \times 12}{20} = \frac{24}{5} = 4\frac{4}{5}$ hours

Shortcut:



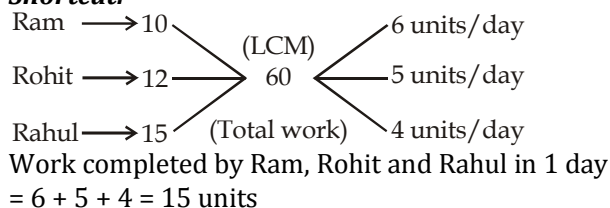
Take L.C.M. as total work.
 One hour work of A is $\frac{24}{8} = 3$ units and one hour work of B is = 2 units. Combined work of (A + B) in 1 hour is (3 + 2) units units.
 Therefore total work will be completed by both (A + B) in $\frac{24}{5}$ hours
 $= 4\frac{4}{5}$ hours

2. Ram, Rohit and Rahul can do a work in 10 days, 12 days and 15 days respectively. In how many days will they finish the work?

Sol. Work done by Ram in 1 day = $\frac{1}{10}$
 Work done by Rohit in 1 day = $\frac{1}{12}$
 Work done by Rahul in 1 day = $\frac{1}{15}$
 Work done by Ram, Rohit and Rahul in 1 day
 $= \frac{1}{10} + \frac{1}{12} + \frac{1}{15} = \frac{6+5+4}{60} = \frac{1}{4}$
 Time taken by them to complete the work = 4 days

Direct formula: $= \frac{xyz}{xy + yz + zx}$ days
 $= \frac{10 \times 12 \times 15}{10 \times 12 + 12 \times 15 + 15 \times 10} = 4$ days

Shortcut:



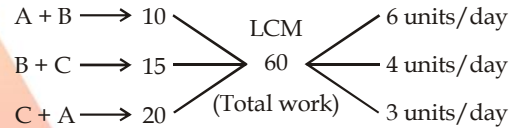
Total work completed by them in = $\frac{60}{15} = 4$ days

3. A and B do a work in 10 days, B and C do it in 15 days while C and A in 20 days. In how many days A, B and C all working together can finish the same work?

Sol. Work done by (A + B) in 1 day = $\frac{1}{10}$
 Work done by (B + C) in 1 day = $\frac{1}{15}$
 Work done by (C + A) in 1 day = $\frac{1}{20}$
 Work done by 2(A + B + C) in 1 day = $\frac{1}{10} + \frac{1}{15} + \frac{1}{20}$
 Work done by (A + B + C) in 1 day = $\frac{6+4+3}{60 \times 2} = \frac{13}{120}$
 Time taken by them to complete the work $\frac{120}{13}$ days

Direct Formula $\rightarrow \frac{2xyz}{xy + yz + zx}$

Shortcut:



Work done by A + B in 1 day = 6 units
 Work done by B + C in 1 day = 4 units
 Work done by C + A in 1 day = 3 units
 Work done by 2(A + B + C) in 1 day = 6 + 4 + 3 = 13 units
 Total work completed by them in = $\frac{60}{\frac{13}{2}} = \frac{120}{13}$ days

4. A is thrice as good as B. A is able to finish the work in 20 days less than B. In how many day B will finish the work?

Sol. A's efficiency = 3 \times B's efficiency.
 $\frac{\text{A's efficiency}}{\text{B's efficiency}} = \frac{3}{1} \Rightarrow 3:1$
 Ratio of Time taken by A and B = 1 : 3
 Let A and B do the work in x and 3x days respectively.
 $3x - x = 20 \Rightarrow 2x = 20 \Rightarrow x = 10$
 Time taken by B to finish the work = 3x = 3 \times 10 = 30 days

Shortcut:

A : B
 Efficiency 3 : 1
 Time Taken 1 : 3
 Efficiency $\propto \frac{1}{\text{Time taken}}$

The difference between time taken by A & B is 20 days
 The difference between ratio of A & B is 2
 Therefore, 2 = 20 \Rightarrow 1 = 10
 Therefore A completed the work in 10 days and B in = 3 \times 10 = 30 days

5. Ram does 40% more work than Shiv. If Shiv can do it in 14 days, then in how many days Ram can do the same work?

Sol. Shiv's 1 day work $\frac{1}{14}$

$$\text{Ram's 1 day work} = \frac{1}{14} \times \frac{14}{100} = \frac{1}{10}$$

Ram alone can finish the work = 10 days

Shortcut:

	Ram	Shiv
Efficiency	140	: 100
	7	: 5
Time taken	5	: 7

The time taken by Shiv to complete the work is 14 days

Therefore, $7 \Rightarrow 14 \Rightarrow 1 = 2$

Time taken by Ram to complete the work = 2×5
= 10 days

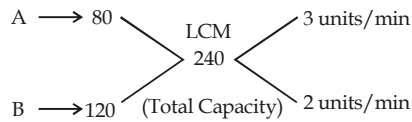
6. Pipe A can fill the tank in 80 minutes and pipe B in 120 minutes. Then after how much time both the pipe can together fill the tank?

Sol. Part filled by two taps in 1 minutes

$$= \frac{1}{80} + \frac{1}{120} = \frac{3+2}{240} = \frac{5}{240} = \frac{1}{48}$$

\therefore Time taken to fill the tank = 48 minutes

Shortcut:



\therefore Take LCM as the total capacity of the tank.

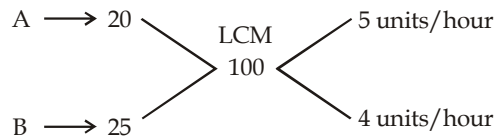
$$\text{Time taken to fill the tank} = \frac{240}{3+2} = 48 \text{ minutes}$$

7. Two pipes A and B can empty a full tank in 20 hours and 25 hours respectively. In how many hours will tank be emptied when they are opened together?

Sol. Efficiency of both pipes = $\frac{1}{20} + \frac{1}{25} = \frac{5+4}{100} = \frac{9}{100}$

\therefore Tank will be emptied in $\frac{100}{9} = 11\frac{1}{9}$ hours

Shortcut:



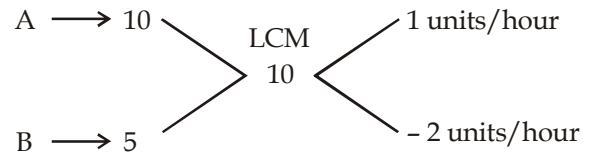
A can empty 5 units/hour and B can empty 4 units/hours.

$$\text{Time taken to empty the tank} = \frac{100}{9} = 11\frac{1}{9} \text{ hours}$$

8. A can fill a cistern in 10 hours and B can empty it in 5 hours. If they are opened together, in how many hours will cistern be empty?

Sol. Required time = $\frac{10 \times 5}{10-5} = \frac{10 \times 5}{5} = 10$ hours.

Shortcut:



Take negative sign when a pipe empty the tank

therefore tank will be empty in $= \frac{10}{1-2} = 10$ hours

9. Two pipe P and Q can fill a cistern in 12 and 15 min, respectively. If both are opened together and at the end of 3 min the first is closed. How much extra time will Q take to fill the cistern?

Sol. Given, time taken by P to fill the tank = 12 min.

And time taken by Q to fill the tank = 15 min.

$$\begin{aligned} \text{Part filled by both pipes in 1 min} &= \frac{1}{12} + \frac{1}{15} \\ &= \frac{5+4}{60} = \frac{9}{60} \end{aligned}$$

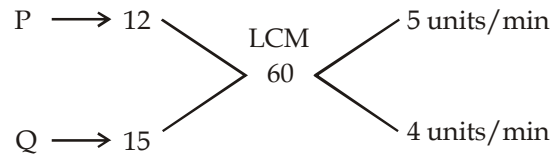
$$\text{Now, part filled in 3 min} = \frac{3 \times 9}{60} = \frac{27}{60} = \frac{9}{20}$$

$$\therefore \text{Remaining part} = 1 - \frac{9}{20} = \frac{11}{20}$$

Now, the remaining part is filled by pipe Q in x min.

$$x = \frac{11}{20} \times 15 = \frac{3 \times 11}{4} = \frac{33}{4} = 8\frac{1}{4} \text{ min}$$

Shortcut:



Total capacity = 60

Part filled by (P + Q) in 3 min = $3(5 + 4) = 27$ units

Remaining part is filled by Q only

$$= \frac{60-27}{4} = \frac{33}{4} = 8\frac{1}{4} \text{ min}$$

10. A tank can be filled by two pipes A and B in 20 min and 30 min, respectively. When the tank was empty the two pipes were opened. After some time, the first pipe was stopped and the tank was filled in 18 min. After how much time of the start was the first pipe stopped?

Sol. Given, tank filled by A = 20 min

And tank filled by B = 30 min

Let the first pipe be closed after x min.

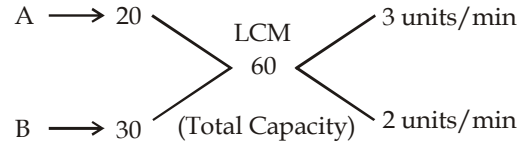
Then, work done by first pipe in x min = $\frac{x}{20}$

According to the question,

$$\frac{x}{20} + \frac{18}{30} = 1 \Rightarrow \frac{x}{20} = 1 - \frac{18}{30} \Rightarrow \frac{x}{20} = 1 - \frac{3}{5} = \frac{2}{5}$$

$$\therefore x = \frac{2}{5} \times 20 = 8 \text{ min}$$

Shortcut:



B work all time, therefore part filled by B in 18 min
= $2 \times 18 = 36$ units

Remaining part is filled by A in min $\frac{24}{3} = 8$

Therefore, after 8 min the first pipe is closed.

Basic Questions

1. 18 boys can do a piece of work in 24 days. In how many days can 27 boys do the same work?
(a) 16 (b) 32 (c) 23
(d) 48 (e) None of these
2. How many days will 1648 persons take to construct a dam, if 721 persons can build the same in 48 days?
(a) 21 days (b) 20 days (c) 23 days
(d) 24 days (e) None of these
3. If 10 persons can do a job in 20 days, then 20 persons with twice the efficiency can do the same job in :
(a) 5 days (b) 10 days (c) 20 days
(d) 40 days (e) None of these
4. A and B can separately do a piece of work in 6 days and 12 days respectively. How long will they together take to do the work?
(a) 9 days (b) 18 days (c) 6 days
(d) 4 days (e) None of these
5. A job can be completed by 12 men in 12 days. How many extra days will be needed to complete the job if, 6 men leave after working for 6 days?
(a) 3 (b) 6 (c) 12
(d) 24 (e) None of these
6. A and B can do a piece of work in 12 days and 15 days, respectively. They began to work together but A left after 4 days. In how many more days would B alone complete the remaining work?
(a) $\frac{20}{3}$ (b) $\frac{25}{3}$ (c) 6
(d) 5 (e) None of these
7. Working efficiencies of A and B for completing a piece of work are in the ratio 3 : 4. The number of days to be taken by them to complete the work will be in the ratio
(a) 3 : 2 (b) 2 : 3 (c) 3 : 4
(d) 4 : 3 (e) None of these
8. 5 men can prepare 10 toys in 6 days working 6 hours a day. Then in how many days can 12 men prepare 16 toys working 8 hrs a day?
(a) 5 days (b) 3 days (c) 4 days
(d) 6 days (e) None of these
9. If a pipe fills a tank in 6 h, then what part of the tank will the pipe fill in 1 h?
(a) $\frac{1}{3}$ (b) $\frac{1}{6}$ (c) $\frac{1}{4}$
(d) $\frac{1}{5}$ (e) None of these
10. An inlet pipe fills $\frac{1}{8}$ part of a tank in 1 h. How much time will the pipe take to fill the empty tank?
(a) 4h (b) 2h (c) 6h
(d) 8h (e) None of these
11. An outlet pipe can empty a cistern in 3 h. In what time will the pipe empty two-third part of the cistern?
(a) 4h (b) 2h (c) 3h
(d) 5h (e) None of these
12. There are two taps A and B to fill up a water tank. The tank can be filled in 40 min, if both taps are on. The same tank can be filled in 60 min, if tap A alone is on. How much time will tap B alone take, to fill up the same tank?
(a) 64 min (b) 80 min (c) 96 min
(d) 120 min (e) None of these
13. A pipe can fill a tank in 10 h, while an another pipe can empty it in 6 h. Find the time taken to empty the tank, when both the pipes are opened simultaneously?
(a) 11h (b) 15h (c) 18h
(d) 16h (e) None of these

14. Three taps are fitted in a cistern. The empty cistern is filled by the first and the second taps in 3 and 4h, respectively. The full cistern is emptied by the third tap in 5 h. If all three taps are opened simultaneously, the empty cistern will be filled up in?
- (a) $1\frac{14}{23}$ h (b) $2\frac{14}{23}$ h (c) 2 h 40 min
(d) 1 h 56 min (e) None of these

15. Pipe A can fill a tank in 30 min, while pipe B can fill the same tank in 10 min and pipe C can empty the full tank in 40 min. If all the pipes are opened together, how much time will be needed to make the tank full?
- (a) $9\frac{3}{13}$ h (b) $9\frac{4}{13}$ h (c) $9\frac{7}{13}$ h
(d) $9\frac{9}{13}$ h (e) None of these

Prelims Questions

Level - 1

1. Veer can do a work in x days. While Sameer can do the same work in (x + 4) days. Ratio of work done by Veer in 3 days to work done by Sameer in 4 days is 15 : 16. Find the value of 'x'.
- (a) 24 (b) 18 (c) 12
(d) 20 (e) 16
2. Two tap A and B can fill a tank in 12h and 10h respectively. Due to a leak in bottom of tank it takes 18h to fill the whole tank. If from the leak water is running at the rate of 46 lit/min, then find capacity of tank?
- (a) 3600 lit (b) 21600 lit (c) 2160 lit
(d) 36000 lit (e) None of these
3. Manoj is 25% less efficient than Hemant. Vikash and Hemant working together can complete a task in 16 days and Vikash is half efficient as Hemant, then find in how many days Manoj alone can complete the task with 150% of his original efficiency?
- (a) $21\frac{1}{3}$ days (b) 21 days (c) $22\frac{2}{3}$ days
(d) 24 days (e) 32 days
4. Raghav can do a piece of work in 15 days while Dev can do the same piece of work in 20 days. If they work together for 4 days, how much fraction of work left?
- (a) $7/15$ (b) $1/2$ (c) $8/13$
(d) $8/15$ (e) None of these
5. A and B together can do a piece of work in 18 days. B and C together can complete the same piece of work in 30 days. If A is 100% more efficient than C. find in how much time B can complete the work alone?
- (a) 22.5 days (b) 45 days (c) 75 days
(d) 90 days (e) 120 days
6. Ravi can do three fourth of a work in $\frac{27}{2}$ hours while Hira can do two third of the same work in 8 hours. If both started working together then in how much time the work will be completed?
- (a) 8h (b) 7.2h (c) 8.4 h
(d) 9 h (e) 9.2 h
7. Ram and Shyam can do work in 16 days. Shyam takes twice time as Ram takes to do the same work. In how many days Shyam alone can complete that work.
- (a) 16 days (b) 32 days (c) 24 days
(d) 40 days (e) 48 days
8. If 9 men or 15 women can do a piece of work in 18 days working 9 hours a day. How many days will it take to complete a work twice as large with 6 men and 8 women working together 6 hours a day?
- (a) 22 days (b) 27.5 days (c) 45 days
(d) 22.5 days (e) 40 days
9. Hemant and Vikash working together can make a wall in 15 days. They both started building the wall and after 3 days Hemant left and Vikash alone build the remaining wall in 24 more days. Find efficiency of Hemant is what percent of Vikash's.
- (a) 50% (b) 20% (c) 25%
(d) 100% (e) 66.67%
10. A filling tap can fill a tank in 10 hour. Two equivalent filling tap and one outlet tap are open simultaneously then tank is filled in $7\frac{1}{2}$ hour. In how much time outlet tap can empty the tank.
- (a) 10 (b) 15 (c) 20
(d) 12 (e) 16
11. Lokesh starts a work and after 6 days he left and remaining work finished by Rakesh in 12 days. Had Lokesh worked for 9 days, Rakesh would have finished the remaining work in 8 days. Find the time taken by Lokesh to complete the work alone.
- (a) 12 days (b) 9 days (c) 15 days
(d) 18 days (e) 20 days
12. Tap D can fill 4 buckets in 36 min and tap E can fill 2 buckets in 12 min and tap D and top E can fill a tank in 1 hour. Find Capacity of tank if capacity of a bucket is 12 lit?
- (a) 240 lit (b) 180 lit (c) 200 lit
(d) 160 lit (e) None of these

13. 40 men and 20 women together can complete a work in 12 days and ratio of efficiency of a man to a woman is 2:3, find how many men are required to complete half of the work in 7 days?
 (a) 70 (b) 35 (c) 30
 (d) 60 (e) 45
14. Tap A can fill a tank in 4 hours and with help of tap B it takes 2.4 hours, tap B fill 14lit per min. Find capacity of tank?
 (a) 5004lit (b) 5080 lit (c) 502 lit
 (d) 508 lit (e) 5040 lit
15. A certain job was assigned to a group of men to do it in 24 days. But 14 men did not turn up for the job and the remaining men did the job in 32 days. The original number of men in the group was
 (a) 32 (b) 66 (c) 36
 (d) 56 (e) 52
16. A can complete $\frac{3}{5}$ th of the work in 9 days. A and B together do $\frac{1}{5}$ th of the same work in $\frac{7}{4}$ days. Find time taken by B to complete the work alone.
 (a) 25 days (b) 21 days (c) 18 days
 (d) 24 days (e) 15 days
17. 15 men can complete a work in 8 days while 10 women can complete the same work in 20 days. 7 men starts working and after 12 days they are replaced by 10 women. Find time taken by 10 women to complete the remaining work.
 (a) 5 days (b) 8 days (c) 7 days
 (d) 6 days (e) 9 days
18. Rohit can paint a wall in 40 days, while Sohan is 25% more efficient than Rohit. How long would it take Rohit and Sohan together to paint the same wall completely?
 (a) $17\frac{1}{9}$ days (b) $17\frac{2}{9}$ days (c) $18\frac{1}{7}$ days
 (d) $17\frac{1}{7}$ days (e) $17\frac{7}{9}$ days
19. Two pipes P and Q alone can fill a tank in 24 min and 30 min respectively and a pipe R alone can empty the tank by throwing out 8 gallons in 2 minutes. All the three pipes working together can fill the tank in 20 minutes. Find the capacity of the tank?
 (a) 80 gallons (b) 160 gallons (c) 320 gallons
 (d) 240 gallons (e) None of these
20. Efficiency of Anurag is two times more than efficiency of Ayush. Both Anurag & Ayush start working alternatively, starting with Anurag and they complete the work in total 37 days. If Shivam alone complete the same work in 50 days, then find in how many days Ayush and Shivam together will complete the work?
 (a) 24 days (b) 30 days (c) 36 days
 (d) 48 days (e) 18 days
21. The ratio of efficiency of A to that of B is 5: 4. A starts the work alone and takes some days to do $33\frac{1}{3}\%$ of the work while B takes 10 more days than A to complete the remaining work. Find difference in time while they work alone to complete the work?
 (a) None of these (b) 8 days (c) 5 days
 (d) 6 days (e) 7.5 days
22. A & B can do a piece of work together in 24 days and C's efficiency is half of A's efficiency. If all three work together, they can complete the same work in 20 days, then find how many days are required to complete the work, if B and C work together?
 (a) 45 days (b) 42 days (c) 30 days
 (d) 48 days (e) 44 days
23. A is 25% more efficient than B. B takes 6 days more time to complete the work alone than A takes to complete the same work alone. If both works together then, in how many days same work will be completed.
 (a) 16 days (b) $8\frac{2}{3}$ days (c) $13\frac{1}{3}$ days
 (d) 21 days (e) $16\frac{2}{3}$ days
24. Efficiency of A is 40% more than that of B and ratio of efficiency of C to A is 6:7. Time taken by A and C together to complete the work is 18 days. Find the number of days taken by all of them working together to complete twice of the same work?
 (a) 32 days (b) 24 days (c) 25 days
 (d) 26 days (e) 27.5 days
25. A and B started the work alternatively starting with A. On last day, A completed the work by doing 12.5% of the whole work. Which of the following can be the possible value of time taken by B alone to do that work if A alone can do the whole work in 6 days.
 (a) 15 days (b) 8 days (c) 10 days
 (d) 6 days (e) 12 days
26. Ayush is thrice as good a workman as Anurag and both working together can complete the work in 20 days. In how many days can Anurag alone complete $\frac{1}{4}$ th of work? (in days)
 (a) 40 (b) 30 (c) 10
 (d) 20 (e) none of these
27. A can do a piece of work in 48 days and B can do the same work in 64 days, while C take as half time as A and B take together. If they start working alternatively, starting by C, followed by B and then A respectively, then find in how many days work will be completed?
 (a) $26\frac{3}{7}$ days (b) $28\frac{5}{7}$ days (c) $26\frac{1}{14}$ days
 (d) $27\frac{3}{14}$ days (e) $27\frac{1}{7}$ days

- 28.** Anurag is 40% less efficient than Bholu, who can do the same work in 20% less time than Chotu. If Anurag and Bholu together can complete 80% of work in 12 days, then in how many days 60% of work can be completed by Bholu and Chotu together.
 (a) 2 days (b) 4 days (c) 6 days
 (d) 8 days (e) 10 days
- 29.** Tap A can fill a tank in 24 minutes and tap B can fill the same tank in 30 minutes, another tap C can empty the tank in 20 minutes. If tap A and tap B are opened together & after six minutes tap C is also opened, then find the total time taken to fill the remaining tank?
 (a) 18 minutes (b) 14 minutes (c) 22 minutes
 (d) 12 minutes (e) 16 minutes
- 30.** Sanjeev can prepare some dishes in 4 hours while Nisha can prepare same in 5 hours. Madhulika takes 20% less time than Sanjeev & Nisha take together to prepare same dishes. What is the efficiency ratio of Sanjeev & Madhulika?
 (a) 4:9 (b) 16:9 (c) 16:45
 (d) 4:5 (e) 2:3
- 31.** X is 40% more efficient than Y and Z takes $33\frac{1}{3}\%$ less time than X to complete a work. If all three together can complete a work in $6\frac{2}{9}$ days, then find X & Z can complete the two times of work in how many days?
 (a) 8 days (b) 16 days (c) 18 days
 (d) 32 days (e) 24 days
- 32.** Anurag can make a video in 10 hours while Karan can make same video in 8 hours. With the help of Sanjay they made the video in 4 hours. In what time Sanjay alone can make the same video?
 (a) 35 hr (b) 36 hr (c) 37 hr
 (d) 39 hr (e) 40 hr
- 33.** A cistern has two pipes. One can fill it with water in 15 hours and other can empty it in 12 hours. In how many hours will the cistern be emptied if both the pipes are opened together when $\frac{3}{5}$ th of the cistern is already full of water?
 (a) 36 hr (b) 24 hr (c) 60 hr
 (d) 45 hr (e) 30 hr
- 34.** A and B undertake to do a piece of work for Rs.999. A can do it in 10 days and B can do it in 15 days. With the help of C, they finish it in 4 days. How much should C be paid for his contribution? (in Rs.)
 (a) 350 (b) 420 (c) 333
 (d) 330 (e) 300
- 35.** A can do a piece of work in 30 days. If A and B together can do $\frac{1}{3}$ rd of work in 4 days, then find in how many days will B do $\frac{3}{5}$ th of work?
 (a) 15 days (b) 12 days (c) 18 days
 (d) 10 days (e) 20 days
- 36.** A, B and C working alone can finish a work in 80 days, 50 days and 90 days respectively. A worked alone for 21 days, then B took over from A. B worked on it alone for 22 days and then C took over from B. In how many days will C finish the remaining work?(in days)
 (a) $31\frac{31}{40}$ (b) $26\frac{31}{40}$ (c) $30\frac{27}{40}$
 (d) $28\frac{31}{40}$ (e) $28\frac{21}{40}$
- 37.** 20 male labours can finish the work in 30 days and 30 female labours can finish the same work in 24 days. If all of them work together, then in how many days they will finish the same work?
 (a) $\frac{28}{3}$ days (b) $\frac{20}{3}$ days (c) $\frac{40}{3}$ days
 (d) $\frac{34}{3}$ days (e) $\frac{37}{3}$ days
- 38.** A jewellery merchant gives its employees silver coins as increment. Jai & Veeru undertook a work to complete in 5 days for 500 coins. If Jai alone can do it in 20 days. How many coins are received by Veeru?
 (a) 350 (b) 400 (c) 375
 (d) 325 (e) 380
- 39.** Pipe A can fill $\frac{2}{3}$ rd of the empty tank in 20 minutes while pipe A and pipe B together can fill the empty tank in 12 minutes. What part of empty tank, pipe B can fill in 15 minutes.
 (a) $\frac{1}{3}$ rd (b) $\frac{2}{3}$ rd (c) none of these
 (d) $\frac{1}{4}$ th (e) $\frac{3}{4}$ th
- 40.** Jai & Veeru undertook a work to complete in 5 days for Rs. 800. But with the help of Basanti the work was finished in 3 days. If Veeru is 50% less efficient than Basanti. Find share of Jai. (in Rs.) (all 3 worked together)
 (a) 350 (b) 320 (c) 375
 (d) 325 (e) 300

Level - 2

- A & B working together can complete a piece of work in 72 days, B & C working together can complete the same work in 90 days and A & C working together can complete the same work in 75 days. If A, B & C starts working together, then find in how many days will the same work be completed?
 (a) $55\frac{7}{23}$ days (b) $52\frac{4}{23}$ days (c) $59\frac{2}{23}$ days
 (d) $49\frac{11}{23}$ days (e) $50\frac{17}{23}$ days
- Shubham work for 5 days and remaining work was completed by Harvinder in 9 days. If Harvinder work for 12 days then remaining work was completed by Shubham in 3 days, then find how much time Harvinder will take to complete the work alone.
 (a) 11 days (b) $16\frac{1}{2}$ days (c) $16\frac{2}{3}$ days
 (d) $11\frac{1}{2}$ days (e) $6\frac{3}{5}$ days
- A pipe can fill a tank in 36 minutes & another pipe can fill it in 48 minutes, but a third Pipe can empty it in 18 minutes. The first two pipes are kept open for 16 minutes in the beginning then the third Pipe is also opened. In what time is the cistern emptied?
 (a) 120 min (b) 80 min (c) 96 min
 (d) 112 min (e) 144 min
- There are three pipes-A, B & C. A & B are filling pipes and C is emptying pipe. Pipe-A alone can fill the tank in 1 hour & pipe-C is 20% more efficient than pipe-A. If pipe-A & B working together fill the tank in $\frac{75}{2}$ minutes, then find in how much time pipe-A, B & C working together can fill the tank?
 (a) 6 hours (b) 4.5 hours (c) 2.5 hours
 (d) 3 hours (e) 5 hours
- If Hemant works for 20 days and Manoj works for 15 days then $\frac{3}{5}$ th of the work has been completed. If Manoj works for 6 days and Hemant works for 16 days then $\frac{2}{5}$ th of the work has been completed. Find in how many days both can complete the work together.
 (a) 30 days (b) 50 days (c) 75 days
 (d) 60 days (e) Can't be determine.
- Four men and four women can complete a piece of work in 5 days, while six men & 8 women can complete the same work in 3 days. If ten men and 'x' women start three times of the previous work and complete it in $6\frac{12}{13}$ day, then find 'x'?
 (a) 4 (b) 2 (c) 8
 (d) 6 (e) 10
- A & B together can finish a certain piece of work in 6 days. If A reduces his efficiency by 20 % and B increases his efficiency by 30 %, then work will be finish in same time. If A work with his original efficiency and B work with 2 times of his efficiency, then in how many days working together work will be finished?
 (a) 7 days (b) $4\frac{4}{7}$ days (c) $3\frac{2}{7}$ days
 (d) None of these (e) $4\frac{2}{7}$ days
- Efficiency of B is 40% more than efficiency of A and efficiency of C is 150% of efficiency of B. B alone can complete 40% of work in 6 days. Then, find in how many days 60% of the same work will be completed by A & C working together, if A is working with 5% more efficiency.
 (a) 4 days (b) 6 days (c) 5 days
 (d) 3 days (e) 7 days
- Pipe P₁ can fill $\frac{3}{5}$ th of the tank in 9 minutes. There are two more pipes P₂ and P₃, in which P₂ is 50% more efficient than P₁ and P₃ pipe is $\frac{5}{9}$ th as efficient as P₂. Then calculate the time taken by all the three pipes to fill that tank when opened together ?
 (a) 5 min (b) 6 min (c) $7\frac{1}{2}$ min
 (d) $3\frac{1}{2}$ min (e) $4\frac{1}{2}$ min
- Anurag can complete a piece of work in 280 days and Rohit is $33\frac{1}{3}$ % more efficient than Anurag. Anurag and Veer together can complete the same piece of work in 180 days. If all three-start working together, then find in how many days the work will be completed?
 (a) 116 days (b) 138 days (c) 134 days
 (d) 102 days (e) None of the above.
- If 'a' number of males can do a work in (2a - 8) days while (a - 8) number of males can do that work in (2a + 12) days, then find in how many days $\frac{3}{2}$ a number of males can do $33\frac{1}{3}$ % of that work?
 (a) 12 days (b) $8\frac{8}{9}$ days (c) $6\frac{2}{3}$ days
 (d) 8 days (e) 9 days
- 8 men and 10 women can do a work in 15 days while 10 men and 18 women can do that work in 10 days. 4 men and 5 women started the work and after 10 days all men left the work then find how many more women would be required to complete the whole work in 21 days?
 (a) 12 (b) 15 (c) 16
 (d) 10 (e) 18

13. A, B & C are three inlet pipes. Time taken by A & B together to fill half of the tank is same as time taken by pipe C alone to fill one – sixth of the tank. If A, B & C together can fill the tank in 9 hours, then find time taken by pipe C alone to fill the tank?
 (a) 24 hours (b) 18 hours (c) 28 hours
 (d) 36 hours (e) 42 hours
14. A & B can complete a work in 24 days and 36 days respectively. A & B together start work and after 8 days C joined him. If remaining work complete by all three in $3\frac{5}{9}$ days, then find in how many days B & C can complete the 75% of work together?
 (a) 9 days (b) 8 days (c) $7\frac{1}{3}$ days
 (d) $6\frac{1}{3}$ days (e) 11 days
15. A, B & C working together can complete a work in 18 days and A & C working together can complete same piece of work in 30 days. C is 50% more efficient than A. In how many days the same work will be completed by all three, if A & B are working with 50% more efficiency.
 (a) $16\frac{9}{11}$ days (b) $24\frac{3}{11}$ days (c) $13\frac{7}{11}$ days
 (d) $19\frac{5}{11}$ days (e) $12\frac{1}{11}$ days
16. A working alone & B working alone can complete a piece of work in 15 days & 9 days respectively. B & C working together can complete same work in 6 days. If A & C starts working together on same work, then find in how many days the work will be completed?
 (a) $6\frac{1}{2}$ days (b) $7\frac{2}{3}$ days (c) $5\frac{3}{4}$ days
 (d) $8\frac{2}{11}$ days (e) $4\frac{5}{7}$ days
17. Veer is 20% more efficient than Anurag and Sameer is $33\frac{1}{3}\%$ less efficient than Veer. When all three work together complete a work in 32 days. Find in how many days Veer & Sameer together can complete the same work?
 (a) 48 days (b) 24 days (c) 36 days
 (d) 28 days (e) 54 days
18. Pipe-B & D are inlet pipes and pipe-A & C are outlet pipes. Pipe-B & D together can fill the tank in $\frac{10}{3}$ hours. Pipe-B is 20% & 200% more efficient than pipe-C & A respectively. If efficiency of pipe-C is 50 liters/hr., then find in how many hours all the pipes working together can fill the same tank?
 (a) 15 hours (b) 18 hours (c) 12 hours
 (d) 9 hours (e) 21 hours
19. Manish and Suresh can do a task A in 48 days and 60 days respectively. If they together can complete another task B in x days and Manish alone can complete the task B in (x+ 16) days, then find in how many days Suresh alone can complete task B?
 (a) 45days (b) 36days (c) 28days
 (d) 40days (e) 48days
20. P can do a work in $(\frac{1}{4})^{th}$ of time in which Q alone can do and R can do the same work in same time as P and Q together will take. If all three working together can complete the work in 16 days, then find in how many days P and R together can complete the work?
 (a) $\frac{200}{9}$ days (b) $\frac{148}{9}$ days (c) $\frac{130}{9}$ days
 (d) $\frac{140}{9}$ days (e) $\frac{160}{9}$ days
21. P alone and Q alone can do a piece of work in x and $\frac{3x}{2}$ days respectively, if they both work alternatively starting with Q then the work will be complete in 30 days. Find in how many days Q alone can complete the work ?
 (a) 32.5 days (b) 37.5 days (c) 38.5 days
 (d) 42.5 days (e) 36.5 days
22. Anurag is 40% more efficient than Ayush. Ayush, Anurag and Shivam working together can do a work in 30 days and Shivam is 20% less efficient than Ayush. Find in how many days Ayush & Shivam working together can do same work?
 (a) $51\frac{1}{3}$ days (b) $49\frac{1}{3}$ days (c) $47\frac{1}{3}$ days
 (d) $45\frac{1}{3}$ days (e) $53\frac{1}{3}$ days
23. Neha who is 50% more efficient than Ritu who take double time than Priya to complete a work. Neha can complete a work in 'x' days while Priya can complete the same work in (x - 15) days. In how many days all three can completes the same work together?
 (a) 36 days (b) 30 days (c) 22.5 days
 (d) 20 days (e) 18 days
24. A, B and C can do a piece of work in 20 days, 10 days and 15 days respectively. They all started the work together but after 2 days B left the work and A left the work 1.5 days before the completion of work. Find the time in which work gets completed.
 (a) 7.5 days (b) $6\frac{2}{3}$ days (c) 8 days
 (d) 6.5 days (e) 9 days
25. Working efficiency of 'A' is twice than that of 'B'. 'A' and 'B' together can complete the work in 60 days while 'A', 'B' and 'C' together can complete the same work in 45 days. Find in how many days 'B' and 'C' together can complete the work.
 (a) 90 days (b) 45 days (c) 30 days
 (d) 40 days (e) 75 days

- 26.** 7 men and 6 women together can complete a piece of work in 8 days and work done by a woman in one day is half the work done by a man in one day. If 8 men and 4 women started working and after 3 days 4 men left the work and 4 new women joined then, in how many more days will the work be completed
 (a) 7 days (b) 6 days (c) 5.25 days
 (d) 6.25 days (e) 8.14 days
- 27.** Deepak is 30% less efficient than Dharam and Dharam take 9 days less to complete the work alone than the time taken by Deepak to complete the same work alone. Find in how many days the same work will be completed, if Deepak and Dharam both starts working together?
 (a) $13\frac{14}{17}$ days (b) $11\frac{8}{17}$ days (c) $14\frac{5}{17}$ days
 (d) $12\frac{6}{17}$ days (e) None of the above.
- 28.** B is 40% less efficient than A and efficiency of C is $\frac{1}{4}$ th the efficiency of A and B together. If C joined A and B every third day ,then all three together complete the work in $27\frac{3}{4}$ days. Find in how many days will B alone complete the work?
 (a) 40days (b) 60days (c) 50days
 (d) 100days (e) 80days
- 29.** If pipe A alone and Pipe B alone can fill a tank in 20 min and 30 min respectively and pipe C alone can empty it in 10 min. If the tank is completely filled, then find the time taken to empty the tank if all the three pipes are opened simultaneously?
 (a) 45 min (b) 50 min (c) 60 min
 (d) 40 min (e) 55 min
- 30.** Pipe A, B and C can fill a cistern in 15 minutes, 24 minutes and 36 minutes respectively. If all the three pipes A,B and C are opened alternatively for 1 minute starting from Pipe A, then Pipe B and then Pipe C, then find in how many minutess will the tank be filled by them?
 (a) $21\frac{17}{24}$ min (b) $22\frac{19}{24}$ min (c) $23\frac{17}{24}$ min
 (d) $20\frac{11}{24}$ min (e) $21\frac{1}{2}$ min
- 31.** A pipe can fill a cistern in 15 min and another pipe can fill the same cistern in 60 min. a third pipe can empty it in 10 min. the first two pipes are kept open for 10 min in the beginning and then the third pipe is also opened, what is the time taken to empty the cistern?
 (a)45 min (b)60 min (c)50 min
 (d)48 min (e)55 min
- 32.** Two pipes A and B can fill a cistern in 12 hours and 8 hours respectively. The pipes are opened simultaneously, and it is found that due to leakage in bottom, 12 min extra are taken to the cistern to be filled. If the cistern is full, in how much time the leak empties the cistern alone?
 (a) 120 hours (b) 112 hours (c) 108 hours
 (d) 132 hours (e) 96 hours
- 33.** A and B working together can do a piece of work in 24 days, B and C working together can do the same piece of work in 15 days and A and C working together can do the same piece of work in 20 days. They all worked together for 6 days and then A and C leaves the work. How many days will B take to finish the remaining work?
 (a) 15 days (b) 8 days (c) 12 days
 (d) 21 days (e) 18 days
- 34.** Three persons A, B and C together undertake to complete a piece of work for Rs 1600. A can complete the work alone in 6 days, B alone in 15 days and C alone in 24 days respectively. If they complete the work with the help of person D in 3 days, then find the wage of person D?
 (a) Rs 250 (b) Rs 350 (c) Rs 210
 (d) Rs 280 (e) Rs 230
- 35.** A does $66\frac{2}{3}\%$ of work in 8 days and is replaced by B and B completes the remaining work. If whole work is completed in 14 days, then find difference of days taken by A and B alone to complete the work.
 (a) 3 days (b) 5 days (c) 6 days
 (d) 2 days (e) 8 days
- 36.** A and B working together can do a piece of work in 24 days, B and C working together can do the same piece of work in 15 days and A and C working together can do the same piece of work in 20 days. They all worked together for 6 days and then A and C leaves the work. How many days will B take to finish the remaining work?
 (a) 15 days (b) 8 days (c) 12 days
 (d) 21 days (e) 18 days
- 37.** Three persons A, B and C together undertake to complete a piece of work for Rs 1600. A can complete the work alone in 6 days, B alone in 15 days and C alone in 24 days respectively. If they complete the work with the help of person D in 3 days, then find the wage of person D?
 (a) Rs 250 (b) Rs 350 (c) Rs 210
 (d) Rs 280 (e) Rs 230
- 38.** A does $66\frac{2}{3}\%$ of work in 8 days and is replaced by B and B completes the remaining work. If whole work is completed in 14 days, then find difference of days taken by A and B alone to complete the work.
 (a) 3 days (b) 5 days (c) 6 days
 (d) 2 days (e) 8 days

39. If $(3p + 6)$ men can complete a work in $33\frac{1}{3}\%$ less time than $(\frac{2}{3}p + 12)$ men can complete the same work. Then find time taken by $3(p-2)$ men to complete the same work if $(3p + 6)$ men completed the work in 100 day.
- (a) 150 days (b) 75 days (c) 125 days
(d) 100 days (e) 200 days

40. The efficiency of A is 40% more than that of B and efficiency of C is $14\frac{2}{7}\%$ less than that of A. Time taken by A and B together to complete the work is 11 days. Find the number of days taken by all of them to complete the thrice of the same work, working simultaneously.
- (a) 13 days (b) 22 days (c) 11 days
(d) 26 days (e) None of these

Mains Questions

1. A and B working together, can do a piece of work in $4\frac{1}{2}$ hours. B and C working together can do it in 3 hours. C and A working together can do it in $2\frac{1}{4}$ hours. If all the three begin the work together. Find how much time they will take to finish the piece of work?
- (a) 3 hours (b) 2 hours (c) 2.5 hours
(d) 1 hour (e) 1.5 hours
2. Working efficiency of A is 20% more than that of B. B can complete a work 'X' in 36 days. B and C together started working on the work 'X' and after 10 days they both left the work and then remaining work is done by A alone in 15 days. After that, A, B and C working together completed $\frac{1}{3}$ rd of work 'X', and then A and C are replaced by D. Now remaining of work 'X' is completed by B and D together in 12 days. In how many days D alone can complete the work?
- (a) 36 days (b) 30 days (c) 45 days
(d) 40 days (e) 50 days
3. Ratio of efficiency of A and B in completing a work is 3 : 4. Both started to work together but A left after 2 days. Another person C joins B and they together complete the remaining work in 6 days. If A and B together can complete the work in 8 days then C alone can complete the work in how many days?
- (a) $\frac{27}{4}$ days (b) $\frac{56}{3}$ days (c) $\frac{41}{3}$ days
(d) $\frac{28}{3}$ days (e) $\frac{49}{3}$ days
4. Two pipes A and B together can fill a tank in 20 hours. Ratio of efficiency A and B is 5 : 4. If both pipe together filled the tank for the first 4 hours, after that pipe B closed and another pipe C is opened and tank filled in another 9 hours. find pipe C alone can fill the tank in how many hours.
- (a) $\frac{90}{7}$ hour (b) $\frac{80}{5}$ hour (c) $\frac{180}{11}$ hour
(d) $\frac{180}{7}$ hour (e) $\frac{90}{11}$ hour

5. Abhishek can do a work in x hours. Bhavya who is 60% more efficient than Abhishek can complete a work 5 hours earlier than Abhimanyu. Abhimanyu worked for 5 hour and finds out that only 25% of work is completed and Remaining work is completed by Abhishek and Bhavya together. Find the total time in which work is completed. (in hours)
- (a) $13\frac{12}{13}$ (b) $15\frac{12}{13}$ (c) $11\frac{12}{13}$
(d) $17\frac{12}{13}$ (e) $19\frac{11}{15}$
6. 20 men can complete a work in 12 days and 5 women are as efficient as 3 men. 4 men and 10 women started the work and worked for 8 days, then find the additional number of women required to complete the remaining work in 10 more days.
- (a) 6 (b) 5 (c) 7
(d) 10 (e) 8
7. Veer is 40% less efficient than Bhavya and both complete the work together in 30 days, if Abhishek takes 10 days less as Veer and Bhavya takes together. Then find how many days will be required to complete the work, if all three work together?
- (a) 16 days (b) 12 days (c) 10 days
(d) 8 days (e) 18 days
8. A and B together can do a piece of work in 48 days and B & C together do the same work in 36 days. If first 24 day A work alone next 36 days B work alone and remaining work complete by C in 20 days, then find in how many days A and C complete work together?
- (a) $27\frac{4}{5}$ days (b) $22\frac{4}{5}$ days (c) $25\frac{4}{5}$ days
(d) $26\frac{4}{5}$ days (e) $28\frac{4}{5}$ days
9. Ram can do a piece of work in 60 days and Shyam is 25% more efficient than Ram. If divya can do the same work in 32 more days than Shyam, then find if all work together, work completed in how many days ?
- (a) 24 days (b) 20 days (c) 30 days
(d) 25 days (e) None of these

- 10.** A can type 40 pages in 8 hours and B type 2 times more than that of A per hours. Then find time taken by B to type 5700 pages if he works 5 hour per day.
 (a) 75 days (b) 77 days (c) 74 days
 (d) 73 days (e) 76 days
- 11.** A certain work was started by 4 men and 10 women who completed 50% of the work in 6 days, if another 2 men and 2 women joined them and they could complete $\frac{2}{3}$ rd of the remaining work in three days. How many men along with 6 women are required to complete the remaining work in two more days?
 (a) 3 (b) 5 (c) 6
 (d) 9 (e) None of these
- 12.** A takes half as long to do a piece of work as B takes and C does it in the same time as A and B together. if all three working together would take 7 days, then find how long would each take separately?
 (a) 21 days, 42 days, 14 days
 (b) 20 days, 0 days, $\frac{40}{3}$ days
 (c) 15 days, 45 days, $\frac{45}{4}$ days
 (d) 15 days, 45 days, 12 days
 (e) None of these

Direction (13-14); These questions are based on the information given below.

Each of A, B, C and D need a unique time to do a certain work. A can do the work in x days and B can do the work in $2x$ days. A started the work and do it for $22\frac{2}{9}$ days then he is replaced by B, who completed remaining work in same time as C and D together can complete the whole work. The ratio of the efficiency of C and D is 4 : 5. If C and D work for alternative days starting from C then they can do the total work in $44\frac{1}{2}$ days.

- 13.** What is the value of x ?
 (a) $66\frac{2}{3}$ (b) $33\frac{1}{3}$ (c) $16\frac{2}{3}$
 (d) $14\frac{2}{7}$ (e) $37\frac{1}{7}$
- 14.** A and B together can compete 225% of the work in how many days?
 (a) $66\frac{2}{3}$ days (b) 60 days (c) 50 days
 (d) 25 days (e) 45 days
- 15.** Working alone, A can complete a task in 'a' days and B in 'b' days. They take turns in doing the task with each working 2 days at a time. If A starts they finish the task in exactly 10 days. If B starts, they take half a day more. How long does it take to complete the task if they both work together? (2 Marks)
 (a) $5\frac{1}{3}$ days (b) $5\frac{1}{7}$ days (c) $5\frac{5}{9}$ days
 (d) $5\frac{5}{11}$ days (e) $7\frac{1}{7}$ days

Directions (16-17): 10 men and 12 women can complete a work in 5 days and 2 women and 6 children can complete the same work in 32 days. The work done by 6 men in one day is equal to the work done by 8 women and 8 children together in one day.

- 16.** If 8 men and 4 women start another work 'X' and they worked for 5 days and completed $\frac{1}{3}$ rd of the work. In how many days the remaining work is done by 8 women 4 children. They all work with same individual efficiency on work 'X' as they work on original work
 (a) 25 days (b) 20 days (c) 23 days
 (d) 10 days (e) 16 days
- 17.** 10 men start another work 'Y' and completed that work in certain days. How many women and children should be assigned to do the same work in same number of days as 10 men take. Given that number of children working is double of the number of women they all work with same individual efficiency on work 'Y' as they work on original work.
 (a) 4 women, 8 child
 (b) 5 women, 10 child
 (c) 15 women, 30 child
 (d) 10 women, 20 child
 (e) 6 woman, 12 child

Direction (18-19); Answer these questions based on the information given below.

A and B together can do a piece of work in 16 days. B and C together can do the same work in 32 days. C can complete the same work in 80 days. After A has worked for 4 days, B for 12 days, time taken by C to complete the remaining job is x days.

- 18.** P, Q and R take $(x - 28)$ days, $(x - 18)$ days and $(x - 8)$ days respectively to complete an another job. The three work in a rotation to complete the job with only 1 person working on a day. Who should start the job so that the job is completed in the least possible time?
 (a) P (b) Q (c) R
 (d) Any one of the three
 (e) Can't be determined
- 19.** Tap A takes $(x - 44)$ days to fill a tank. Tap B takes $(x - 42)$ days to fill the tank. If both the taps were opened simultaneously, then by the time the tank was full, what fraction of the tank was filled by tap A?
 (a) $\frac{2}{5}$ (b) $\frac{2}{3}$ (c) $\frac{1}{5}$
 (d) $\frac{3}{5}$ (e) $\frac{1}{7}$

Directions (20-21): Answer these questions based on the information given below.

6 men complete a piece of work in 12 days. 8 women can complete the same piece of work in 18 days. Whereas 18 children can complete the piece of work in 10 days. 4 men, 12 women and 20 children work together for 2 days, and then only 36 men were to complete the remaining work in x day.

20. A can do a piece of work in $10x$ days and B can do the same work in $20x$ days. They do the work on alternative days starting from A then in how many days A and B can complete the work?
 (a) 11 days (b) 12 days (c) 13 days
 (d) 14 days (e) 15 days

21. $56x$ soldiers can complete a piece of work in 24 days. In how many days can 42 soldiers complete the same piece of work?
 (a) 32 days (b) 24 days (c) 16 days
 (d) 48 days (e) 36 days

Directions (22-23): Each of A, B, C and D require a unique time to do a certain work. B requires twice the time A requires to do the work. A started the work and do it for 10 days, then he is replaced by B, who worked for four more days than A worked, after that B also left the work. C and D started working on alternative days starting from C and both completed the remaining work in 30 days. The ratio of the efficiency of C and D is 5 : 3 and both together did 32% of the total work.

22. In how many days, A alone can complete twice the work?
 (a) 25 days (b) 30 days (c) 40 days
 (d) 50 days (e) 60 days

23. E and F together work for 12 days, then they are replaced by A and B and they completed the remaining work in 10 days. If the ratio of efficiencies of E and F is 3 : 2 and E and F together completed the whole work then find the difference between the part of work done by E and the part of work done by F in one day?
 (a) $\frac{1}{200}$ (b) $\frac{1}{150}$ (c) $\frac{1}{300}$
 (d) $\frac{1}{75}$ (e) $\frac{1}{100}$

24. A contractor took a construction work for Rs.400000 and employed 50 men to complete the work in 20 days. He decided to set aside 25% of the amount as profit for himself and distributed rest of the amounts among the workers as their wages. But at the end of 18th day, he noticed that the work is behind the schedule. So he employed some women along with the men and decided to pay a woman 80% of what was paid to a man per day. The work was completed 3 days later than the schedule. If the contractor finally had a profit of Rs.31000 only, then how many women were employed by him?
 (a) 25 (b) 20 (c) 15
 (d) 10 (e) 12

Directions (25-26): A is thrice as good a workman as B and therefore is able to finish a job in 80 days less than B. If A and B complete $\frac{5}{8}$ th of the job and then A is replaced by C, the remaining job is done by B and C in 15 days. If A and

B complete $\frac{5}{12}$ th of the job and then B is replaced by D the remaining job is done by A and D in 10 days.

25. How long will it take to complete job the job, if A,B,C and D working together?
 (a) 12 days (b) 10 days (c) 15 days
 (d) 18 days (e) 20 days

26. The job is completed in the following manner: A and B work on day 1, B and C work on day 2, C and D work on day 3, D and A work on day 4 and so on. How long will it take for the job to be completed in this manner?
 (a) 30 days (b) 24 days (c) 18 days
 (d) 15 days (e) 12 days

Directions (27-29): Working efficiency of A is 20% more than that of B, who can complete a work 'X' in 36 days. B and C together started to complete the work 'X' and after 10 days they both left the work and then remaining work is done by A alone in 15 days.

A and C together started to complete another work 'Y' and after working for 12 days they both left the work and Remaining work is done by B alone in 16 days. if D first completed work 'X' and then completed work 'Y' in total 38 days.

It is given that efficiency of all, in completing work 'X' and work 'Y' is same.

27. A, B and C working together completed $\frac{1}{3}$ rd of work 'X', and then A and C are replaced by D. Now remaining of work 'X' is completed by B and D together. For how many days B worked?
 (a) 12 days (b) 10 days (c) 15 days
 (d) 4 days (e) 16 days

28. A, C and D working simultaneously completed work 'X' in 'n' days and after A, B, C and D working simultaneously completed work 'Y' in 'm' days. Find the value of (m+n)?
 (a) 15 days (b) 10 days (c) 12 days
 (d) 8 days (e) 17 days

29. A person E starts the work 'X' and leave after 12 days, then B and C complete the remaining work in 8 days. What is the ratio of number of days taken by A and E together to complete the work 'X' to the number of days taken by D, B and C together to complete the both work 'X' and 'Y'.
 (a) 3 : 5 (b) 5 : 3 (c) 8 : 7
 (d) 1 : 2 (e) None of these

30. A and B can do a work in 30 days, B and C do same work in 24 days. If first 16 days A work alone, next 24 days B work alone and in the last C complete the remaining work in 12 day then how many days B complete the whole work alone
 (a) 60 days (b) 45 days (c) 90 days
 (d) 120 days (e) None of these

Directions (31-32): P, Q and R are 3 small pumps fitted to a tank. S is a large pump fitted to the tank. Q is 50% more efficient than P. R is $33\frac{1}{3}\%$ more efficient than Q. S is 50% more efficient than R. All of the pipes are used to fill the tank.

31. What is the ratio of the time taken by pumps P and R to fill the tank together to the time taken by pumps Q and S to fill the tank together ?

- (a) 3 : 2 (b) 4 : 3 (c) 2 : 3
(d) 3 : 5 (e) None of these

32. If pump S starts emptying the tank instead of filling it, then find the ratio of time taken by all pumps fill the tank and pipe S emptying to the time taken by all pumps to fill the tank together?

- (a) 7 : 5 (b) 5 : 1 (c) 1 : 5
(d) 2 : 3 (e) 4:1

Directions (33-34): Bibhor takes 3 hours to fetch as much water as Ahmed can fetch in 2 hours. Deepak takes 5 hours to fetch as much water as Bibhor can fetch in 4 hours. A tank takes 20 hours to fill if all work together.

33. What time would Bibhor take to fill the tank alone?

- (a) 50 h (b) 56 h (c) 77 h
(d) 66 h (e) 88 h

34. What time would be taken by them to fill the tank if they fill the tank in the following manner :

Deepak and Bibhor fill together in 1st hr.
Bibhor and Ahmed together in 2nd hr.
And Ahmed and Deepak together in 3rd hr.

- (a) 45 h (b) 35 h (c) 40 h
(d) 30 h (e) 25 h

Directions (35-36): The daily work of two men is equal to that of 3 women or that of 4 youngsters. By employing 14 men, 12 women, and 12 youngsters a certain work can be finished in 24 days.

35. If it is required to finish it in 14 days and as an additional labor, only men are available, how many of them will be required?

- (a) 20 (b) 30 (c) 25
(d) 15 (e) 28

36. If it is required to finish it in $19\frac{1}{5}$ days and as an additional labor, only women and youngsters are available in pairs, how many pairs of women and youngsters will be required?

- (a) 7 (b) 5 (c) 6
(d) 8 (e) 4

37. A can complete a work in 20 days and B can complete the same work in 16 days. C's work efficiency is $33\frac{1}{3}\%$ of the work efficiency of A and B together. In how many day A, B and C can complete the work if they work alternatively starting from A followed by B and C?

- (a) $18\frac{4}{5}$ days (b) 18 days (c) 14 days
(d) $19\frac{4}{5}$ days (e) $20\frac{1}{5}$ days

38. Time taken by A and B to complete a work is in the ratio 4 : 5. A alone worked for 6 days and left the work then B alone worked for 8 days on the same work, It is found that 31% of the work is completed. Find the time in which they together can complete the work.

- (a) $\frac{100}{9}$ days (b) $\frac{200}{9}$ days (c) $\frac{100}{6}$ days
(d) $\frac{200}{3}$ days (e) $\frac{100}{3}$ days

39. There are three pipes connected to the tank. Pipe A and pipe B can fill the tank while pipe C alone can empty the tank in 12 hours. Pipe A is 80% more efficient than pipe B. If all the pipes are opened simultaneously then the tank is filled in $13\frac{11}{13}$ hours. Find the time in which pipe A and pipe B together can fill the tank when pipe C is closed for whole time.

- (a) $\frac{45}{6}$ hr (b) $\frac{25}{3}$ hr (c) $\frac{45}{7}$ hr
(d) $\frac{35}{4}$ hr (e) $\frac{40}{7}$ hr

40. Q is 50% more efficient than P, who completed a task in 45 days and R can do the same task in 7.5 days less than Q did. If P and Q start task together and after X day they left the task and R completed the remaining task in (X + 9) day. if Ratio between task done by (P + Q) together to task done by R alone is 1 : 2, Then find the value of X ?

- (a) 4.5 days (b) 7 days (c) 6 days
(d) 5 days (e) 4 days

41. There are 2 inlet pipes and 1 outlet pipe assigned to fill a tank. If inlet pipe 1 and inlet pipe 2 can fill the tank in 5 hrs and 10 hours respectively and outlet pipe can empty the tank in 15 hrs, then what will be time taken by all three pipes together to fill the tank?

- (a) $20/7$ hours (b) $30/7$ hours (c) $15/4$ hours
(d) 7 hours (e) 9 hours

42. A ship is 108 km away from the shore when a leak appears on its bottom surface which admits 2.5 tons of water in 10 minutes. 40 tons of water is required to start sinking the ship but the pumps can throw out 2 tons of water in 12 minutes. Find the average rate of sailing at which ship must sail so that it may just reach the shore as it begins to sink.

- (a) 13.5 kmph (b) 16.5 kmph (c) 10 kmph
(d) 15 kmph (e) 12.5 kmph

43. There are four pipes connected to a tank – A, B, C and D. A & D are inlet pipes and B & C are outlet pipes. When all four pipes are opened together, then the tank will be filled in 40 minutes. When B & D are opened together, then the tank will be filled in 60 minutes. If D is twice as efficient than C and A is 25% more efficient than C, then find in how much time the tank will be filled when A & C are opened together?
 (a) 120 minutes (b) 100 minutes (c) 90 minutes
 (d) 70 minutes (e) None of the above.
44. B alone can complete a piece of work in 36 days while D alone can complete same piece of work in 25 days. C is 50% more efficient than B and A is 20% less efficient than C. If all four starts working together (B & C are working with 56% & 20% more efficiency respectively than their usual efficiency), then in how many days the work will be completed?
 (a) 12 days (b) 18 days (c) 15 days
 (d) 6 days (e) 10 days
45. Tap A and B together can fill a tank in 6 hours while B and C together can fill the same tank in 9 hours. If A fill the tank for 4 hours and C fill the tank for 6 hours then the remaining tank is filled by B in 5 hours. Then, find in how many hours tap C alone can fill the tank?
 (a) 17.5 hours (b) 21 hours (c) 24 hours
 (d) 22.5 hours (e) 27.5 hours
46. Dharam alone can complete a piece of work in 18 days. Deepak and Veer together can complete same piece of work in 10 days and got total Rs. 1575 for their work out of which share of Deepak is Rs. 450. Find time taken by Dharam and Veer to complete the work?
 (a) $10\frac{2}{5}$ days (b) $9\frac{3}{5}$ days (c) $5\frac{3}{4}$ days
 (d) $7\frac{7}{8}$ days (e) $8\frac{3}{4}$ days
- Direction (47 – 48):** Efficiency of A is two times more than efficiency of B. Both A & B start working alternatively, starting with A and they complete the work in total $74\frac{2}{3}$ days. C can alone complete the same work in 100 days.
47. If efficiency of D is $33\frac{1}{3}\%$ more than that of C, then find time taken by A & D together to complete the work?
 (a) 30 days (b) 20 days (c) 24 days
 (d) 36 days (e) 40 days
48. If A, B & C work for 36 days, 18 days & 16 days and get total wage of Rs. 2500, then find difference between wage of share of B & C together and wage share of A?
 (a) 900 Rs. (b) 1500 Rs. (c) 1100 Rs.
 (d) 1800 Rs. (e) 800 Rs.
49. P and Q together can complete a work in 24 days, while Q and R working together can complete the same job in 32 days. P and Q started the work and did it for 8 days, after that P left the work and R joined Q and after 12 more days, Q also left the work. Then, the remaining work was completed by R in 28 days. Find in how many days R will complete the work alone?
 (a) 96 days (b) 72 days (c) 108 days
 (d) 90 days (e) 81 days
50. A, B and C can do a work in 12, 15 and 20 days respectively. All three started together but C left in between before completion of work. The remaining work was completed by A and B and the total work was completed in 6 days. Find after how many days C left the work?
 (a) 2 (b) 3 (c) 4
 (d) 1 (e) 5
51. 'X' men can complete a work in 4 days. '(X – 2)' women can complete the same work in 8 days, while ratio of efficiency of man to woman is 3 : 2. If ' $\frac{X}{2}$ ' men & '(X – 2)' women started the work & worked for only 2 days then, how many women should replace to men to complete the remaining work in three days?
 (a) 2 women (b) 8 women (c) 6 women
 (d) 4 women (e) 16 women
52. Ravi who is 20% more efficient than Manoj while 10% less efficient than Mahesh. Mahesh & Manoj when working together with double their efficiencies can complete a work in 5 days. Find the time taken to complete the work by all when working together if Ravi works with $\frac{5}{6}$ th of his actual efficiency.
 (a) $7\frac{1}{5}$ days (b) $3\frac{16}{53}$ days (c) 3.5 days
 (d) $6\frac{32}{53}$ days (e) 7 days
53. A work can be completed by A, B and C when working together in 12 days. If B working alone can complete 25% of the same work in 8 days and ratio of efficiency of C to that of A is 1:4. Find in how many days A and B can complete the same work together?(in days)
 (a) $12\frac{5}{7}$ (b) $13\frac{5}{7}$ (c) $14\frac{5}{7}$
 (d) $11\frac{5}{7}$ (e) $10\frac{5}{7}$
54. 24 men can complete a work in 20 days. 36 women can do the same work in 40 days. 54 children can do that work in 40 days. 18 women and 18 children together do that work for 32 days and 'X' number of men complete the remaining work in four days, then find (X + 14) women & (X – 13) child can do the same work in how many days?
 (a) 16 days (b) 24 days (c) 20 days
 (d) 30 days (e) 36 days

55. Anurag & Veer works to complete a task while Sameer works to destroy the task. Anurag and Veer together can complete the task in $8\frac{4}{7}$ hours, while when all three works together task is completed in 12 hours. If ratio of efficiency of Veer (in completing a task) is 50% more

than that of Sameer (in destroying a task) and Sameer takes 10 hours more to destroy the task that Veer alone to complete the task, then find time required when Anurag & Sameer works together?

- (a) 36 days (b) 12 days (c) 40 days
(d) 24 days (e) 30 days

Previous Year Question

1. C is 100% more efficient than B. A alone can complete a piece of work in 9 days and B & C together can complete the same work in $2\frac{2}{3}$ days. Find what portion of work will be completed, if A & B works together for 4 days.

- (a) $\frac{13}{18}$ (b) $\frac{8}{9}$ (c) $\frac{5}{6}$
(d) $\frac{2}{3}$ (e) $\frac{17}{18}$

IBPS Clerk Prelims 2019

2. A alone can fill a tank in 16 mins and B alone can fill the same tank in 'X' mins. C alone can empty the tank in 12 mins. A, B, and C together take $34\frac{2}{7}$ min to fill the tank. What is the time taken by B alone to fill the tank?

- (a) 12 min (b) 16 min (c) 20 min
(d) 24 min (e) 18 min

IBPS Clerk Mains 2019

3. If Pipes A and B can fill a tank in 15 min and 20 mins respectively and pipe C empties the tank in 12 mins. what will be the time taken by A, B and C together to fill the tank completely?

- (a) 25 min (b) 30 min (c) 40 min
(d) 20 min (e) 35 min

IBPS RRB PO Prelims 2019

4. A, B and C together can complete a work in 8 days and A alone can complete the same work in 24 days. If A and B started the work and after 2 days C also joined them, then remaining work was completed by A, B and C together in $6\frac{4}{5}$ days. Find in how many days B alone can complete the whole work?

- (a) 28 days (b) 36 days (c) 24 days
(d) 32 days (e) 30 days

RRB PO Mains 2019

5. Two inlet taps A and B can fill a tank in 36 minutes and 60 minutes respectively. Find the time taken by both the taps together to fill $\frac{1}{6}$ th of the tank?

- (a) 3 minutes (b) $3\frac{3}{4}$ minutes (c) $3\frac{1}{2}$ minutes
(d) $3\frac{1}{3}$ minutes (e) $2\frac{1}{3}$ minutes

RRB Clerk Prelims 2019

6. Efficiency of A is 40% more than that of B and ratio of efficiency of C to A is 6:7. Time taken by A and C together to complete the work is 18 days. Find the number of days taken by all of them working together to complete twice of the same work?

- (a) 32 days (b) 24 days (c) 25 days
(d) 26 days (e) 27.5 days

RRB Clerk Mains 2019

7. 8 men and 10 women can do a work in 15 days while 10 men and 18 women can do that work in 10 days. 4 men and 5 women started the work and after 10 days all men left the work then find how many more women would be required to complete the whole work in 21 days?

- (a) 12 (b) 15 (c) 16
(d) 10 (e) 18

RBI Grade B Phase I 2019

8. A, B & C are three inlet pipes. Time taken by A & B together to fill half of the tank is same as time taken by pipe C alone to fill one - sixth of the tank. If A, B & C together can fill the tank in 9 hours, then find time taken by pipe C alone to fill the tank?

- (a) 24 hours (b) 18 hours (c) 28 hours
(d) 36 hours (e) 42 hours

RBI Grade B Phase I 2019

9. A can complete 45% of a work in $11\frac{1}{4}$ days and B can do 30% of same work in 3 days. If A, B & C can do the same work in $6\frac{1}{4}$ days, then find that C is how much percent less efficient than A?

- (a) 60% (b) 50% (c) 40%
(d) 54% (e) 72%

SBI PO Prelims 2020

10. 12 men can do a work in 10 days while 10 women can do the same work in 18 days. In how many days 4 men & 6 women together can do the same work?

- (a) $\frac{120}{7}$ days (b) 24 days (c) $\frac{180}{13}$ days
(d) 15 days (e) 18 days

SBI Clerk Prelims 2020

11. The ratio of time taken by A, B & C to complete work alone is 4: 6 : 3 respectively. If all three together complete the work in 8 days, then find in how many days A alone complete three – fourth of the same work?
 (a) 12 (b) 30 (c) 15
 (d) 24 (e) 18

IBPS Clerk Prelims 2020

12. A & B together can complete a piece of work in 9 days. Time taken by A alone to complete the same work is 7.5 days less than time taken by B alone to complete the same work. In how many days B alone will complete $\frac{2}{9}$ of the work?
 (a) 8 days (b) 6 days (c) 7 days
 (d) 5 days (e) 4 days

IBPS RRB PO Prelims 2020

13. 12 women can complete a work in 64 day, then find how many women will be required to complete $\frac{2}{3}$ rd of the same work in 16 days?
 (a) 28 (b) 24
 (c) 36 (d) 32 (e) 48

RRB Clerk Prelims 2020

14. Shivam alone and Deepak alone can finish a task in 6 hours and 10 hours respectively. Find the time taken by both of them together to do twice of the work?
 (a) 8 hr (b) $7\frac{1}{2}$ hr (c) $7\frac{3}{4}$ hr
 (d) 6 hr (e) $6\frac{2}{3}$ hr

RBI Assistant Prelims 2020

15. 40 men can complete a work in 48 days. 64 men started for the same work for x days. After x days, 32 men increased, So, the remaining work is completed in $16(\frac{2}{3})$ days. Find x.
 (a) 5 (b) 8 (c) 10
 (d) 6 (e) None of these

SBI PO Prelims 2019

16. A alone can do a work in 12 days while A and B together can do that work in 7.5 days. Find the time taken by C alone to do that work if C takes 3 days more than that of B alone to do that work?
 (a) 33 days (b) 30 days (c) 23 days
 (d) 27 days (e) 28 days

SBI Clerk Prelims 2019

17. A can complete a piece of work in 33 days and C is three times more efficient than A. Ratio of efficiency of B to that of C is 3 : 2. If all three starts working together, then find in how many days the work will be completed?
 (a) $2\frac{1}{2}$ days (b) 5 days (c) 3 days
 (d) 4 days (e) $4\frac{1}{2}$ days

SBI Clerk Mains 2019

18. A is twice as good a workman as B and together they finish a piece of work in 14 days. The number of days taken by A alone to finish the work is:
 (a) 11 days (b) 21 days (c) 28 days
 (d) 42 days (e) None of these

19. Kamal can do a work in 15 days. Sita is 50 per cent more efficient than Kamal in doing the work. In how many days will Sita do that work?
 (a) 14 days (b) 12 days (c) 10 days
 (d) $10\frac{1}{2}$ days (e) None of these

20. A does half as much work as B in three-fourth of the time. If together they take 18 days to complete a work, how much time shall B take to do it alone?
 (a) 30 days (b) 35 days (c) 40 days
 (d) 45 days (e) None of these

21. 2 men and 3 women together or 4 men together can complete a piece of work in 20 days. 3 men and 3 women will complete the same work in
 (a) 12 days (b) 16 days (c) 18 days
 (d) 19 days (e) None of these

22. 15 men take 20 days to complete a job working 8 h a day. The number of hours a day should 20 men take to complete the job in 12 days
 (a) 5 h (b) 10 h (c) 15 h
 (d) 18 h (e) None of these

23. 45 men can complete the work in 16 days. Four days after they started working, 36 more men joined them. How many days will they now take to complete the remaining work?
 (a) 6 days (b) 8 days (c) days
 (d) $7\frac{3}{4}$ days (e) None of these

24. If 10 men can do a piece of work in 12 days, the time taken by 12 men to do the same piece of work will be:
 (a) 12 days (b) 10 days (c) 9 days
 (d) 8 days (e) None of these

25. 10 men working 6 h a day can complete a work in 18 days. How many hours per day must 15 men work to complete the same work in 12 days?
 (a) 6 (b) 10 (c) 12
 (d) 15 (e) None of these

26. Two taps A and B can fill a water tank respectively in 20 and 24 min. and a third tap C empties the tank at a speed of 3 gallon per min. It takes 15 min to fill the tank if A, B and C are opened together. The capacity of the tank is?
 (a) 180 gallon (b) 150 gallon (c) 720 gallon
 (d) 60 gallon (e) None of these

27. Three taps P, Q and R separately can fill a tank completely in 4, 8 and 12 hours respectively. An another taps S can empty the filled tank in 10 hours. Which technique among the following will fill the empty tank in lesser time than other.
 (a) Q opened alone
 (b) P and S are opened
 (c) P, R and S are opened
 (d) P, Q and S are opened
 (e) None of these
28. A pipe can fill a tank in x h and another pipe can empty it in $y(y > x)$ h. If both the pipes are open, in how many hours will the tank be filled?
 (a) $(x - y)$ h (b) $(y - x)$ h (c) $\frac{xy}{x-y}$ h
 (d) $\frac{xy}{y-x}$ h (e) None of these
29. A pipe can fill a tank with water in 3 h. Due to leakage in bottom, it takes $3\frac{1}{2}$ h to fill it. In what time the leak will empty the fully filled tank?
 (a) 12 h (b) 21 h (c) $6\frac{1}{2}$ h
 (d) h (e) None of these
30. A water tank has two pipes. The empty tank is filled in 12 min by the 1st and the, full tank is emptied by the 2nd in 20 min. The time required to fill the $\frac{1}{2}$ full tank when both pipes are in action, is?
 (a) 16 min (b) 15 min (c) 20 min
 (d) 30 min (e) None of these
31. Three taps are fitted to a cistern. The empty cistern is filled by the first and second taps in 3 and 4 h, respectively. The full cistern is emptied by the third tap in 5 h. If all three taps are opened simultaneously, the empty cistern will be filled up in?
 (a) $1\frac{14}{23}$ h (b) $2\frac{14}{23}$ h (c) 2 h 40 min
 (d) 1 h 56 min (e) None of these
32. A tank can be filled by pipe A in 2 h and pipe B in 6 h. At 10 am pipe A was opened. At what time will the tank be filled if pipe B is opened at 11 am?
 (a) 12 : 45 (b) 5 pm (c) 11 : 45
 (d) 12 pm (e) None of these

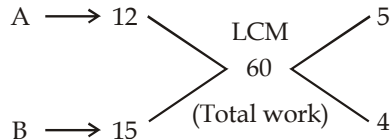
Solutions

Basic Questions

1. **(a):** Here, $M_1 = 18, M_2 = 27, D_1 = 24$
 By the formula
 $M_1 D_1 = M_2 D_2$ $\therefore 18 \times 24 = 27 \times D_2$
 $\therefore D_2 = \frac{18 \times 24}{27} = 16$ days
2. **(a):** Let 1648 persons can construct a dam in x days
 Given, $M_1 = 1648, M_2 = 721$
 $D_1 = x$ days, $D_2 = 48$ days
 $\therefore M_1 D_1 = M_2 D_2 \Rightarrow 1648 \times x = 721 \times 48$
 $x = \frac{721 \times 48}{1648} = 21$ days
 $\therefore 1648$ persons require 21 days to construct a dam.
3. **(a):** Efficiency is inversely proportional to time.
 Efficiency 2 : 1 }
 Persons 20 : 10 } $\therefore 20 : x$
 $\therefore x = \frac{1 \times 10 \times 20}{20 \times 2} = 5$ days.
4. **(d):** $(A + B)$'s 1 day's work = $\frac{1}{6} + \frac{1}{12} = \frac{2+1}{12} = \frac{1}{4}$
 $\therefore A$ and B together will complete the work in 4 days.
5. **(b):** Work done by 12 men in 6 days $\frac{1}{2}$
 Remaining work = $1 - \frac{1}{2} = \frac{1}{2}$
 By the formula
 $\frac{M_1 D_1}{W_1} = \frac{M_2 D_2}{W_2}, \frac{12 \times 12}{1} = \frac{6 \times x}{\frac{1}{2}}$
 $12 \times 12 = 12 \times x \Rightarrow x = 12$
 Extra days to complete the work = $12 - 6 = 6$ days
Shortcut:
 $12 \times 12 = 12 \times 6 + 6 \times x$
 $6x = 12 \times 6 \Rightarrow x = 12$
 No. of extra days = $12 - 6 = 6$ days
6. **(c):** 1 day's work of $A = \frac{1}{12}$
 1 day's work of $B = \frac{1}{15}$
 Part of the work done by A and B in 4 days
 $= 4 \left(\frac{1}{12} + \frac{1}{15} \right) = 4 \left(\frac{5+4}{60} \right) = 4 \times \frac{9}{60} = \frac{3}{5}$
 Remaining work = $1 - \frac{3}{5} = \frac{2}{5}$

∴ Time taken by B to complete the remaining work
 $= \frac{2}{5} \times 15 = 6$ days

Shortcut:



In 4 days, work done by (A + B) = 4(5 + 4) = 36 units

Remaining work done by B = $\frac{24}{4} = 6$ days

7. (d): Working efficiencies are in the ratio 3 : 4
 ∴ ratio of time taken by them = 4 : 3

8. (b): By using MDH formula
 $M_1 D_1 H_1 W_2 = M_2 D_2 H_2 W_1$
 Here, $5 \times 6 \times 6 \times 16 = 12 \times D_2 \times 8 \times 10$
 ∴ $D_2 = \frac{5 \times 6 \times 6 \times 16}{12 \times 8 \times 10} = 3$ days

9. (b): Time taken to fill the tank = 6 h.
 Part of tank filled in 6 h = 1
 Part of tank filled in 1 h = $\frac{1}{6}$

10. (d): Time taken to fill $\frac{1}{8}$ part of tank = 1 h
 ∴ Time taken to fill the empty tank = 8 h.

11. (b): Time taken to empty a cistern = 3h
 Time taken to empty $\frac{2}{3}$ part of the cistern
 $= 3 \times \frac{2}{3} = 2$ h

12. (d): Given time taken by tap A to fill the tank = 60 min
 Let Time taken by tap B to fill the tank = x min

$$\text{There, } \frac{1}{60} + \frac{1}{x} = \frac{1}{40} \Rightarrow \frac{1}{x} = \frac{1}{40} - \frac{1}{60} = \frac{3-2}{120}$$

$$\frac{1}{x} = \frac{1}{120} \Rightarrow x = 120 \text{ min}$$

13. (b): Given pipe A can fill a tank = 10 h
 Pipe B can empty it = 6 h

$$\text{Time taken to empty the full tank} = \frac{1}{\frac{1}{6} - \frac{1}{10}}$$

$$= \frac{1}{\frac{1}{5-3}} = \frac{1}{\frac{1}{5-3}} = 15 \text{ h}$$

14. (b): Given,

Time taken by first tap to fill the tank (A) = 3 h
 Time taken by second tap to fill the tank (B) = 4 h
 And time taken to empty the full tank by third tap (C) = 5hr

∴ Part of the tank will be filled by all there taps in

$$1 \text{ hr} = \frac{1}{3} + \frac{1}{4} - \frac{1}{5} = \frac{20+15-12}{60} = \frac{23}{60} \text{ h}$$

$$\text{Required time} = \frac{60}{23} \text{ h} = 2\frac{14}{23} \text{ h}$$

15. (a): Given,

A = 30 min, B = 10 min, C = 40 min

$$\text{Part of the tank filled in 1 h} = \frac{1}{30} + \frac{1}{10} - \frac{1}{40}$$

$$= \frac{4+12-3}{120} = \frac{13}{120}$$

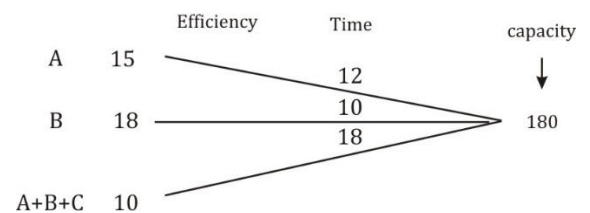
$$\text{Required time} = \frac{120}{13} = 9\frac{3}{13} \text{ h}$$

Prelims Solutions

Level - 1

1. (e): One day work of Veer = $\frac{1}{x}$
 3 day work of Veer = $\frac{3}{x}$
 One day work of Sameer = $\frac{1}{(x+4)}$
 4 day work of Sameer = $\frac{4}{x+4}$
 ATQ,
 $\frac{\frac{3}{x}}{\frac{4}{x+4}} = \frac{15}{16}$
 $(3x + 12) 16 = 60x$
 $48x + 192 = 60x$
 $x = 16$

2. (b): Let capacity of tank = 180 lit (L.C.M of 12,10, and 18)



A+B+C 10
 Efficiency of C (leak) = 10 - 15 - 18 = -23 lit/h.
 -ve sign indicate that water is leaking.

$$23 \text{ lit/h units} = \frac{23}{60} \text{ lit/min units} = 46 \text{ lit/min.}$$

$$180 \text{ units} = \frac{46 \times 60}{23} = 21600 \text{ lit}$$

3. (a): let total work = 96 units (multiple of 16)
Let efficiency of Hemant = $4x$ units/day
Then, efficiency of Manoj and Vikash = $3x$ units/day and $2x$ units/day respectively
ATQ
 $4x + 2x = \frac{96}{16}$
 $6x = 6$
 $x = 1$
Required time = $\frac{96}{3 \times 1 \times \frac{150}{100}} = 21\frac{1}{3}$ days.
4. (d): Let total work be 60 units (LCM)
So, efficiency of Raghav and Dev be 4 units/day and 3 units/day respectively.
4-day work of Raghav and Dev = $(4 + 3) \times 4 = 28$ units
Remaining work = $60 - 28 = 32$ units
So, fraction of work left = $\frac{32}{60} = \frac{8}{15}$
5. (d): Let total work be 90 units (LCM)
So, efficiency of A + B = 5 units/days
And efficiency of B + C = 3 units/day
Let efficiency of C = a units/day
So, efficiency of A = $2a$ units/day
ATQ
 $\Rightarrow 2a + B = 5$ (i)
 $\Rightarrow B + a = 3$ (ii)
From (i) and (ii)
Efficiency of B = 1 unit/day
 \therefore required time = $\frac{90}{1} = 90$ days
6. (b): $\frac{3}{4}$ th work can be done by Ravi in = $\frac{27}{2}$ hrs
 \therefore whole work completed by Ravi = $\frac{4}{3} \times \frac{27}{2}$
= 18 h
And,
Whole work completed by Hira in = $\frac{3}{2} \times 8 = 12$ h
 \therefore Required time = $\frac{18 \times 12}{18 + 12} = 7.2$ h
7. (e): Let efficiency of Shyam = x unit/day
So, Ram's efficiency = $2x$ unit/day
Total work = $16 \times (2x + x) = 48x$
Time taken by Shyam = $\frac{48x}{x} = 48$ days
8. (c): let efficiency of a man and a woman are M and W respectively.
 $9M \times 18 \times 9 = 15W \times 18 \times 9$
 $3M = 5W$
Let time taken by 6 men and 8 women to complete the twice work be D days.
ATQ
 $2 \times 15W \times 18 \times 9 = (6M + 8W) \times 6 \times D$
 $2 \times 15W \times 18 \times 9 = 18W \times 6 \times D$
 $D = 45$ days

9. (d): let efficiency of Hemant and Vikash are H and V respectively.
ATQ
 $15(H + V) = 3(H + V) + 24V$
 $12(H + V) = 24V$
 $12H = 12V$
 $\frac{H}{V} = \frac{1}{1}$
Required percentage = $\frac{1}{1} \times 100 = 100\%$
10. (b): Inlet tap can fill in $\rightarrow 10$ hour
Two inlet to can fill in $\rightarrow 5$ hour
ATQ,
 $\frac{1}{5} + \frac{1}{x} = \frac{2}{15}$
'x' hour take by outlet tap to empty the tank
 $x = 15$
11. (c): let efficiency of Lokesh and Rakesh be x units/day and y units/day respectively.
ATQ
 $6x + 12y = 9x + 8y$
 $3x = 4y$
 $\frac{x}{y} = \frac{4}{3}$
Let $x = 4a$ and $y = 3a$
 \therefore Required time = $\frac{6 \times 4a + 12 \times 3a}{4a} = \frac{60}{4}$
= 15 days
12. (c): One tap D can fill a bucket in = $\frac{36}{4} = 9$ min
One tap E can fill a bucket in = $\frac{12}{2} = 6$ min.
Tap D and E can fill a bucket in = $\frac{9 \times 6}{9 + 6} = \frac{18}{5}$ min
So, in $\frac{18}{5}$ min Water filled = 12 lit
In 60 min Water filled = $\frac{12}{18} \times 5 \times 60 = 200$ lit
So, Capacity of tank = 200 lit
13. (d): let efficiency of a man and a woman are $2a$ units/day and $3a$ units/day respectively
Total work = $(40 \times 2a + 20 \times 3a) \times 12 = 140a \times 12$ units
Required no. of men = $\frac{1}{2} \times \frac{140a \times 12}{7 \times 2a} = 60$
14. (e): let capacity of tank is 12x lit (lcf of time)
Efficiency of tap A = $\frac{12x}{4} = 3x$ lit/hr
Efficiency of A and B together = $\frac{12x}{2.4} = 5x$ lit/hr
So, efficiency of B = $5x - 3x = 2x$ lit/h
ATQ
 $2x \text{ lit/h} = 14 \times 60 \text{ lit/h}$
And $12x \text{ lit} = 14 \times \frac{60}{2} \times 12 = 5040 \text{ lit}$
15. (d): let original no. of men are x
ATQ
 $24 \times (x) = 32 \times (x - 14)$
 $3x = 4x - 56$
 $x = 56$ men

16. (b): Time taken by A to complete the work alone = $9 \times \frac{5}{3} = 15 \text{ days}$
 Time taken by A and B together to complete the work = $5 \times \frac{7}{4} = \frac{35}{4} \text{ days}$
 Let total work = 105 units (LCM)
 So, efficiency of A = $\frac{105}{15} = 7 \text{ units/day}$
 And efficiency of A+B = $\frac{105}{\frac{35}{4}} = 12 \text{ units/day}$
 \therefore efficiency of B = $12 - 7 = 5 \text{ units/day}$
 Now, time taken by B alone to complete the work alone = $\frac{105}{5} = 21 \text{ days}$

17. (d): $15M \times 8 = 10W \times 20$
 $3M = 5W$
 ATQ
 Let time taken by 10 women to complete the remaining work be T days
 $7M \times 12 + 10W \times T = 10W \times 20$
 $\frac{35}{3}W \times 12 + 10W \times T = 200W$
 $10T = 200 - 140$
 $T = \frac{60}{10} = 6 \text{ days}$

18. (e): Let the efficiency of Rohit be $4x$ unit/day.
 So, the efficiency of Sohan = $4x \times \frac{125}{100} = 5x$ unit/day.
 Required number of days = $\frac{40 \times 4x}{4x + 5x} = 17\frac{7}{9} \text{ days.}$

19. (b): Let pipe R alone can empty the tank in x minutes
 ATQ
 $20 \left[\frac{1}{24} + \frac{1}{30} - \frac{1}{x} \right] = 1$
 $x = 40 \text{ minutes}$
 Capacity of the tank = $8 \times 40 \times \frac{1}{2} = 160 \text{ gallons}$

20. (b): Let efficiency of Ayush be x unit/day and efficiency of Anurag is $3x$ unit/day
 So, Anurag work for 19 days and Ayush work for 18 days when Both Anurag & Ayush start working alternatively
 ATQ—
 Total work = $19 \times 3x + 18 \times x = 75x$ units
 Efficiency of Shivam = $\frac{75x}{50}$
 = $1.5x \text{ unit/day}$
 Required time = $\frac{75x}{(x+1.5x)}$
 = 30 days

21. (c): Let A takes y days to do $33\frac{1}{3}\%$ of the work.
 Time taken by A and B alone to complete the whole work will be $4x$ days and $5x$ days
 ATQ
 $\frac{y}{4x} = \frac{1}{3}$

$\Rightarrow 3y = 4x \dots(i)$

And,
 $\frac{y+10}{5x} = \frac{2}{3}$
 $\Rightarrow 3y + 30 = 10x \dots\dots\dots (ii)$

From (i) and (ii)
 $\Rightarrow x = 5$
 A and B alone can complete the work in 20 and 25 days respectively.
 Required difference = 5 days

22. (c): Let one day work of A, B & C be 'x', 'y' & 'z' units respectively

$x + y = \frac{1}{24} \dots\dots\dots (i)$

Given, $x + y + z = \frac{1}{20}$

Given, $z = \frac{x}{2}$

$\frac{3x}{2} + y = \frac{1}{20} \dots\dots\dots (ii)$

From (i) & (ii) -

$\frac{x}{2} = \frac{1}{120}$

$x = \frac{1}{60}$

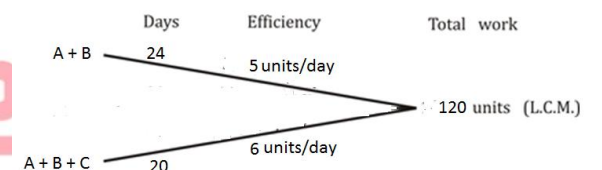
So A takes 60 days, B takes 40 days and C takes 120 days to complete the work individually

B & C together = $\frac{1}{40} + \frac{1}{120}$

= $\frac{3+1}{120} = \frac{1}{30}$

Hence, B & C together can complete the work in 30 days.

Alternate,



Efficiency of C = $6 - 5 = 1 \text{ unit/day}$
 So, efficiency of A and B are 2 units/day and 3 units/day respectively.

ATQ
 Time taken by B & C together to complete the work = $\frac{120}{3+1} = 30 \text{ days}$

23. (c): We know work efficiency ratio of A to B = 5 : 4
 Let time taken by A alone to complete the work = $4x$

And by B to complete the work alone = $5x$
 Atq,
 $5x - 4x = 6$
 $\Rightarrow x = 6$

So, A alone can complete the work in 24 day
 And, B alone can complete the work in 30 day
 A and B working together can complete the work in

= $\frac{1}{\frac{1}{30} + \frac{1}{24}} = \frac{120}{9} = 13\frac{1}{3} \text{ days}$

24. (d): Let the efficiency of B be $5x$ units/day
 Then efficiency of A = $7x$ units/day
 efficiency of C is = $\frac{6}{7} \times 7x = 6x$ units/day
 $\therefore A : B : C = 7 : 5 : 6$
 ATQ,
 Total work = $(A + C) \times 18 = (7 + 6) \times 18 = 234$ units
 Required days = $\frac{234 \times 2}{(7+5+6)} = 26$ days.

25. (b): Let the total work be $48x$ unit
 Efficiency of A = $8x$ units/day
 Let efficiency of B be b units/day
 Remaining work = $48x - 48x \times \frac{1}{8} = 42x$ units
 Let A and B individually work for t days to complete $42x$ unit of work
 ATQ
 $t \times (8x + b) = 42x$
 Since 't' has integral value i.e. 1,2,3 and so on
 For $t=3$ we have $b=6x$ unit/day
 So required day = 8 days

26. (d): Efficiency \Rightarrow
 Ayush Anurag
 $\frac{3}{1}$
 Total work = $(3 + 1) \times 20 = 80$ units
 Required no. of day taken by Anurag = $80 \times \frac{1}{4}$
 $\Rightarrow 20$ days

27. (d):

Person	day	total work	efficiency
A	48	192 unit	4 unit/day
B	64		3 unit/day

Efficiency of C = 14 unit/day
 When all three works alternatively then three day's work = First day work of C + second day work of B + third day work of A
 $= 14 + 3 + 4 = 21$ unit
 In total 27 day = $\frac{27}{3} \times 21 = 189$ unit of work gets completed
 Remaining work will be completed by C in = $\frac{3}{14}$ days
 Total time = $27\frac{3}{14}$ days

28. (d): Ratio of efficiency of Anurag and Bholu = 3 : 5
 \Rightarrow Time taken by Anurag and Bholu alone to complete the work = 5 : 3
 Ratio of time taken by Bholu and Chotu alone to complete the work = 4 : 5
 \Rightarrow Ratio of time taken by Anurag, Bholu and Chotu alone to complete the work = 20 : 12 : 15
 Let, Anurag, Bholu and Chotu alone can complete the work alone in $20x$, $12x$ and $15x$ days respectively.

ATQ,
 $\frac{12}{20x} + \frac{12}{12x} = \frac{80}{100}$
 $\Rightarrow \frac{144+240}{240x} = \frac{4}{5}$
 $\Rightarrow \frac{5 \times 384}{4 \times 240} = x$
 $\Rightarrow x = 2$
 Let in 'a' days 'Bholu' and 'Chotu' can complete 60% of work

ATQ,
 $\frac{a}{12 \times 2} + \frac{a}{15 \times 2} = \frac{60}{100}$
 $\Rightarrow \frac{5a+4a}{120} = \frac{3}{5}$
 $\Rightarrow a = \frac{3}{5} \times \frac{120}{9} = 8$ days

29. (c): Total capacity of tank = 120 units (LCM of time taken by tab A, B & C)
 Efficiency of A = $\frac{120}{24} = 5$ units/min
 Efficiency of B = $\frac{120}{30} = 4$ units/min
 Efficiency of C = $\frac{120}{20} = 6$ units/min
 ATQ,
 Tank filled by A&B in 6 minutes = $(5+4) \times 6 = 54$ units
 Remaining = $120 - 54 = 66$ units
 Required time = $\frac{66}{(5+4+6)} = 22$ minutes.

30. (a):

	Time (hours)	Work (units)	Efficiency (units/hour)
S	4	20	5
N	5		4

Time taken by Sanjeev & Nisha together = 20/9 hours
 Time taken by Madhulika alone to prepare the dish = $\frac{20}{9} \times \frac{80}{100} = \frac{16}{9}$ hours
 Ratio of efficiency of Sanjeev & Madhulika = $\frac{1}{4} : \frac{9}{16} = 4 : 9$

31. (b): Let efficiency of Y = $5w$ units/day
 So, efficiency of X = $5w \times \frac{140}{100} = 7w$ units/day
 Given, time taken by Z to complete the work is $\frac{2}{3}$ rd of the time taken by X.
 So, efficiency of Z = $7w \times \frac{3}{2} = \frac{21w}{2}$ units/day
 One day work of X, Y & Z together = $(5w + 7w + \frac{21w}{2}) = \frac{45w}{2}$ units
 Total work = $\frac{45w}{2} \times \frac{56}{9} = 140w$ units
 Two times of work = $280w$ units
 Required days = $\frac{280w \times 2}{35w} = 16$ days

32. (e):

	Time (hours)	Work (units)	Efficiency (units/hr)
Anurag	10		4
Karan	8	40	5
A+K+S	4		10

Time taken by Sanjay alone to make the video
 $= \frac{40}{10-5-4} = 40 \text{ hour}$

33. (a): Let the capacity of cistern is 60l.

Given
 $\frac{3}{5}$ th of cistern capacity i.e. 36l of the cistern is already full of water.
 Filling rate = $\frac{60}{15} = 4 \frac{l}{hr}$
 Emptying rate = $\frac{60}{12} = 5 \frac{l}{hr}$
 So Effective emptying rate = $\frac{36}{5-4} = 1 \frac{l}{hr}$
 So the cistern will get empty in 36 hr.

34. (c): Let the total work be 60 units.

Then A's efficiency = $\frac{60}{10} = 6 \text{ units/day}$
 B's efficiency = $\frac{60}{15} = 4 \text{ units/day}$
 Now ATQ
 With the help of C work can be done in 4 days
 So C's efficiency = $\frac{60}{12} = 5 \text{ units/day}$
 So C completes $\frac{1}{3}$ rd of the total work in 4 days.
 C's contribution out of Rs.999 = $\text{Rs.}(\frac{999}{3}) = \text{Rs.} 333$
 So C would be paid Rs. 333 for his contribution

35. (b): (A+B) together can complete the work in $4 \times 3 = 12$ days

Let number of days taken by B be n days to complete the entire work alone
 $\frac{1}{30} + \frac{1}{n} = \frac{1}{12}$
 $\frac{1}{n} = \frac{1}{12} - \frac{1}{30} = \frac{5-2}{60} = \frac{3}{60} = \frac{1}{20}$
 B takes 20 days to complete the work alone
 So $\frac{3}{5}$ th of work can be done by B in 12 days

36. (b): Total work = L.C.M of 80,50 and 90 days

= 3600 units
 Total work done by (A+ B) = $45 \times 21 + 72 \times 22 = 2529$ units
 Remaining work = $3600 - 2529 = 1071$
 Time taken by C = $\frac{1071}{40} = 26 \frac{31}{40}$ days

37. (c): 20 male labour's 1 day work = $\frac{1}{30}$

30 female labour's 1 day work = $\frac{1}{24}$
 Together, their 1 day work = $\frac{1}{30} + \frac{1}{24} = \frac{3}{40}$
 They will finish the same work together in = $\frac{40}{3}$ days

38. (c): Let the total work be 20 units

	Time (days)	Work (units)	Efficiency (units/day)
Jai	20		1
Veeru		20	$=(4 - 1) = 3$
J+V	5		4

Work done by Veeru in 5 days = 15 units
 Coins received by Veeru = $\frac{15}{20} \times 500 = 375$

39. (e): Let the capacity of tank be 60 units

then, pipe A's efficiency = $\frac{60}{30} = 2 \text{ units/min}$
 together pipe (A+ B)'s efficiency = $\frac{60}{12} = 5 \text{ units/min}$
 So, pipe B's efficiency = 3 units/min
 Pipe B can fill 45 units i.e. $\frac{3}{4}$ th part of tank in 15 minutes.

40. (b): Efficiency of Basanti = $\frac{1}{3} - \frac{1}{5} = \frac{2}{15} \text{ units/day}$

Efficiency of Veeru = $\frac{50}{100} \times \frac{2}{15} = \frac{1}{15} \text{ units/day}$
 Efficiency of Jai = $\frac{1}{5} - \frac{1}{15} = \frac{2}{15} \text{ units/day}$
 Since the work was finished in 3 days
 Share of Jai = $800 \times \frac{2}{15} \times 3 = \text{Rs.} 320$

Level - 2

1. (b):

	Days	Efficiency	Total work
A + B	72	25 units/day	1800 units (L.C.M.)
B + C	90	20 units/day	
A + C	75	24 units/day	

Let efficiency of A, B & C be 'x', 'y' & 'z' units/day respectively.

ATQ,

$x + y = 25$... (i)

$y + z = 20$... (ii)

$x + z = 24$... (iii)

On solving (i), (ii) and (iii), we get:

$x + y + z = \frac{69}{2}$

Now,

$$\text{Required days} = \frac{1800}{\left(\frac{69}{2}\right)} = \frac{1800 \times 2}{69}$$

$$= \frac{1200}{23} \text{ days} = 52\frac{4}{23} \text{ days}$$

2. (b): Let efficiency of Shubham and Harvinder be S & H respectively.

ATQ

$$5S + 9H = 12H + 3S$$

$$2S = 3H$$

$$\frac{S}{H} = \frac{3}{2}$$

Let S & H be 3a & 2a respectively.

$$\text{So, total work} = 5 \times 3a + 9 \times 2a = 33a$$

Time taken by Harvinder to complete the work while working alone = $\frac{33a}{2a} = 16\frac{1}{2} \text{ days}$

3. (d): Let Capacity of tank be 144 litre.

So, efficiency of Ist Pipe = 4 litre / min

Efficiency of IInd Pipe = 3 litre / min

Efficiency of IIIrd pipe = 8 litre / min

ATQ,

First tank will be filled by pipe Ist & IInd and then emptied when pipe Ist, IInd & IIIrd together are opened

$$\text{So, } (4 + 3) \times 16 = (8 - 4 - 3) t$$

$$t = \frac{112}{1} = 112 \text{ min.}$$

4. (c):

Pipe	Time	Efficiency	Total work
A	60 minutes	5 liters/minute	300 Liters (L.C.M.)
A+B	$\frac{75}{2}$ minutes	8liters/minute	

So, efficiency of pipe - B = $8 - 5 = 3$ liters/minute

And efficiency of pipe - C = $5 \times \frac{120}{100} = 6$ liters/minute

Now,

Work done by all there pipes together in 1 minute

$$= 5 + 3 - 6 = 2 \text{ liters/minute}$$

$$\text{Required time} = \frac{300}{2}$$

$$= 150 \text{ minutes}$$

$$= 2\frac{1}{2} \text{ hours}$$

5. (a): let efficiency of Hemant = h units/day

Let efficiency of Manoj = m units/day

ATQ

$$\frac{20h+15m}{6m+16h} = \frac{3}{2}$$

$$40h + 30m = 18m + 48h$$

$$\frac{h}{m} = \frac{3}{2}$$

$$\text{Let } h = 3x$$

$$m = 2x$$

$$\text{Total work} = \frac{20 \times 3x + 15 \times 2x}{3} \times 5 = 150x \text{ units}$$

$$\text{Required time} = \frac{150x}{5x} = 30 \text{ days}$$

6. (d): ATQ -

$$(4\text{men} + 4\text{women})5 = (6\text{men} + 8\text{women})3$$

$$20\text{men} - 18\text{men} = 24\text{women} - 20\text{women}$$

$$\text{Man} = 2\text{women}$$

$$\text{So, total work} = (8 \text{ women} + 4 \text{ women}) \times 5 = 60 \text{ units}$$

$$\text{Now, new work} = 60 \times 3 = 180 \text{ units}$$

ATQ,

$$(20 \text{ women} + x \text{ women}) \frac{90}{13} = 180$$

$$x = 6$$

7. (e): Let efficiency of A and B be x units/day and y units/day respectively.

ATQ

$$(x + y) \times 6 = \left(x \times \frac{4}{5} + y \times \frac{13}{10}\right) \times 6$$

$$10x + 10y = 8x + 13y$$

$$2x = 3y$$

$$\frac{x}{y} = \frac{3}{2}$$

Now, let x = 3a and y = 2a

$$\text{Total work} = (3a + 2a) \times 6 = 30a \text{ units}$$

$$\text{Required days} = \frac{30a}{3a+2a \times 2} = 4\frac{2}{7} \text{ days}$$

8. (a): Let efficiency of A be '5x units / day'.

$$\text{So, efficiency of B} = 5x \times \frac{140}{100} = 7x \text{ units/day}$$

$$\text{And, efficiency of C} = 7x \times \frac{150}{100} = 10.5x \text{ units/day}$$

Now,

$$\text{Work done by B in 6 days} = 7x \times 6 = 42x \text{ units}$$

$$\text{So, total work} = 42x \times \frac{100}{40} = 105x \text{ units}$$

$$\text{Now, A's new efficiency} = 5x \times \frac{105}{100} = \frac{21x}{4} \text{ units/day}$$

$$\text{Required days} = \frac{105x \times \frac{60}{100}}{10.5x + \frac{21x}{4}} = \frac{63x}{4} = 4 \text{ days}$$

- 9 (e): P_1 can fill the whole tank in $\frac{9 \times 5}{3} = 15$ min.

Let the efficiency of P_1 be 3x unit/min.

$$\therefore \text{total capacity of tank} = 15 \times 3x = 45x \text{ unit}$$

$$\text{Efficiency of } P_2 = 3x \times 1.5 = 4.5x \text{ unit/min}$$

$$\text{Efficiency of } P_3 = 4.5x \times \frac{5}{9} = 2.5x \text{ unit/min}$$

$$\text{Required time} = \frac{45x}{(3x+4.5x+2.5x)} = 4.5 \text{ min.}$$

10. (e): Rohit alone can complete the work in = $280 \times \frac{3}{4}$
= 210 days

Total work = 2520 units (L.C.M. of 210, 280 & 180)

$$\text{Efficiency of Anurag} = \frac{2520}{280} = 9 \text{ units/day}$$

$$\text{Efficiency of Rohit} = \frac{2520}{210} = 12 \text{ units/day}$$

$$\text{Efficiency of Veer} = \frac{2520}{180} - 9 = 5 \text{ units/day}$$

Total one day work of Anurag , Rohit & Veer together = (9 + 12 + 5) = 26 units/day

$$\text{Required time} = \frac{2520}{26} = 96\frac{12}{13} \text{ days}$$

11. (b): ATQ,

$$a \times (2a - 8) = (2a + 12) \times (a - 8)$$

$$a = 24$$

$$\text{Total work} = 24 \times 40 = 960 \text{ units}$$

$$\text{Required time} = \frac{960 \times \frac{1}{3}}{24 \times \frac{2}{9}} = 8 \frac{8}{9} \text{ days}$$

12. (b):

Let the efficiency of a man be m units/day and efficiency of a woman be w units/day

ATQ

$$(8m + 10w) \times 15 = (10m + 18w) \times 10$$

$$\frac{m}{w} = \frac{3}{2}$$

$$\text{Total work} = (8 \times 3 + 10 \times 2) \times 15 = 660 \text{ units}$$

$$\text{Work done in 10 days} = (4 \times 3 + 5 \times 2) \times 10 = 220 \text{ units}$$

Let the number of more women required be x

$$\text{Then } 2 \times (5 + x) \times 11 = 440$$

$$x = 15$$

13. (d): ATQ -

$$2(A + B) = 6C$$

$$A + B = 3C$$

$$\text{Also given, } A + B + C = \frac{1}{9}$$

$$4C = \frac{1}{9}$$

$$C = 36 \text{ hours}$$

14. (a): Total work = 72 units (LCM of days taken by A & B)

Efficiency of A = 3 units / day

Efficiency of B = 2 units/day

In 8 days work A & B together complete the work

$$= 8 \times (3 + 2) = 40 \text{ units}$$

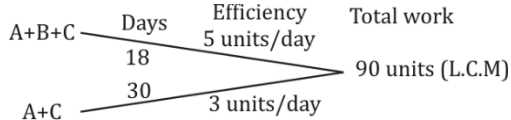
Remaining work = 32 units, which complete by A, B & C together

$$\text{Efficiency of C} = 32 \times \frac{9}{32} - (3 + 2) = 4 \text{ units/day}$$

B & C can complete the 75% of work together =

$$72 \times \frac{3}{4} \times \frac{1}{6} = 9 \text{ day}$$

15. (c):



So, efficiency of B = 5 - 3

$$= 2 \text{ units/day}$$

Let efficiency of A be $2x$ units/day

$$\text{So, efficiency of C} = 2x \times \frac{150}{100}$$

$$= 3x \text{ units/day}$$

Atq,

$$2x + 3x = 3$$

$$x = 0.6$$

$$\text{New efficiency of A} = 2 \times 0.6 \times \frac{150}{100}$$

$$= 1.8 \text{ units/day}$$

$$\text{New efficiency of B} = 2 \times \frac{150}{100} = 3 \text{ units/day}$$

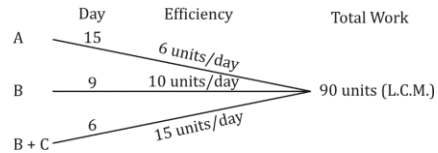
$$\text{Required days} = \frac{90}{(1.8 + 3 + 1.8)}$$

$$= \frac{90}{6.6}$$

$$= \frac{150}{11} \text{ days}$$

$$= 13 \frac{7}{11} \text{ days}$$

16. (d):



So, efficiency of C = 15 - 10

$$= 5 \text{ units/day}$$

$$\text{Required time} = \frac{90}{(6 + 5)}$$

$$= \frac{90}{11} \text{ days}$$

$$= 8 \frac{2}{11} \text{ days}$$

17. (a): Let efficiency of Anurag be $5a$ units/day

$$\text{So, efficiency of Veer} = 5a \times \frac{120}{100} = 6a \text{ unit/day}$$

$$\text{Efficiency of Sameer} = 6a \times \frac{2}{3} = 4a \text{ units/day}$$

$$\text{Total work} = (6a + 5a + 4a) \times 32 = 480a \text{ units}$$

$$\text{Veer \& Sameer together} = \frac{480a}{(6a + 4a)} = 48 \text{ day}$$

18. (a): Efficiency of pipe -B = $50 \times \frac{120}{100}$

$$= 60 \text{ liters/hour}$$

$$\text{And efficiency of pipe -A} = 60 \times \frac{100}{300}$$

$$= 20 \text{ liters/hour}$$

Let capacity of tank be 300 liters (L.C.M of 20, 50 & 60)

$$\text{So, efficiency of pipe -D} = \frac{300}{(\frac{10}{3})} - 60$$

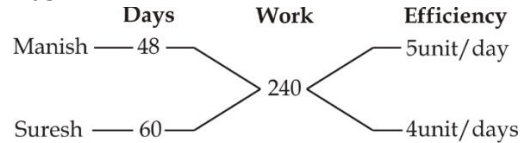
$$= 30 \text{ liters/hour}$$

$$\text{Required time} = \frac{300}{(60 + 30 - 20 - 50)}$$

$$= \frac{300}{20}$$

$$= 15 \text{ hours}$$

19. (a): Task A



ATQ

Task

One day work of Manish and Suresh = 5+4=9 units

$$\text{Total work} = 9x$$

$$\text{Manish alone can do task B in } (x + 16) \text{ days}$$

So total work = $9x = 5(x+16)$
 $x = 20$ days
 Total work = 9×20
 = 180 unit
 Suresh alone can do the work = $\frac{180}{4} = 45$ days

- 20. (e):** Let P can do work in x days
 Q can do in = $4x$ days
 And R can do work in = $\frac{x \times 4x}{4x+x} = \frac{4x}{5}$ days
 ATQ—
 All three together can complete work in = 16 days
 So,
 $\frac{1}{x} + \frac{1}{4x} + \frac{1}{\frac{4x}{5}} = \frac{1}{16}$
 $\frac{4+1+5}{4x} = \frac{1}{16}$
 $x = 40$ days
 P can complete work in $x = 40$ days
 Q can complete work in $4x = 4 \times 40 = 160$ days
 Time taken by R to complete work = $\frac{4x}{5}$ days =
 $\frac{4 \times 40}{5} = 32$ days
 P and R can do work in = $\frac{40 \times 32}{40+32} = \frac{160}{9}$ days

- 21. (b):** Time taken by P alone and Q alone to complete the work = x days and $\frac{3x}{2}$ days
 Ratio between efficiency of P and Q = 3 : 2
 ATQ—
 Work done on first day by Q $\rightarrow 2a$
 Work done on second day by P $\rightarrow 3a$
 2 days work = $(2a + 3a) = 5a$
 Total work = $\frac{30}{2} \times 5a$
 = $75a$
 Q can complete the work alone = $\frac{75a}{2a}$
 = 37.5 days

- 22. (e):** Let Ayush efficiency per/day = $5x$ units/day
 So, efficiency of Anurag per/day = $7x$ units/day
 So, efficiency of Shivam = $5x \times \frac{80}{100} = 4x$ units/day
 Total work = $(5x + 7x + 4x) \times 30 = 480x$ units
 One day work of Ayush & Shivam together = $(5x + 4x) = 9x$ units
 Required day = $\frac{480x}{9x} = 53\frac{1}{3}$ days

- 23. (d):** Ratio of efficiency of Neha and Ritu = 15 : 10 = 3 : 2
 Ratio of time taken by Neha and Ritu alone to complete the work = 2 : 3
 Ratio of time taken by Ritu and Priya alone to complete the work = 2 : 1
 \Rightarrow Ratio of time taken by Neha, Ritu and Priya alone to complete the work = 4 : 6 : 3

ATQ,
 $\frac{4}{3} = \frac{x}{x-15}$
 $\Rightarrow 4x - 60 = 3x$
 $\Rightarrow x = 60$
 Neha alone can do the work in 60 days
 Priya alone can do the work in $(60 - 15 = 45)$ days
 Ritu alone can do the work = $\frac{60}{4} \times 6 = 90$ days
 Work done by Neha, Priya and Ritu together in one day
 $= \frac{1}{60} + \frac{1}{45} + \frac{1}{90} = \frac{3+4+2}{180}$
 $= \frac{9}{180} = \frac{1}{20}$
 Time taken by Neha, Priya & Ritu together to complete the work = 20 days

- 24. (a):** Let the total work be 60 units (LCM of 20, 10 and 15)
 Efficiency of A = 3 units/day
 Efficiency of B = 6 units/day
 Efficiency of C = 4 units/day
 B's work in 2 days = $2 \times 6 = 12$ unit.
 Total remaining work = 48 unit.
 Let C works for x days.
 Then, A will work for $(x - 1.5)$ days.
 ATQ,
 $x \times 4 + (x - 1.5) \times 3 = 48$
 $\Rightarrow x = 7.5$ days

- 25. (a):** Let per day work of A = $2x$ units
 So, per day work of B = x unit
 So, total unit of work = $(2x + x) \times 60 = 180x$ units
 Let, per day work of C = y unit
 $(2x + x + y) \times 45 = 180x$ units
 $y = x$
 Time required to complete the work by B & C together
 $= \frac{180x}{(x+x)} = 90$ days

- 26. (d):** One day work of women = half of work done by a man in one day
 Let efficiency of one woman = w unit/day
 Man's efficiency = $2w$ unit/day
 Total work = $(7 \times 2w + 6 \times w) \times 8 = 160w$ unit
 8 men and 4 women start work for 3 days
 Total work done = $(8 \times 2w + 4 \times w) \times 3$
 = $60w$
 4 women replace 4 man
 $= (4 \times 2w + 8 \times w) = 16w$
 Days required = $\frac{100w}{16w} = 6.25$ days

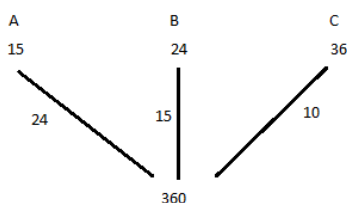
27. (d): Let efficiency of Dharam be '10x units/day'
 So, efficiency of Deepak = 7x units/day.
 Now, ratio of efficiency of Deepak to that of Dharam = 7 : 10
 Hence, ratio of time taken by Deepak to Dharam to complete the work working alone = 10: 7
 Now, let time taken by Deepak alone and Dharam alone to complete the work be 10y days and 7y days respectively.

ATQ,
 $10y - 7y = 9$
 $3y = 9$
 $y = 3$
 Now, total work = $7x \times 10y$
 $= 70xy$
 $= 210x$ units
 Hence, required days = $\frac{210x}{10x + 7x}$
 $= \frac{210x}{17x}$
 $= 12\frac{6}{17}$ days

28. (e): Lets efficiency of A and B = 100x : 60x
 $= 5x : 3x$
 Efficiency of C = $\left(\frac{5x+3x}{4}\right) = 2x$ unit/day
 On every third day C work
 So C work for 9 days = $2x \times 9 = 18x$
 $(A + B)$ work for $27\frac{3}{4} = (5x + 3x) \times \frac{111}{4}$
 $= 222x$
 Total work = $18x + 222x = 240x$
 B alone = $\frac{240x}{3x} = 80$ days

29. (c): Here, Pipe A alone and Pipe B alone can fill the tank in 20 min and 30 min respectively and Pipe C alone can empty the tank in 10 min
 Then, total work = 60 units
 Therefore, efficiency of pipe A and pipe B are 3 units/min and 2 units/min respectively and efficiency of pipe C is 6 units/min
 Total efficiency when all 3 pipes are opened simultaneously = $3+2-6 = -1$ unit/min
 Total time taken to empty the tank if the tank is completely full = $\frac{60}{-1}$
 $= 60$ min (as total efficiency of all 3 pipes is -1)

30. (a):



Here, Efficiency of Pipe A, Pipe B, Pipe C is 24 unit/min, 15 unit/min and 10 unit/min respectively.

And total capacity of cistern = 360 units
 Pipe filled by A, B and C in 3 min = $24 + 15 + 10 = 49$ units
 Pipe filled in 21 mins = $49 \times 7 = 343$ units
 In 22nd minnute, Pipe A can fill the remaining in $\frac{17}{24}$ minnute
 Total time taken = $21\frac{17}{24}$ min

31. (c): Let total capacity of the tank be 60 units (LCM of 15, 60, 10)
 Now, efficiency of the First, second and third pipe be 4 units/min, 1 units/min and 6 units/min respectively.
 Tank filled in first 10 min = $(4 + 1) \times 10 = 50$ units
 Now, when all the pipe work together, 1 unit of water will out in every minute from tank.
 So, 50 units of water will be emptied in 50 min.

32. (a): Let the total capacity of the cistern is 24 units. (LCM)
 So, the efficiency of the pipe A and pipe B are 2 units/ hour and 3 units/hour respectively.
 ATQ
 Total time taken to fill the cistern = $\frac{24}{2+3} + \frac{12}{60} = 5$ hour
 Efficiency of leakage = $(2 + 3) - \frac{24}{5}$ units/hour
 $= \frac{1}{5}$ units/hour
 \therefore time taken by leakage to empty the full tank alone = $\frac{24}{\frac{1}{5}} = 120$ hours

33. (e): Let the total work be 120 units (LCM)
 So, the efficiency of A + B = 5 units/day
 the efficiency of B + C = 8 units/day
 the efficiency of A + C = 6 units/day
 \therefore the efficiency of A + B + C = $\frac{5+8+6}{2} = \frac{19}{2}$ units/day
 So, the efficiency of B = $\frac{19}{2} - 6 = \frac{7}{2}$ units/day
 Let the time taken by B to complete the remaining work be x days.
 ATQ
 $\frac{19}{2} \times 6 + \frac{7}{2} \times x = 120$
 $x = 18$ days

34. (d): Let the total work be 120 units (LCM)
 So, the efficiency of A, B and C be 20 units/day, 8 units/day and 5 units/day respectively.
 1 day work of A, B, C and D = 40 units
 So, the efficiency of D = $40 - (20 + 8 + 5) = 7$ units/day

$$\begin{aligned} \text{Wage of D} &= \frac{7}{(20+8+5+7)} \times 1600 \\ &= \frac{7}{40} \times 1600 = \text{Rs } 280 \end{aligned}$$

35. (c): Let total work be $300x$ units

$$\text{So, efficiency of A} = \frac{300x \times \frac{200}{300}}{8} = 25x \text{ units/day}$$

$$\text{And efficiency of B} = \frac{300x \times \frac{100}{300}}{(14-8)}$$

$$\begin{aligned} &= \frac{100x}{6} \\ &= \frac{50x}{3} \text{ units/day} \end{aligned}$$

$$\text{Required difference} = \frac{300x}{\left(\frac{50x}{3}\right)} - \frac{300x}{25x}$$

$$= 18 - 12 = 6 \text{ days}$$

36. (e): Let the total work be 120 units (LCM)

So, the efficiency of A + B = 5 units/day

the efficiency of B + C = 8 units/day

the efficiency of A + C = 6 units/day

$$\therefore \text{the efficiency of A + B + C} = \frac{5+8+6}{2} = \frac{19}{2} \text{ units/day}$$

$$\text{So, the efficiency of B} = \frac{19}{2} - 6 = \frac{7}{2} \text{ units/day}$$

Let the time taken by B to complete the remaining work be x days.

ATQ

$$\frac{19}{2} \times 6 + \frac{7}{2} \times x = 120$$

$$x = 18 \text{ days}$$

37. (d): Let the total work be 120 units (LCM)

So, the efficiency of A, B and C be 20 units/day, 8 units/day and 5 units/day respectively.

1 day work of A, B, C and D = 40 units

So, the efficiency of D = $40 - (20 + 8 + 5) = 7$ units/day

$$\begin{aligned} \text{Wage of D} &= \frac{7}{(20+8+5+7)} \times 1600 \\ &= \frac{7}{40} \times 1600 = \text{Rs } 280 \end{aligned}$$

38. (c): Let total work be $300x$ units

$$\text{So, efficiency of A} = \frac{300x \times \frac{200}{300}}{8} = 25x \text{ units/day}$$

$$\text{And efficiency of B} = \frac{300x \times \frac{100}{300}}{(14-8)}$$

$$\begin{aligned} &= \frac{100x}{6} \\ &= \frac{50x}{3} \text{ units/day} \end{aligned}$$

$$\text{Required difference} = \frac{300x}{\left(\frac{50x}{3}\right)} - \frac{300x}{25x}$$

$$= 18 - 12 = 6 \text{ days}$$

39. (e): ATQ,

$$(3p + 6) \times 100 = \left(\frac{2}{3}p + 12\right) \times \frac{100}{2} \times 3$$

$$2(3p + 6) = 3\left(\frac{2}{3}p + 12\right)$$

$$6p + 12 = 2p + 36$$

$$4p = 24$$

$$p = 6$$

$$\text{Total work} = (3p + 6) \times 100 \text{ or } \left(\frac{2}{3}p + 12\right) \times 150$$

$$= 24 \times 100$$

$$= 2400 \text{ unit}$$

$$\text{Required time} = \frac{2400}{3(p-2)}$$

$$= \frac{2400}{3 \times 4}$$

$$= 200 \text{ days}$$

40. (b): Let the efficiency of B is $100x$

\therefore the efficiency of A is $140x$

Similarly,

If efficiency of A is $140x$

Then the efficiency of C is

$$= \left[100 - 14\frac{2}{7}\right] \% \times 140x$$

$$= \frac{6}{7} \times 140x$$

$$= 120x$$

So,

$$A : B = 7 : 5 \text{ [efficiency of A : B]}$$

$$A : C = 7 : 6 \text{ [efficiency of A : C]}$$

$$\therefore A : B : C = 7 : 5 : 6$$

ATQ,

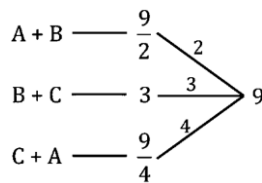
$$\text{Total work} = (A + B) \times 11 = (7 + 5) \times 11 = 132 \text{ units}$$

$$\text{Thrice work} = (132 \times 3) \text{ units}$$

$$\text{Total number of days taken} = \frac{132 \times 3}{(7+5+6)} = 22 \text{ days.}$$

Mains Solutions

1. (b):



$$\text{Total efficiency} = \frac{9}{2}$$

$$\text{Time} = 2 \text{ hours}$$

2. (a): Working efficiency of A and B = $120 : 100 = 6 : 5$

B can complete 'X' work = 36 days

$$\text{A can complete 'X' work} = \frac{36 \times 5}{6} = 30 \text{ days}$$

$$\text{Let 'X' work} = 36 \times 5 = 180 \text{ unit}$$

ATQ-

$$15 \times 6 + 10 \times 5 + C \times 10 = 180$$

$$\text{so, C working efficiency} = 4 \text{ unit/day}$$

A, B and C work together on 'X' work

$$= \frac{1}{3} \times 180 \text{ unit} = 60 \text{ unit}$$

$$A + B + C = (6 + 4 + 5) \text{ unit per day}$$

$$= \frac{60}{15} = 4 \text{ days}$$

$$\text{Remaining work} = 120 \text{ unit}$$

$$\text{Let D's working efficiency} = y \text{ unit/day}$$

$$(B + D) \Rightarrow (5 + y) \text{ unit/day}$$

$$= \frac{120}{12} = 10 \text{ unit/day}$$

$$y = 10 - 5 = 5 \text{ unit/day}$$

$$\text{Required days} = 180/5=36$$

3. (b): Let A and B can do $3x$ and $4x$ unit of work in one day.

So,

$$\text{Total work} = (3x + 4x) \times 8 = 56x$$

$$(A + B) \text{ two day work} = 7x \times 2 = 14x$$

$$\text{Remaining work} = 42x$$

$$\text{In 6 days B will complete} = 6 \times 4x = 24x \text{ units}$$

So, remaining $18x$ units are completed by C in 6 day

So,

$$56x \text{ unit will be completed in} = \frac{56x}{\frac{18x}{6}} = \frac{56}{3} \text{ days}$$

4. (c): A can fill alone in $= \frac{20 \times (5+4)}{5} = \frac{180}{5} = 36 \text{ hours}$

$$B \text{ can fill alone in} = \frac{20 \times (5+4)}{4} = \frac{180}{4} = 45 \text{ hours}$$

According to question

$$\frac{4}{20} + \frac{9}{36} + \frac{9}{C} = 1$$

$$\frac{9}{C} = \frac{11}{20}$$

$$C = \frac{180}{11} \text{ hour}$$

5. (c): Abhimanyu completes 25% of work in 5 hours

$$100\% \text{ work} = 20 \text{ hours}$$

So Bhavya will complete whole work in

$$= 20 - 5 = 15 \text{ hour}$$

$$\text{Ratio of efficiency of Abhishek to Bhavya} = 5 : 8$$

$$\text{Ratio of time taken by Abhishek to Bhavya} = 8 : 5$$

$$\text{Abhishek will complete the work in} = \frac{15}{5} \times 8$$

$$x = 24 \text{ hours}$$

together Bhavya and Abhishek will complete

75% of work in

$$= \frac{3}{4} \times \frac{24 \times 15}{39} = 6 \frac{12}{13} \text{ hours}$$

$$\text{Required total time} = 5 + 6 \frac{12}{13} = 11 \frac{12}{13} \text{ hours}$$

6. (d): 20 men can complete the work in 12 days. So, 1

man can complete the same work in 240 days.

$$\text{Efficiency of 5 women} = \text{Efficiency of 3 men}$$

$$5W = 3M$$

Ratio of efficiencies:

$$\frac{M}{W} = \frac{5}{3}$$

Let, a man does 5 units and a woman does 3 units of work per day

& total units of work are 1200 units.

$$8 \text{ days' work of 4 men and 10 women} = 8 \times (4 \times 5 + 10 \times 3) = 400 \text{ units}$$

$$\text{Remaining work} = 1200 - 400 = 800 \text{ units}$$

Let the additional number of women required be x .

There are 4 men and $10 + x$ women now.

$$\text{Per day work of 4 men and } 10 + x \text{ woman} = 4 \times 5 + (10 + x) \times 3 = 50 + 3x \text{ units}$$

No. of day required to complete the remaining work

$$= \frac{800}{50 + 3x} \Rightarrow \frac{800}{50 + 3x} = 10$$

$$x = 10$$

10 additional women are required to complete the remaining work in 10 days.

7. (b): Veer : Bhavya = 60 : 100 = 3 : 5

$$\text{Total work} = 8 \times 30 = 240$$

$$\text{Abhishek} = \frac{240}{(3+8)} - 10 = 20 \text{ days}$$

$$\text{Abhishek efficiency} = \frac{240}{20} = 12 \text{ w/d}$$

$$(\text{Veer} + \text{Bhavya} + \text{Abhishek}) = \frac{240}{(3+5+12)}$$

$$= \frac{240}{20} = 12 \text{ days}$$

8. (e): ATQ—

$$24A + 36B + 20C = 1$$

$$24A + 24B + 12B + 12C + 8C = 1$$

$$24(A + B) + 12(B + C) + 8C = 1 \text{ work}$$

$$\frac{24}{48} + \frac{12}{36} + 8C = 1$$

$$\frac{5}{6} + 8C = 1$$

$$C = \frac{1}{48} \text{ days}$$

$$B = \frac{1}{36} - \frac{1}{48} = \frac{4-3}{144} = \frac{1}{144}$$

$$A = \frac{1}{48} - \frac{1}{144} = \frac{3-1}{144} = \frac{1}{72}$$

$$(A + C) = \frac{1}{72} + \frac{1}{48} = \frac{2+3}{144}$$

$$= \frac{5}{144} = 28 \frac{4}{5} \text{ days}$$

9. (b): Ram - 60 days

$$\text{Ram : Shyam} = 100 : 125 = 4 : 5$$

$$\text{Total work} = 60 \times 4 = 240$$

$$\text{Shyam} = \frac{240}{5} = 48$$

$$\text{Divya} = 48 + 32 = 80 \text{ days}$$

$$\text{Divya efficiency} = \frac{240}{80} = 3$$

$$(\text{Ram} + \text{Shyam} + \text{Divya}) = \frac{240}{(4+5+3)}$$

$$= \frac{240}{12} = 20 \text{ days}$$

10. (e): A's working efficiency = $\frac{40}{8} = 5$ page/hour
 B's working efficiency = $5 + 5 \times 2 = 15$ page/hour
 Required time = $\frac{5700}{15 \times 5} = 76$ days

11. (c): $4m + 10w = \frac{1}{12}$
 $6m + 12w = \frac{1}{9}$
 $m = \frac{1}{108}, w = \frac{1}{216}$
 x men and 6 women per day
 work = $\frac{x}{108} + \frac{6}{216} = \frac{2x+6}{216}$
 $\frac{2x+6}{216} = \frac{1}{12}$
 $x = 6$

12. (a): Let A takes x days to complete the work.
 \therefore B takes 2x days
 From the question, C takes to complete the work
 = $\frac{2x \times x}{2x+x} = \frac{2}{3}x$ days
 Now, applying the given rule, we have
 $\frac{x \times 2x \times \frac{2}{3}x}{x \times 2x + 2x \times \frac{2}{3}x + x \times \frac{2}{3}x} = 7$
 Or, $\frac{4/3x^3}{4x^2} = 7$
 Or, $\frac{x}{3} = 7 \therefore x = 21$ days
 Hence, A completes the work in 21 days, B in
 (21 \times 2 = 42) days and C in ($\frac{2}{3} \times 21 = 14$) days.

13. (b): Let the C do in one day = 4y work
 Let the D do in one day = 5y work
 2 day work of C + D = 9y
 In 44 day they will complete $9y \times 22 = 198y$
 In another $\frac{1}{2}$ days 2y work will be done by C
 C will take alone = $\frac{200y}{4y}$ days = 50 day
 D will take = 40 days.
 C and D will complete work together in
 = $\frac{50 \times 40}{90} = \frac{200}{9}$
 According to condition
 $\frac{200}{9x} + \frac{200}{9 \times 2x} = 1$
 $\frac{400+200}{18x} = 1$
 $\Rightarrow x = 33\frac{1}{3}$

14. (c): A - $33\frac{1}{3}$ days
 B - $66\frac{2}{3}$ days
 (A+B) - $\frac{200}{9}$ days
 Required Time - $\frac{200}{9} \times \frac{9}{4} = 50$ days

15. (b): If each works 2 days at a time alternately starting with A, the work is completed in exactly 10 days.
 \therefore A works for 6 days and B worked for 4 days.
 $\frac{6}{a} + \frac{4}{b} = 1$ (i)
 If B starts, the work is completed in 10.5 days.

\therefore B works for 6 days and A worked for 4.5 days.
 $\frac{6}{b} + \frac{4.5}{a} = 1$ (ii)
 By solving (i) and (ii)
 a = 9 days
 And, b = 12 days
 Time taken by A and B working together to complete the work
 = $\frac{1}{\frac{1}{9} + \frac{1}{12}} = \frac{1}{\frac{4+3}{36}} = \frac{36}{7} = 5\frac{1}{7}$ days

16. (b): Let efficiency of man = M
 Efficiency of woman = W
 Efficiency of child = C
 (10M + 12W)5 = (2W + 6C) 32
 25M = 2W + 96C ... (i)
 6M = 8W + 8C
 3M = 4W + 4C ... (ii)
 Solving (i) and (ii)
 M : W : C = 4 : 2 : 1
 ATQ
 $\frac{(8M+4W)5}{\frac{1}{3}} = \frac{(8W+4C)D}{\frac{2}{3}}$
 D no. of day taken by 8 women and 4 children.
 1 man efficiency = 4 children's efficiency
 1 women efficiency = 2 children's efficiency
 D = 20 days

17. (d): Let no. of day in which work completed = x
 No. of children = 2y
 No. of women = y
 10M \times x = (2y \times C + y \times W) x
 10M = y(2C + W)
 y = 10
 No. of child = 20
 No. of women = 10

Solutions (18-19)

(A + B) \rightarrow 16 days
 (B + C) \rightarrow 32 days
 C \rightarrow 80 days

$$\frac{1}{B} = \frac{1}{32} - \frac{1}{80}$$

$$\frac{1}{B} = \frac{160}{160} - \frac{160}{160}$$

$$B = \frac{160}{3} \text{ days.}$$

$$\frac{1}{A} = \frac{1}{16} - \frac{3}{160}$$

$$\frac{1}{A} = \frac{10}{160} - \frac{12}{160}$$

$$\frac{1}{A} = \frac{160}{160}$$

$$A = \frac{160}{7} \text{ days}$$

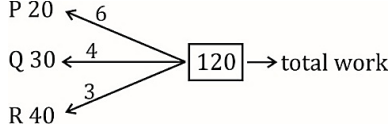
$$\therefore \frac{7 \times 4}{160} + \frac{12 \times 3}{160} + \frac{x}{80} = 1$$

$$x = 48$$

18. (a): P → 48 - 28 = 20 days

Q → 48 - 18 = 30 days

R → 48 - 8 = 40 days



If we want to do the work in least possible time then P should start the work because in 3 day they complete total 13 units of work and in 27 days they complete 117 units of work.

Remaining 3 unit is completed by P in least time

19. (d): Tap A → 48 - 44 = 4 days

Tap B → 48 - 42 = 6 days

Ratio of their efficiency = $\frac{1}{4} : \frac{1}{6} = \frac{1}{2} : \frac{1}{3} = 3 : 2$

Required fraction of the work = $\frac{3}{5}$

Solutions (20-21)

Man → 12 × 6 days

Woman → 8 × 18 days

Child → 10 × 18 days

(4 men + 12 women + 20 children)'s 2 day work

$$= 2 \left[\frac{4}{12 \times 6} + \frac{12}{8 \times 18} + \frac{20}{10 \times 18} \right] = \frac{1}{2}$$

$$\text{Remaining work} = 1 - \frac{1}{2} = \frac{1}{2}$$

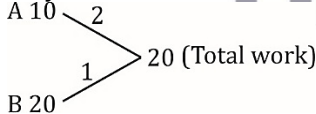
According to question —

$$\frac{\frac{1}{2}}{\frac{36}{12 \times 6}} = x$$

$$x = 1$$

20. (c): A → 10 days

B → 20 days



2 days' work of (A + B) = 3

12 days' work of (A + B) = 18

A does the remaining work (20 - 18 = 2 units)

Required time = $12 + \frac{2}{2} = 13$ days.

21. (a): Soldier = 56 × 1 × 24 days

Required time = $\frac{56 \times 24}{42} = 32$ days

22. (d): B requires twice the time A requires to do the work.

∴ Ratio of efficiencies of A and B = 2 : 1

Let, A and B do 2x units and x units of work per day respectively.

Work done by A = 10 × 2x = 20x units

Work done by B = (10 + 4) × x = 14x units

Ratio of the efficiencies of C and D = 5 : 3

Let, C and D do 5y units and 3y units of work per day respectively.

2 days' work of C and D = 5y + 3y = 8y units

30 days' work of C and D = $\frac{30}{2} \times 8y = 120y$ units

Now,

32% of the total work is done by C and D.

32% of total work = 120y units

Total work = $\frac{100}{32} \times 120y = 375y$

68% of total work = 20x + 14x = 34x

∴ Total work = $\frac{100}{32} \times 120y = \frac{100}{68} \times 34x$

$$\Rightarrow x = \frac{15}{2}y$$

So, the efficiencies of A, B, C and D per day are 15y, $\frac{15}{2}y$, 5y and 3y units respectively.

Time taken by A to complete twice the work = $\frac{2 \times 375y}{15y} = 50$ days

23. (b): 10 days' work of A and B = $10 \times (15y + \frac{15}{2}y) = 225y$ units

Work done by E and F = 375y - 225y = 150y units

Time taken by E and F to complete the whole

work = $\frac{12}{150y} \times 375y = 30$ days

Per day work done by E and F = $\frac{1}{30}$

Ratio of efficiencies of E and F is 3 : 2.

Diff. b/w part of work done by E alone and work done by F alone = $\frac{3-2}{3+2} = \frac{1}{5}$

Diff. b/w part of work done by E alone and work done by F alone in one day

$$= \frac{1}{5} \times \frac{1}{30} = \frac{1}{150}$$

24. (b): Estimated Profit = 25% of 400000 = Rs.100000

Remaining Amount = 400000 - 100000 = Rs.300000

Per day wages of a man = $\frac{300000}{50 \times 20} = \text{Rs.}300$

At the end of 18th day, some women were employed.

Let the number of women employed were x.

Per day wages of a woman = 80% of per day wages of a man = Rs.240

The work was completed 3 days later than the schedule i.e. in 23 days (20 + 3 = 23)

So, 50 men worked for 3 extra days and x women worked for 5 days.

Actual Profit = Rs.31000

Reduction in profit = 3 days' wages of 50 men + 5 days' wages of x women

$$\Rightarrow 100000 - 31000 = 3 \times 50 \times 300 + 5 \times x \times 240$$

$$\Rightarrow 69000 = 45000 + 1200x$$

$$\Rightarrow 1200x = 24000$$

$$\Rightarrow x = 20$$

Hence, 20 women were employed.

- 25. (a):** Let A and B take x and $3x$ days respectively to complete the job.
According to the question,
 $3x - x = 80$
 $\Rightarrow x = 40$
A takes 40 days and B takes 120 days to complete the job working alone.
Let C takes y days to complete the job working alone.
Then,
 $15 \left(\frac{1}{120} + \frac{1}{y} \right) = 1 - \frac{5}{8}$
 $\Rightarrow y = 60$
Let D takes z days to complete the job working alone.
 $10 \left(\frac{1}{40} + \frac{1}{z} \right) = 1 - \frac{5}{12}$
 $\Rightarrow z = 30$
One day's work of A, B, C and D working together
 $= \frac{1}{40} + \frac{1}{120} + \frac{1}{60} + \frac{1}{30} = \frac{3+1+2+4}{120} = \frac{10}{120} = \frac{1}{12}$
Therefore A, B, C and D working together will complete the work in 12 days.
- 26. (b):** Part of work done by A and B in one day $= \frac{1}{40} + \frac{1}{120} = \frac{4}{120} = \frac{1}{30}$
Part of work done by B and C in one day $= \frac{1}{120} + \frac{1}{60} = \frac{3}{120} = \frac{1}{40}$
Part of work done by C and D in one day $= \frac{1}{60} + \frac{1}{30} = \frac{3}{60} = \frac{1}{20}$
Part of work done by D and A in one day $= \frac{1}{30} + \frac{1}{40} = \frac{7}{120}$
Part of work done in four days $= \frac{1}{30} + \frac{1}{40} + \frac{1}{20} + \frac{7}{120} = \frac{4+3+6+7}{120} = \frac{20}{120} = \frac{1}{6}$
Hence, the work is completed in $4 \times 6 = 24$ days
- 27. (a):** Working efficiency of A = 120% of working efficiency of B
B can complete 'X' work = 36 days
A can complete 'X' work = 30 days
Let 'X' work = 180 unit
A working efficiency = 6 unit/day
B working efficiency = 5 unit/day
 $15 \times 6 + 10 \times 5 + C \times 10 = 180$
so, C working efficiency = 4 unit/day
For work 'Y'
Total of work 'Y' $= (6 + 4) \times 12 + 16 \times 5 = 200$ units
Total units of both work 'X' and work 'Y' = 180+200= 380 units
so, D working efficiency $= \frac{380}{38} = 10$ unit/day

Now:

A, B and C work together in 'x' work
 $= \frac{1}{3} \times 180 \text{ unit} = 60 \text{ unit}$
 $A + B + C = (6 + 4 + 5) \text{ unit per day}$
 $= \frac{60}{15} = 4 \text{ days}$
Remaining work = 120 unit
 $(B + D) \Rightarrow (5 + 10) \text{ unit per day}$
 $= \frac{120}{15} = 8 \text{ days.}$
B work for = $4 + 8 = 12$ days.

- 28. (e):** 'X' work = 180 unit
 $A + C + D \Rightarrow 6 + 4 + 10 = 20 \text{ unit/day}$
Days $= \frac{180}{20} = 9 \text{ days}$
Work = 200 unit
 $(A + B + C + D) \Rightarrow (6 + 5 + 4 + 10) = 25 \text{ unit/day}$
 $= \frac{200}{25} = 8 \text{ days}$
Total time = $(9 + 8) = 17$ days

- 29. (a):** Let efficiency of E is Z unit/day
he work for 12 days
work complete = 12Z unit
B and C work for 8 days = $(5 + 4) \times 8 \text{ unit} = 72$ unit
Remaining work = $180 - 72 = 108$ unit
Efficiency of E $= \frac{108}{12} = 9$ unit/day
Now,
A and E completed work 'X'
 $= \frac{180}{15} = 12$ days
D, B and C completed both work 'X' and 'Y'
 $= \frac{200+180}{19} = 20$ days
Ratio = $12 : 20 \Rightarrow 3 : 5$

- 30. (d):** A + B — 30 days
B + C — 24 days
 $(A + B) 16 \text{ days} + (B + C) 8 \text{ days} + 4C = 1 \text{ work}$
 $= \frac{16}{30} + \frac{8}{24} + 4C = 1 = \frac{8+5}{15} + 4C = 1$
 $4C = 1 - \frac{13}{15}$
 $C = \frac{2}{15 \times 4}$
B alone $= \frac{1}{24} - \frac{1}{30} = \frac{5-4}{120} = \frac{1}{120}$ days

- 31. (a):** Let P fills $2x$ litres a day.
then Q fills $3x$ litres a day
R fills $\frac{4}{3} \times 3x = 4x$ litres a day
And S fills $\frac{3}{2} \times 4x = 6x$ litres a day
Let total capacity of tank be $15x$ litres
Required ratio $= \frac{\frac{15x}{15x}}{\frac{2x+4x}{3x+6x}} = 3:2$

- 32. (b):** Let total capacity of tank be $15x$ litres.
 Time taken by all pumps to fill the tank together when pumps S fills = $\frac{15x}{2x+3x+4x+6x} = 1$ day
 Time taken by them when pumps S empties = $\frac{15x}{2x+3x+4x-6x} = \frac{15x}{3x} = 5$ days
 Required ratio = $5 : 1$
- 33. (d):** Ratio of efficiencies of Bibhor and Ahmed = $2 : 3$
 Ratio of efficiencies of Bibhor and Deepak = $5 : 4$
 Ratio of efficiencies of Deepak, Bibhor and Ahmed is $8 : 10 : 15$
 Suppose they fill 8, 10 and 15 units per hour respectively.
 Total units of water to be filled = $(8 + 10 + 15) \times 20 = 660$ units
 Time taken by Bibhor to fill the tank alone = $\frac{660}{10} = 66$ hrs.
- 34. (d):** Units of water filled in 1st hr. = $8 + 10 = 18$ units
 Units of water filled in 2nd hr. = $10 + 15 = 25$ units
 Units of water filled in 3rd hr. = $15 + 8 = 23$ units
 Units of water filled in 3 hrs. = $18 + 25 + 23 = 66$ units
 Total time taken to fill the tank = $3 \times \frac{660}{66} = 30$ hrs.
- 35. (a):** Let, one day work of a man, woman and youngster be m, w and y units,
 ATQ, $2m = 3w = 4y$
 One-day work of 14 men, 12 women and 12 youngsters
 = $14m + 12w + 12y$
 = $14m + 12 \times \frac{2}{3}m + 12 \times \frac{2}{4}m$
 = $14m + 8m + 6m$
 $28m$
 Total work = $24 \times 28m$ units
 To finish it in 14 days,
 $\frac{24 \times 28m}{14} = 48m$ units must be done daily.
 Which means, $48m - 28m = 20m$ additional units are to be done.
 For this, 20 more men are required.
- 36. (c):** To finish it in $19\frac{1}{5} = 19.2$ days,
 $\frac{24 \times 28m}{19.5} = 35m$ units are to be done daily.
 Which means, $35m - 28m = 7m$ additional units are to be done daily.
 Now, $1. w + 1. y = \frac{2}{3}m + \frac{1}{2}m = \frac{7}{6}m$
 Daily work of a pair of women & youngster is $\frac{7m}{6}$ units
 Hence, 6 such pairs are needed.

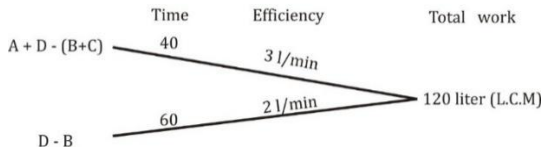
- 37. (d):** Let total work $i = 80$ unit
 A's efficiency $\rightarrow \frac{80}{20} \rightarrow 4$ unit/day
 B's efficiency $\rightarrow \frac{80}{16} \rightarrow 5$ unit/day
 C's efficiency $\rightarrow (4 + 5) \times \frac{1}{3} = 3$ unit/day
 Work completed in 18 days $\rightarrow (4 + 5 + 3) \times 6 \rightarrow 72$ unit
 Time required $\Rightarrow 18 + 1 + \frac{4}{5} \rightarrow 19\frac{4}{5}$ days
- 38. (b):** Let A and B can complete work in $4x, 5x$ days respectively
 So, According to question
 $\frac{6}{4x} + \frac{8}{5x} = \frac{31}{100}$
 $\frac{30+32}{20x} = \frac{31}{100} \Rightarrow \frac{62}{20x} = \frac{31}{100}$
 $x = 10$
 They both will complete the work in
 = $\frac{4 \times 5 \times 10 \times 10}{4 \times 10 + 5 \times 10} = \frac{40 \times 50}{90} = \frac{200}{9}$ days
- 39. (c):** Ratio of efficiency of pipe A to pipe B = $9 : 5$
 Ratio of time taken by pipe A to pipe B = $5 : 9$
 Let time taken by pipe A to pipe B to fill tank alone be $5x$ and $9x$ respectively.
 According to question.
 $\frac{180}{13 \times 5x} + \frac{180}{13 \times 9x} - \frac{180}{13 \times 12} = 1$
 $\frac{180}{13} \left(\frac{1}{5x} + \frac{1}{9x} - \frac{1}{12} \right) = 1$
 $\frac{1}{5x} + \frac{1}{9x} = \frac{13}{180} + \frac{1}{12}$
 $\frac{14}{45x} = \frac{13+15}{180} \Rightarrow \frac{14}{45x} = \frac{28}{180}$
 $x = 2$
 pipe A and pipe B together fill the tank
 = $\frac{5x \times 9x}{5x+9x} = \frac{45x}{14}$
 = $\frac{45}{14} \times 2 = \frac{45}{7}$ hour
- 40. (c):** $P = 45$ days
 $P : Q = 100 : 150 = 2 : 3$
 Total work = $45 \times 2 = 90$
 $R = \frac{90}{3} - 7.5 = 22.5$ days
 R efficiency = $\frac{90}{22.5} = 4 w/d$
 According to question
 = $\frac{5X}{4(X+9)} = \frac{1}{2} = 10X - 4X = 36$
 $6X = 36$
 $X = 6$ days
- 41. (b):** A.T.Q,
 Tank filled by all 3 pipes together in 1 hour = $\frac{1}{5} + \frac{1}{10} - \frac{1}{15} = \frac{7}{30}$ units.
 Time taken by all 3 pipes together to fill the tank = $\frac{30}{7}$ hours.

42. (a): ATQ,

Water enter into ship in 1 hour = 15 tons
 Water thrown out by pumps in 1 hour = 10 tons
 Total time to sink ship in water = $\frac{40}{5} = 8$ hours
 So, required average speed = $\frac{108}{8} = 13.5$ kmph

43. (a): Let efficiency of B be 'y liters/minute' and let efficiency of C be '4x liters/minute.'

So, efficiency of A = $4x \times \frac{125}{100} = 5x$ liters/minute
 and efficiency of D = $4x \times 2 = 8x$ liters/minute.
 Now,



Now,

$$5x + 8x - (y + 4x) = 3$$

$$9x - y = 3 \quad \dots (i)$$

And

$$8x - y = 2 \quad \dots (ii)$$

On solving (i) & (ii), we get:

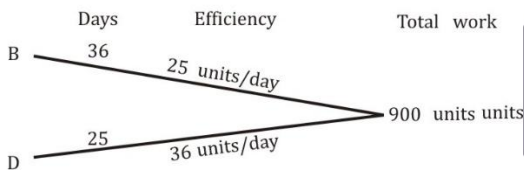
$$x = 1, y = 6$$

Hence efficiency of A = $5x = 5$ l/min

And efficiency of C = $4x = 4$ l/min.

$$\text{So, required time} = \frac{120}{(5 - 4)} = 120 \text{ minutes}$$

44. (d):



$$\text{So, efficiency of C} = \frac{150}{100} \times 25 = 37.5 \text{ units/day}$$

$$\text{And efficiency of A} = \frac{80}{100} \times 37.5 = 30 \text{ units/day}$$

$$\text{B's new efficiency} = \frac{156}{100} \times 25 = 39 \text{ units/day}$$

$$\text{C's new efficiency} = \frac{120}{100} \times 37.5 = 45 \text{ units/day}$$

$$\text{Required days} = \frac{900}{(30+39+45+36)} = 6 \text{ days}$$

45. (d): Capacity of tank = LCM of 6 and 9 = 36 units

$$\text{Total efficiency of A and B} = \frac{36}{6} = 6 \text{ units/h}$$

$$\text{Total efficiency of B and C} = \frac{36}{9} = 4 \text{ units/h}$$

Let the efficiency of A, B and C be x, y and z units/h.

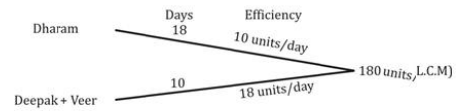
Then,

$$4(x + y) + 1(y + z) + 5 \times z = 36$$

$$\Rightarrow z = 1.6$$

$$\text{Time taken by C alone to fill the whole tank} = \frac{36}{1.6} = 22.5 \text{ h}$$

46. (d):



ATQ,

Ratio of efficiency of Veer to Deepak =

$$\frac{1575 - 450}{450} = \frac{1125}{450} = \frac{5}{2}$$

Now, let efficiency of Veer & Deepak be '5x units/day' & '2x units/day'.

$$\text{So, } 5x + 2x = 18$$

$$x = \frac{18}{7}$$

$$\text{Hence, required days} = \frac{180}{10 + 5 \times \frac{18}{7}} = \frac{180 \times 7}{160} = 7 \frac{7}{8}$$

days

Solutions (47 - 48):

Let efficiency of B = x units/day

So, efficiency of A = x + 2x = 3x units/day

When A & B start working alternatively, starting with A.

So, A work for $37 \frac{2}{3}$ days and B work for 37 days

$$\text{Total work} = \frac{113}{3} \times 3x + 37 \times x = 150x \text{ units}$$

$$\text{Efficiency of C} = \frac{150x}{100} = 1.5x \text{ units/day}$$

47. (a): Efficiency of D = $1.5x \times \frac{4}{3} = 2x \text{ units/day}$

$$\text{Required time} = \frac{150x}{(3x+2x)} = 30 \text{ days}$$

48. (c): Total work done by A = $36 \times 3x = 108x$ units

Total work done by B = $18 \times x = 18x$ units

Total work done by C = $16 \times 1.5 = 24x$ units

Ratio of wage share of A, B & C = $108x : 18x : 24x = 18 : 4 : 3$

$$\text{Required difference} = 2500 \times \frac{18 - (4+3)}{(18+4+3)} = 1100$$

Rs.

49. (a): ATQ,

$$\frac{8}{24} + \frac{12}{32} + \frac{28}{x} = 1 \text{ (where x is time taken by R to complete whole work in days)}$$

$$\frac{1}{3} + \frac{3}{8} + \frac{28}{x} = 1$$

$$x = 96 \text{ days}$$

Time taken by R to complete the whole work = 96 days

50. (a): Let the total work be 60 units

A's work in 1 Day = 5 units

B's work in 1 Day = 4 units

C's work in 1 Day = 3 units

(A+B)'s work in 6 Days = 54 units

Remaining work must be done by C before leaving the work.

So 'C' left the work after 2 days from starting.

51. (a): Let efficiency of man and woman be $3w$ & $2w$ units per day respectively
 ATQ - $4 \times X \times 3w = 8 \times (X - 2) \times 2w$
 $16X - 12X = 32$
 $X = 8$
 Total work = $6 \times 8 \times 2w = 96w$ units
 Work done by $\frac{X}{2}$ men & $(X - 2)$ women in two days = $\frac{8}{2} \times 3w \times 2 + 6 \times 2w \times 2 = 48w$ units
 Remaining work = $48w$ units
 Number of total women required to complete the remaining work in three days = $\frac{48w}{3 \times 2w} = 8$
 We have already 6 women working with 4 men.
 So, women should replace to men = $8 - 6 = 2$

52. (e): Efficiency ratio $\frac{\text{Ravi}}{\text{Manoj}} = \frac{6}{5} \frac{\text{Ravi}}{\text{Mahesh}} = \frac{9}{10}$
 Ravi:Manoj:Mahesh = 18:15:20
 Let efficiency of Ravi be $18x$ units/day; Manoj be $15x$ units/day; Mahesh be $20x$ units/day
 Total work = $2(15x+20x) \times 5 = 350x$ units (Mahesh & Manoj working with double efficiency)
 New efficiency of Ravi = $\frac{5}{6} \times 18 = 15 \frac{\text{units}}{\text{day}}$
 Time taken when working together (Ravi at $\frac{5}{6}$ th of actual effi.) = $\frac{350x}{15x+15x+20x} = 7$ days

53. (b): Let the time taken by C alone and A alone to complete the work be $4x$ days and x days respectively.
 (time taken is inversely proportional to efficiency; ratio of efficiency of C:A=1:4)
 The work can be completed by B alone in = $\frac{8 \times 100}{25} = 32$ days
 ATQ
 $\left(\frac{1}{A} + \frac{1}{B} + \frac{1}{C}\right) = \frac{1}{12}$
 $\left(\frac{1}{x} + \frac{1}{32} + \frac{1}{4x}\right) = \frac{1}{12}$
 $\left(\frac{5}{4x}\right) = \frac{5}{96}$
 $\Rightarrow x = 24$ days
 So time taken by A alone to complete the work = 24 days

So time taken by A and B together to complete the work = $\left(\frac{24 \times 32}{24+32}\right) = \frac{96}{7} = 13 \frac{5}{7}$ days

54. (c): Let efficiency of 1 man, 1 woman and 1 child are m, w, c respectively
 ATQ -
 $20 \times 24m = 40 \times 36w = 40 \times 54c$
 $2m = 6w = 9c$
 Total work = $480m$
 $(18w + 18c) \times 32 = (6m + 4w) \times 32 = 320m$
 Remaining work = $480m - 320m = 160m$
 $X = \frac{160m}{4} = 40$ m = number of men required to complete the work
 $(X + 14)$ women + $(X - 13)$ child = $(18m + 6m) = 24m$
 Required days = $\frac{480m}{24m} = 20$ days

55. (e): ATQ -
 Anurag + Veer = $\frac{7}{60}$ ----- (i)
 And also, Anurag + Veer - Sameer = $\frac{1}{12}$ -----
 ----- (ii)
 From (i) & (ii) we get
 $\frac{7}{60} - \text{Sameer} = \frac{1}{12}$
 Sameer = $\frac{7-5}{60} = \frac{2}{60} = \frac{1}{30}$ hours (Destroy complete work)
 Let efficiency of Veer and Sameer be $3x$ & $2x$ respectively
 So, time taken by Veer & Sameer be $2x$ and $3x$ respectively
 Given, $3x - 2x = 10$
 $x = 10$ days
 So, time taken by Veer = 20 days
 And, time taken by Anurag = $\frac{1}{\text{Anurag}} + \frac{1}{20} - \frac{1}{30} = \frac{1}{12}$
 Time taken by Anurag = 15 days
 So, time required when Anurag & Sameer complete the task = 30 days

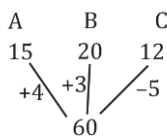
Previous Year Question

1. (e): Let efficiency of B be x units/day
 So, efficiency of C = $x \times \frac{200}{100} = 2x$ units/day
 Now, total work = $(x + 2x) \times \frac{8}{3} = 8x$ units
 Hence, efficiency of A = $\frac{8x}{9}$ units/day
 Work completed by A & B together in 4 days

= $\left(\frac{8x}{9} + x\right) \times 4 = \frac{68x}{9}$ units
 Required portion = $\frac{\frac{68x}{9}}{8x} = \frac{17}{18}$

2. (c): ATQ, $\frac{1}{16} + \frac{1}{x} - \frac{1}{12} = \frac{7}{240}$
 On solving, $\frac{1}{x} = \frac{1}{20}$
 $X = 20$ min

3. (b);



∴ tank filled in 1 min = 2 units

Total time = $\frac{60}{2} = 30$ minutes

4. (e); Let the time take by A, B and C alone be A days, B days and C days respectively.

$$\text{ATQ, } 2 \left(\frac{1}{A} + \frac{1}{B} \right) + \frac{34}{5} \times \left(\frac{1}{A} + \frac{1}{B} + \frac{1}{C} \right) = 1$$

$$2 \left(\frac{1}{24} + \frac{1}{B} \right) + \frac{34}{5} \times \frac{1}{8} = 1$$

$$\frac{1}{12} + \frac{2}{B} = \frac{3}{20}$$

$$\frac{2}{B} = \frac{3}{20} - \frac{1}{12}$$

$$\frac{2}{B} = \frac{9-5}{60}$$

$$\frac{2}{B} = \frac{4}{60}$$

$$\frac{2}{B} = \frac{1}{15}$$

$$B = 30 \text{ days}$$

5. (b); Let the capacity of the tank be 180 units (LCM of 36 and 60)

Efficiency of tap A = 5 units/minute

Efficiency of tap B = 3 units/minute

$\frac{1}{6}$ th of the tank = 30 units

Required time = $\frac{30}{5+3} = 3\frac{3}{4}$ minutes

6. (d); Let the efficiency of B be 5x units/day

Then efficiency of A = 7x units/day

efficiency of C is = $\frac{6}{7} \times 7x = 6x$ units/day

∴ A : B : C = 7 : 5 : 6

ATQ,

Total work = (A + C) × 18 = (7 + 6) × 18 = 234 units

Required days = $\frac{234 \times 2}{(7+5+6)} = 26$ days.

7. (b); Let the efficiency of a man be m units/day and efficiency of a woman be w units/day

ATQ

$$(8m+10w) \times 15 = (10m + 18w) \times 10$$

$$\frac{m}{w} = \frac{3}{2}$$

Total work = (8 × 3 + 10 × 2) × 15 = 660 units

Work done in 10 days = (4 × 3 + 5 × 2) × 10 = 220 units

Let the number of more women required be x

$$\text{Then } 2 \times (5 + x) \times 11 = 440$$

$$x = 15$$

8. (d); ATQ -

$$2(A + B) = 6C$$

$$A + B = 3C$$

$$\text{Also given, } A + B + C = \frac{1}{9}$$

$$4C = \frac{1}{9}$$

$$C = 36 \text{ hours}$$

9. (b); Let total work = 90x unit

$$\text{Efficiency of A} = 90x \times \frac{45}{100} \times \frac{4}{45} = 3.6x \text{ unit/day}$$

$$\text{Efficiency of B} = 90x \times \frac{30}{100} \times \frac{1}{3} = 9x \text{ unit/day}$$

$$\text{Efficiency of (A + B + C)} = 90x \times \frac{4}{25} = 14.4x \text{ unit/day}$$

$$\text{So, efficiency of C} = 14.4x - (3.6x + 9x) = 1.8x \text{ units/day}$$

$$\text{Required percentage} = \frac{3.6x - 1.8x}{3.6x} \times 100 = 50\%$$

10. (d); let total work be 360 units

$$\text{Efficiency of 1 man} = \frac{360}{12 \times 10} = 3 \text{ units/day}$$

$$\text{Efficiency of 1 woman} = \frac{360}{10 \times 18} = 2 \text{ units/day}$$

$$\text{Required time} = \frac{360}{4 \times 3 + 6 \times 2} = 15 \text{ days}$$

11. (e); Ratio of efficiency of A, B & C = 3 : 2 : 4

So, let total work = (3x + 2x + 4x) × 8 = 72x unit

$$\text{Required days} = 72x \times \frac{3}{4} \times \frac{1}{3x} = 18 \text{ days}$$

12. (d); Let time taken by B alone to complete the work be x days.

So, time taken by A alone to complete the same work = (x - 7.5) days

ATQ,

$$\frac{1}{x-7.5} + \frac{1}{x} = \frac{1}{9}$$

$$x = 3, \frac{45}{2}$$

x cannot be 3 as time taken by A alone cannot be negative.

$$\text{Required time} = \frac{1 \times \frac{45}{2}}{\frac{45}{2}} = 5 \text{ days}$$

13. (d); Let total work = 12 × 64 = 768 units

$$\text{Required women} = 768 \times \frac{2}{3} \times \frac{1}{16} = 32$$

14. (b); Let the total work be 30 units (LCM of 6 and 10)

Efficiency of Shivam = 5 units/hr

Efficiency of Deepak = 3 units/hr

twice of the work = 60 units

$$\text{Required time} = \frac{60}{5+3} = 7\frac{1}{2} \text{ hr}$$

15. (a); A/q, $40 \times 48 = 64x + 96 \times \frac{50}{3}$

$$120 = 4x + 100$$

$$x = 5$$

16. (c); Let total work be 60 units (LCM of 12 and 7.5)

Efficiency of A = 5 units/day

Efficiency of A and B together = 8 units/day

Efficiency of B = 3 units/day

Time taken by B alone to do that work = 20 days

Time taken by C alone = 23 days

17. (c): Let efficiency of A be x units/day.

$$\text{So, efficiency of C} = \frac{400}{100} \times x \\ = 4x \text{ units/day}$$

$$\text{And, efficiency of B} = 4x \times \frac{3}{2} \\ = 6x \text{ units/day}$$

$$\text{Now, total work} = 33 \times x = 33x \text{ units}$$

$$\text{Required days} = \frac{33x}{x+6x+4x} = 3 \text{ days}$$

18. (b): Let A's time = x days

$$\therefore \text{B's time} = 2x \text{ days}$$

$$\therefore \frac{1}{x} + \frac{1}{2x} = \frac{1}{14} \Rightarrow \frac{2+1}{2x} = \frac{1}{14} \Rightarrow \frac{3}{x} = \frac{1}{7} \\ x = 21$$

$$\therefore \text{Required time} = 21 \text{ days}$$

19. (c): Sita's 1 day work

$$= \frac{50}{100} \times \frac{1}{15} + \frac{1}{15} \\ = \frac{1}{30} + \frac{1}{15} = \frac{1+2}{30} = \frac{3}{30} = \frac{1}{10}$$

$$\text{Required time} = 10 \text{ days}$$

20. (a): Let B take x days.

$$\therefore \text{Time taken by } \frac{A}{2} = \frac{3}{4} \times x$$

$$\frac{1}{x} + \frac{2}{3x} = \frac{1}{18} \Rightarrow \frac{3+2}{3x} = \frac{1}{18}$$

$$3x = 18 \times 5 \quad \text{P} \quad x = 6 \times 5 = 30$$

$$\therefore \text{Required time} = 30 \text{ days}$$

21. (b): 1M will do it in = $20 \times 4 = 80$ days

Let women's 1 day work

$$\therefore \frac{2}{80} + \frac{3}{x} = \frac{1}{20} \Rightarrow \frac{3}{x} = \frac{1}{40} \Rightarrow x = 120$$

$$\therefore \frac{3}{80} + \frac{3}{120} = \frac{9+6}{240} = \frac{15}{240} = \frac{1}{16}$$

$$\therefore \text{Required time} = 16 \text{ days}$$

22. (b): $\frac{M_1 D_1 H_1}{W_1} = \frac{M_2 D_2 H_2}{W_2}$

$$15 \times 20 \times 8 = H_2 \times 20 \times 12$$

$$12H_2 = 120 \quad \text{P} \quad H_2 = 10 \text{ hrs}$$

23. (c): 1 men can do it = 45×16

Part of work done by 45 men in 4 days

$$= \frac{4 \times 45}{45 \times 16} = \frac{1}{4}$$

$$\text{Remaining work} = 1 - \frac{1}{4} = \frac{3}{4}$$

Now no. of men = $45 + 36 = 81$

$$\therefore \text{Required time} = \frac{\frac{3}{4}}{\frac{81}{45 \times 16}}$$

$$= \frac{3 \times 45 \times 16}{81 \times 4} = \frac{20}{3} = 6\frac{2}{3} \text{ days}$$

24. (b): $M_1 D_1 = M_2 D_2 \Rightarrow 10 \times 12 = 12 \times D_2$

$$D_2 = 10 \text{ days}$$

25. (a): $M_1 D_1 H_1 = M_2 D_2 H_2 \Rightarrow 10 \times 18 \times 6 = H_2 \times 15 \times$

$$12 = \frac{180}{2 \times 15}$$

$$H_2 = 6 \text{ days} = \frac{12}{2}$$

26. (c): Part of the tank will empty by tap C in 1 min

$$= \frac{1}{20} + \frac{1}{24} - \frac{1}{15} = \frac{6+5-8}{120} = \frac{3}{120}$$

Tap C will empty the tank in 120 min

Capacity of four $120 \times 6 = 720$ gallon

27. (d): Let us check option wise.

(i) Q opened alone required time = 8 hr

(ii) P and S are opened

$$\frac{1}{4} - \frac{1}{10} = \frac{10-4}{40} = \frac{6}{40} = \frac{3}{20}$$

Required time = 6.67 hr

(iii) P, R and S are opened = $\frac{1}{4} + \frac{1}{12} - \frac{1}{10}$

$$= \frac{15+5-6}{60} = \frac{14}{60} = \frac{7}{30}$$

Required time = 4.28 hr

(iv) P, Q and S are opened = $\frac{1}{4} + \frac{1}{8} - \frac{1}{10}$

$$= \frac{10+5-4}{40} = \frac{10+5-4}{40}$$

Required time = $\frac{40}{11} = 3.636$ hr

So by option conclude that (d) is correct.

28. (d): Part of the tank that will fill when both pipe are

$$\text{opened} = \frac{1}{x} - \frac{1}{y} = \frac{y-x}{xy}$$

$$\therefore \text{Required time} = \frac{xy}{y-x} \text{ h}$$

29. (b): Part of the tank that will empty in 1 h = $\frac{1}{3} - \frac{2}{7}$

$$= \frac{7-6}{21} = \frac{1}{21}$$

Required time = 21 h

30. (b): Part of the tank is filled when both pipes are opened in 1 hour

$$= \frac{1}{15} - \frac{1}{30} = \frac{2-1}{30} = \frac{1}{30}$$

∴ Required time to fill half of the tank

$$= \frac{30}{2} = 15 \text{ min}$$

31. (b): Part of the cistern will be filled up when all the taps are opened in 1 h

$$= \frac{1}{3} + \frac{1}{4} - \frac{1}{5} = \frac{20+15-12}{60} = \frac{23}{60}$$

$$\therefore \text{Required time} = \frac{60}{23} = 2\frac{14}{23}$$

32. (c): Let in x h the tank will be filled up completely

$$\frac{x}{2} + \frac{(x-1)}{6} = 1 \Rightarrow \frac{3x+x-1}{6} = 1 \Rightarrow 4x-1=6$$

$$4x = 7 \Rightarrow x = \frac{7}{4} \text{ hr} \Rightarrow x = \frac{7}{4} \times 60$$

$$x = 105 \text{ } \therefore x = 1 \text{ hr } 45 \text{ min}$$

∴ Exact time = 11 : 45



Speed, Time and Distance

The concepts of time distance are most important in the terms of competitive exams. The basic concept of time and distance is used in solving the question based on motion in a straight line. The applications of time & distance are used to solve the problems related to trains and races.

The relation between time, distance and speed is

Distance = Time × Speed

$$\text{i.e., } D = T \times S \Rightarrow \text{Time (T)} = \frac{\text{Distance (D)}}{\text{Speed (S)}} \Rightarrow \text{Speed (S)} = \frac{\text{Distance (D)}}{\text{Time (T)}}$$

Example: A car covers 200 km in 4 hours, then find the speed of the car.

Sol. We know that, $\Rightarrow \text{Speed (S)} = \frac{\text{Distance (D)}}{\text{Time (T)}}$

$$\text{Required speed} = \frac{200}{4} = 50 \text{ km/h}$$

Conversion of Units: (i) When we convert km/h into m/s, we multiply the speed by $\frac{5}{18}$. i.e, $1 \text{ km/h} \times \frac{5}{18} = \text{m/s}$.
 (ii) When we convert m/s into km/h, we multiply the speed by $\frac{18}{5}$. i.e, $1 \text{ m/s} \times \frac{18}{5} = \text{km/h}$

Example: Convert 72 km/h into m/s.

Sol. We know that, $72 \text{ km/h} = \left(72 \times \frac{5}{18}\right) \text{ m/s} = 4 \times 5 = 20 \text{ m/s}$

Concept 1:

Average speed: A certain distance is covered at 'x' km/h and the same distance is covered at 'y' km/h then the average speed during the whole journey.

$$\text{Average speed} = \frac{2xy}{x+y} \text{ km/h}$$

Example: Rohit covers a certain distance by car driving at speed of 40 km/h and he returns back to the starting point riding on a scooter with a speed of 10 km/hr. Find the average speed of the whole journey?

Sol. Average speed = $\frac{2 \times 40 \times 10}{40 + 10} = \frac{2 \times 400}{50} = 16 \text{ km/hr}$

Concept 2: A person covers a distance in T hours and the first half at S_1 km/h and the second half at S_2 km/h, then the total distance covered by the person.

$$D = \frac{2 \times T \times S_1 \times S_2}{S_1 + S_2}$$

Example: A car covers a distance in 10 hrs, the first half at 40 km/h and the second half at 20 km/h. Find the distance travelled by car?

Sol. Distance = $\frac{2 \times 10 \times 40 \times 20}{40 + 20} \text{ km/h} = \frac{2 \times 10 \times 40 \times 20}{60} = 266.67 \text{ km}$

Concept 3: If two persons P and Q start at the same time in opposite directions from two points and after passing each they complete their journeys in 'a' and 'b' hrs respectively then

$$\frac{\text{P's speed}}{\text{Q's speed}} = \frac{\sqrt{b}}{\sqrt{a}}$$

Example: Shivam sets out to cycle from Delhi to Ghaziabad and at the same time Hemant starts from Ghaziabad to Delhi, After passing each other they complete their journeys in 4 and 16 hours respectively. At what rate does Hemant cycle if Shivam cycle at 18 km per hour?

Sol.
$$\frac{\text{Shivam's speed}}{\text{Hemant's speed}} = \frac{\sqrt{16}}{\sqrt{4}} \Rightarrow \frac{18}{\text{Hemant's speed}} = \frac{4}{2} \Rightarrow \text{Hemant's speed} = \frac{18}{2} = 9 \text{ km/h}$$

Concept 4: If a man travelled a certain distance by bus at a rate of x km/h and walked back at the rate of ' y ' km/h. If the whole journey took ' t ' hours, then the distance he travelled is $\left(\frac{xy}{x+y}\right)t$ km.

Example: A man travelled a certain distance by train at a rate of 15 km/h and walked back at the rate of 12 km/h. The whole journey took 9 hours. Find the distance he travelled?

Sol. Required distance = $\left(\frac{xy}{x+y}\right)t = \left(\frac{15 \times 12}{15+12}\right)9 = \frac{15 \times 12 \times 9}{27} = 60 \text{ km}$

Concept 5: If a person changes his speed to $\frac{a}{b}$ of its usual speed and late by T minutes, then the usual time taken by him is $\frac{T}{\frac{b}{a}-1}$ $\left[\frac{a}{b} < 1\right]$ and when $\left[\frac{a}{b} > 1\right]$ then the usual time taken by him is $\frac{T}{1-\frac{b}{a}}$.

Example: Walking $\frac{4}{5}$ of his usual speed, a man is 16 minutes late. Find the usual time taken by him to cover that distance?

Sol: Usual time = $\frac{T}{\frac{b}{a}-1} = \frac{16}{\frac{5}{4}-1} = \frac{16 \times 4}{5-4} = 64 \text{ minutes}$

- Concept 6:**
- (i) If speed is constant, then distance is directly proportional to the time; $D \propto T$
 - (ii) If time is constant, then distance is directly proportional to the speed; $D \propto S$
 - (iii) If Distance is constant, then speed is inversely proportional to the time; $S \propto \frac{1}{T}$

Example A person covers a certain distance with a speed of 54 km/h in 15 min. If he wants to cover the same distance in 30 min, what should be his speed?

Sol. We know that, Distance = Speed \times Time = $54 \times \frac{15}{60} = \frac{9}{10} \times 15 = \frac{27}{2}$ km

Speed to cover $\frac{27}{2}$ km in 30 min = $\frac{27}{2} = \frac{27}{2} \times 2 = 27 \text{ km/h}$

- Concept 7:**
- (i) When a train passes a pole or any other object, the distance covered by train is equal to the length of the train.
 - (ii) If a train passes a bridge, platform etc, then distance travel by train is equal to the sum of the length of train and the stationary object through which the train is passing.

Example: A 100 m long train passes a platform of 200 m long. Find the distance covered by the train in passing the platform?

Sol. Required distance = length of train + length of platform = $100 + 200 = 300 \text{ m}$

- Concept 8:**
- (i) When two trains are moving in opposite directions, then their relative speed is equal to the sum of the speed of both trains.
 - (ii) When two trains are moving in same directions, then their relative speed is equal to the difference of the speed of both trains.

Example: Two trains are moving in the same direction with speed of 40 km/h and 50 km/h respectively. Find the relative speed?

Sol. Required relative speed = $(50 - 40)$ km/h = 10 km/h

Concept 9: Two trains start at the same time from P and Q and proceed towards each other at the rate of x km/h and y km/h respectively. When they meet it is found that one train has travelled D km more than the other. The

$$\text{Distance between P and Q is } \left(\frac{x + y}{x - y} \right) D, \text{ Distance} = \frac{\text{Sum of speeds}}{\text{Difference of speed}} \times \text{Difference in distance}$$

Example: Two trains start at the same time from Kanpur and Delhi and proceed towards each other at the rate of 74 km/h and 47 km/h respectively. When they meet it is found that the train has travelled 13 km more than the other. Find the distance b/w Kanpur and Delhi?

Sol. Required Distance = $\frac{\text{Sum of speeds}}{\text{Difference of speeds}} \times \text{Difference in Distance} = \frac{(73+47)}{(73-47)} \times 13 = \frac{120}{26} \times 13 = 60$ km

Concept 10: When the speed of two trains are in the ratio $x : y$. They are moving in opposite directions on parallel tracks. The first train crosses a telegraph pole in ' t_1 ' seconds where as the second train crosses the pole in ' t_2 '

seconds. Time taken by the trains to cross each other completely is given by Time taken = $\frac{t_1 x + t_2 y}{x + y}$ seconds.

Example: The speed of two trains are in the ratio 4 : 5. They are moving in opposite directions along the parallel tracks. If each takes 3 seconds to cross a pole. Find the time taken by the train to cross each other completely?

Sol. Time taken = $\left(\frac{t_1 x + t_2 y}{x + y} \right) = \frac{3 \times 4 + 3 \times 5}{4 + 5} = \frac{27}{9} = 3$ seconds

Solved Example

1. A man covers a certain distance between his house and office on bike. When his speed is 30 km/h, he is late by 20 min. However, with a speed of 40 km/h, he reaches his office 10 min earlier. Find the distance between his house and office?

Sol. Let the distance be x km.

$$\text{Time taken to cover } x \text{ km at } 30 \text{ km/h} = \frac{x}{30} \text{ h}$$

$$\text{Time taken to cover } x \text{ km at } 40 \text{ km/h} = \frac{x}{40} \text{ h}$$

$$\text{Difference between time taken} = (20 + 10) \text{ min} = \frac{1}{2} \text{ h}$$

$$\Rightarrow \therefore \frac{x}{30} - \frac{x}{40} = \frac{1}{2} \quad 40x - 30x = \frac{30 \times 40}{2}$$

$$x = \frac{30 \times 40}{20} = 60 \text{ km}$$

Hence, the required distance is 60 km.

2. A boy goes to school at a speed of 6 km/h and return to his house at a speed of 4 km/h. If he takes 5 hrs in all, what is the distance between his house and the school?

Sol. Let the required distance be x km.

$$\text{Then time taken when he goes to school} = \frac{x}{6} \text{ h}$$

$$\text{Time taken when he goes to his house} = \frac{x}{4} \text{ h}$$

$$\text{Therefore, } \frac{x}{6} + \frac{x}{4} = 5$$

$$\Rightarrow \frac{2x + 3x}{12} = 5$$

$$\therefore x = \frac{5}{5} \times 12 = 12 \text{ km}$$

3. The distance between two stations A and B is 450 km. A train starts from A and moves towards B at an average speed of 20 km/h. Another train starts from B, 20 minutes earlier than the train at A, and moves towards A at an average speed of 30 km/h. How far from A will the two trains meet?

Sol. Let the trains meet at a distance of x km from A.

$$\frac{450 - x}{30} - \frac{x}{20} = \frac{20}{60}; \quad \frac{20(450 - x) - 30x}{20 \times 30} = \frac{1}{3}$$

$$9000 - 20x - 30x = \frac{20 \times 30}{3}, 9000 - 50x = 200$$

$$8800 = 50x \Rightarrow x = \frac{8800}{50} = 176 \text{ km}$$

4. Two men P and Q start from a place walking at 6 km and 8 km an hour respectively. How many km will they be apart at the end of 2 hours, if they walk in same direction?

Sol. Distance travelled by P in 2 hours = $2 \times 6 = 12$ km
 Distance travelled by Q in 2 hours = $2 \times 8 = 16$ km
 Distance between P and Q = $(16 - 12)$ km = 4 km

5. Two runners cover the same distance at the rate of 10 km/h and 15 km/h respectively. Find the distance travelled when one takes 16 minutes longer than the other?

Sol. Let the distance be x km.

$$\text{Time taken by the first runner} = \frac{x}{10} \text{ h}$$

$$\text{Time taken by the second runner} = \frac{x}{15} \text{ h}$$

$$\text{Now, } \frac{x}{10} - \frac{x}{15} = \frac{16}{60} \Rightarrow \frac{3x - 2x}{30} = \frac{16}{60}$$

$$x = \frac{16}{60} \times 30 = 8 \text{ km}$$

6. Without any stoppage a person travels a certain distance at an average speed 80 km/h and with stoppages he covers the same distance at an average speed of 60 km/h. How many minutes per hour does he stop?

Sol. Let the total distance be x km.

$$\text{Time taken at the speed of 80 km/h} = \frac{x}{80} \text{ h}$$

$$\text{Time taken at the speed of 60 km/h} = \frac{x}{60} \text{ h}$$

$$\therefore \text{he rested for } \left(\frac{x}{60} - \frac{x}{80} \right) \text{ h} = \frac{20x}{60 \times 80} = \frac{x}{240} \text{ h}$$

He rested per hour = 15 minutes

7. A train leaves the station 1 hour before the scheduled time. The driver decreases its speed by 2 km/h. At the next station 60 km away, the train reached on time. Find the original speed of the train?

Sol. Let it takes x hours in second case

$$\frac{60}{x-1} - \frac{60}{x} = 2, \frac{30}{x-1} - \frac{30}{x} = 1$$

$$30x - 30(x-1) = x^2 - x \Rightarrow 30x - 30x + 30 = x^2 - x$$

$$x^2 - x - 30 = 0$$

$$x^2 - 6x + 5x - 30 = 0 \Rightarrow x(x-6) + 5(x-6) = 0$$

$$(x+5)(x-6) = 0 \Rightarrow x = -5, 6; \therefore x = 6$$

Train takes 6 hours in second case

5 hours in original case

Original speed = 12 km/h

8. A thief is spotted by a policeman at a distance of 200 metres. When the policeman starts to chase, the thief also starts running. The speed of thief and policeman are 10 km/h and 14 km/h respectively. How far will have the thief run before he caught?

Sol. Relative Speed = $(14 - 10) = 4$ km/h

$$\therefore \text{The thief will be caught after} = \frac{200}{1000 \times 4} = \frac{1}{20} \text{ h}$$

The distance covered by thief before he caught

$$= 10 \times \frac{1}{20} = 0.5 \text{ km} = 500 \text{ m}$$

9. The ratio between the speeds of Hemant and Nitish is 6 : 7. If Hemant takes 30 minutes more than Nitish to cover a distance. Find the actual time taken by Hemant and Nitish ?

Sol. Let the speed of Hemant and Nitish be x_1 km/h and x_2 km/h respectively.
 and the time taken by Hemant and Nitish be t_1 and t_2 respectively.

$$\text{Distance} = x_1 t_2 = x_2 t_1, \frac{x_1}{x_2} = \frac{t_2}{t_1} \text{ or } \frac{t_2}{t_1} = \frac{6}{7}$$

$$\frac{t_1 - t_2}{t_1} = \frac{7-6}{7}, \frac{t_1 - t_2}{t_1} = \frac{1}{7}, \frac{30}{60} = \frac{1}{7}$$

$$t_1 = \frac{7}{2} \text{ hours and } t_2 = \frac{7}{2} \times \frac{6}{7} = 3 \text{ hours}$$

$$\text{Actual time taken by Hemant} = t_1 = \frac{7}{2} \text{ hours}$$

Actual time taken by Nitish = 3 hours

10. A man tries to ascend a greased pole 101 metres high. He ascends 10 metres in first minute and slips down 1 metre in the alternate minute. If he continues to ascend in this way. How long does he takes to reach the top?

Sol. In every 2 minutes, he is able to ascend $(10 - 1) = 9$ metres

In 22 minutes, he ascends upto $9 \times 11 = 99$ metres

$$\text{For remaining distance he takes} = \frac{2}{10} = \frac{1}{5} \text{ min} = 12$$

seconds

Total time taken = 22 min 12 seconds.

11. A train running at 25 km/h takes 18 seconds to pass a platform. Next, it takes 12 seconds to pass a man walking at 5 km/h in the opposite direction. Find the length of the train and platform?

Sol. Speed of train relative to man = $(25 + 5) = 30$ km/h

$$= 30 \times \frac{5}{18} = \frac{25}{3} \text{ m/sec}$$

$$\text{Distance travelled in 12 seconds} = \frac{25}{3} \times 12 = 100 \text{ m}$$

Length of train = 100 m

$$\text{Speed of train} = 25 \text{ km/h} = 25 \times \frac{5}{18} = \frac{125}{18} \text{ m/sec}$$

$$\text{Distance travelled in 18 seconds} = \frac{125}{18} \times 18 = 125 \text{ m}$$

Length of train + length of platform = 125 m

$$\text{Length of platform} = (125 - 100) = 25 \text{ m}$$

12. Two trains of length 200 m and 250 m respectively with different speeds passes a static pole in 8 sec and 14 sec respectively. In what time will they cross each other when they are moving in same direction.

Sol. Speed of first train = $\frac{200}{8} = 25$ m/s

$$\text{Speed of second train} = \frac{250}{14} = \frac{125}{7} \text{ m/s}$$

Total distance to be travelled = $200 + 250 = 450$ m

Relative speed when they are moving in the same direction

$$= 25 - \frac{125}{7}$$

$$\text{Required time} = \frac{450 \times 7}{50} = 63 \text{ sec}$$

13. A train overtakes two persons who are walking in the same direction as the train is moving, at the rate of 2 km/hr and 4 km/hr and passes them completely in 9 and 10 seconds respectively. Find the speed and the length of the train?

Sol. Speed of two men are:

$$2 \text{ km/hr} = 2 \times \frac{5}{18} = \frac{5}{9} \text{ m/s and}$$

$$4 \text{ km/hr} = 4 \times \frac{5}{18} = \frac{10}{9} \text{ m/s}$$

Let the speed of the train be x m/s. Then relative speed

$$\text{are } \left(x - \frac{5}{9}\right) \text{ m/s and } \left(x - \frac{10}{9}\right) \text{ m/s}$$

Now, length of train = Relative speed \times Time taken to pass a man

$$\therefore \text{ length of train} = \left(x - \frac{5}{9}\right) \times 9 = \left(x - \frac{10}{9}\right) \times 10$$

$$\therefore x = \frac{100}{9} - \frac{45}{9} = \frac{55}{9} \text{ m/s}$$

$$\therefore \text{ speed of the train} = \frac{55}{9} \times \frac{18}{5} = 22 \text{ km/hr and}$$

$$\text{length of the train} = \left(x - \frac{5}{9}\right) \times 9 = \left(\frac{55}{9} - \frac{5}{9}\right) \times 9 = 50 \text{ m.}$$

14. A train after travelling 50 km meets with an accident and then proceeds at $\frac{3}{4}$ of its former speed and arrives at its destination 35 minutes late. Had the accident occurred 24 km further, it would have reached the destination only 25 minutes late. Find the speed of the train and the distance which the train travels?

Sol. Let the speed of the train be x km/hr and the distance D km.

From the question we have,

$$\frac{50}{x} + \frac{(D-50)4}{3x} = \frac{D}{x} + \frac{35}{60}$$

$$\text{or, } \frac{150 + 4D - 200}{3x} = \frac{12D + 7x}{12x}$$

$$\text{or, } 4D - 7x = 200 \quad \dots \text{ (i) and}$$

$$\frac{74}{x} + \frac{(D-74)4}{3x} = \frac{D}{x} + \frac{25}{60}$$

$$\text{or, } \frac{222 + 4D - 296}{3x} = \frac{12D + 5x}{12x}$$

$$4D - 5x = 296 \quad \dots \text{ (ii)}$$

Now, subtracting equation (i) from the equation (ii), we have

$$2x = 96$$

$$\therefore x = 48 \text{ km/hr}$$

$$\therefore \text{ Speed of the train} = 48 \text{ km/hr}$$

To find the distance, put the value of x in equation (ii)

$$4D - 5x = 296$$

$$\text{or, } 4D - 5 \times 48 = 296$$

$$\text{or, } D =$$

$$\therefore \text{ Distance which the train travel} = 134 \text{ km.}$$

15. In a race of 2500 m, A beats B by 500 m and in a race of 2000 m, B beats C by 800 m. By what distance A gives start to C so that they will end up at same time in 3 km race. Also, find by what distance A will win over C in 1 km race?

Sol. Ratio of speeds of A : B = $2500 : 2000 = 5 : 4$

Ratio of speeds of B : C = $2000 : 1200 = 5 : 3$

Ratio of speeds of A : B : C = $25 : 20 : 12$

In 3 km race A run 3000 m,

$$B \text{ run} = \frac{3000 \times 20}{25} = 2400 \text{ m}$$

$$C \text{ run} = \frac{3000 \times 12}{25} = 1440 \text{ m}$$

So to end up the race at same time A should gives C the start of 1560 m.

In 1 km race, A will win over C by 520 m.

Basic Questions

- A man travels first 50 km at 25 kmph, next 40 km at 20 kmph and then 90 km at 15 kmph. His average speed for the whole journey (in kmph) is :
(a) 25 (b) 20 (c) 18
(d) 40 (e) None of these
- A man walks at the rate of 5 km/hr for 6 hours and at 4 km/hr for 12 hours. The average speed of the man (in km/hr) is :
(a) 4 (b) $4\frac{1}{2}$ (c) $4\frac{1}{3}$
(d) $4\frac{2}{3}$ (e) None of these
- If a person travels $10\frac{1}{5}$ km in 3 hours, then the distance covered by him in 5 hours will be :
(a) 18 km (b) 17 km (c) 16 km
(d) 15 km (e) None of these
- If a train 110m long passes a telegraph pole in 3 seconds, then the time taken (in seconds) by it to cross a railway platform 165 m long, is :
(a) 3 (b) 4 (c) 5
(d) 7.5 (e) None of these
- A train 700 m long is running at the speed of 72 km/hr. If it crosses a tunnel in 1 minute, then the length of the tunnel (in metres) is :
(a) 700 (b) 600 (c) 550
(d) 500 (e) None of these
- If a 200 m long train crosses a platform of the same length as that of the train in 20 seconds, then the speed of the train is :
(a) 50 km/hr (b) 60 km/hr (c) 72 km/hr
(d) 80 km/hr (e) None of these
- Two trains, each of length 125 metre, are running in parallel tracks in opposite directions. One train is running at a speed 65 km/hour and they cross each other in 6 seconds. The speed of the other train is:
(a) 75 km /hour (b) 85 km/ hour
(c) 95 km/ hour (d) 105 km/ hour
(e) None of these
- A man with $\frac{3}{5}$ of his usual speed reaches the destination $2\frac{1}{2}$ hours late. Find his usual time to reach the destination?
(a) 4 hours (b) 3 hours (c) $3\frac{3}{4}$ hours
(d) $4\frac{1}{2}$ hours (e) None of these
- A train running at $\frac{7}{11}$ of its normal speed reached a place in 22 hours. How much time could be saved if the train would have run at its normal speed?
(a) 14 hours (b) 7 hours (c) 8 hours
(d) 16 hours (e) None of these
- Walking at three-fourth of his usual speed, a man covers certain distance in 2 hours more than the time he takes to cover the distance at his usual speed. The time taken by him to cover the distance with his usual speed is:
(a) 4.5 hours (b) 5.5 hours (c) 6 hours
(d) 5 hours (e) None of these
- A man goes from a place A to B at a speed of 12 km/hr and returns from B to A at a speed of 18 km/hr. The average speed for the whole journey is:
(a) $14\frac{2}{5}$ km/hr (b) 15 km/hr (c) $15\frac{1}{2}$ km/hr
(d) 16 km/hr (e) None of these
- Two trains started at the same time, one from A to B and the other from B to A. If they arrived at B and A respectively 4 hours and 9 hours after they passed each other, the ratio of the speeds of the two trains was:
(a) 2 : 1 (b) 3 : 2 (c) 4 : 3
(d) 5 : 4 (e) None of these
- A starts from a place P to go to a place Q. At the same time B starts from Q to P. If after meeting each other A and B took 16 and 25 hours more respectively to reach their destinations, the ratio of their speeds is:
(a) 3 : 2 (b) 5 : 4 (c) 9 : 4
(d) 9 : 13 (e) None of these
- A train of 320 m cross a platform in 24 seconds at the speed of 120 km/h. while a man cross same platform in 4 minute. What is the speed of man in m/s?
(a) 2.4 (b) 1.5 (c) 1.6
(d) 2.0 (e) None of these
- A car travel first 39 km distance in 45 minute while next 25 km distance in 35 minutes. What is its average speed?
(a) 45 Km/h (b) 35 Km/h (c) 48 Km/h
(d) 90 Km/h (e) None of these

Prelims Questions

Level - 1

- A train 220m long passes a platform in 40 seconds. If its speed is increased by 3 m/sec, then it crosses a pole in 11 seconds. Find the length of platform.
(a) 380m (b) 420m (c) 350m
(d) 460m (e) 450m
- Suresh takes 2 hours more than Mukesh to cover a distance of 300 km. If Suresh doubles his speed, he will be ahead of Mukesh by 30 minutes. Find speed of Mukesh is how much more than Suresh?
(a) 60 kmph (b) 40 kmph (c) 80 kmph
(d) 50 kmph (e) 30 kmph
- A train can cover 18km in 15 min. Find the time taken by train to cover 100m if it stops for 1 min after every 20meter?
(a) 9 min. (b) 4 min. (c) 232 sec.
(d) 245 sec. (e) 265 sec.
- A train can cross a pole in 50 sec. and a 220-meter long bridge in $1\frac{1}{6}$ min. Find length of train?
(a) 500 meters (b) 660 meters (c) 440 meters
(d) 550 meters (e) 400 meters
- A train can cross a pole in 15 seconds and travelling at the same speed it can cross a bridge of 500 m in 45 seconds, then find the length of the train?(in metre)
(a) 250 (b) 300 (c) 200
(d) 240 (e)320
- Sanjay starts from A to reach B which is 20 kms apart, at a speed of 5 kmph. By what percent should he increase his speed in order to shorten the journey time by 60%?
(a) 165% (b) 140% (c) 175%
(d) 125% (e) 150%
- Shatabdi express leaves from delhi to Kolkata at 3 p.m at 60 km/hr. If another train, duronto express leaves from the same station at 5 p.m at 90 km/hr for Kolkata. At what distance from delhi,the both train will meet each other?
(a) 360 km (b) 450 km (c) 320 km
(d) 420 km (e) 480 km
- Shreyas walks at a speed of 4 kmph for half an hour and rides bicycle at 10 kmph for next 20 minutes and finally in car at 50 kmph for 10 minutes. Find his average speed during the entire journey. (in kmph)
(a) 13.67 (b) 12 (c) 21.33
(d) 15 (e) 18.67
- Ashish walks at a speed of 8 km/hr and he runs at a speed of 12 km/hr. How much time will he take to cover a distance of 72 km, if he covers equal distance by walking and running?
(a) 6 hrs (b) 7.5 hrs (c) 8 hrs
(d) 9 hrs (e) 5.5 hrs
- Kappu & Chandu have their speed in ratio 5:6. If both start from 2 points 110 kms away towards each other. How much distance Chandu had travelled more than Kappu when they meet for first time? (both start at same time)
(a) 11 kms (b) 20 kms (c) 10 kms
(d) Cannot be determined (e) None of these
- What will be the time taken by Rahul to cover the same distance which is covered by Abhishek in 5 hours if ratio of speed of Abhishek and Rahul is 6 : 5?
(a) 4 hrs (b) 5 hrs (c) 6 hrs
(d) 7 hrs (e) 3 hrs
- Anurag can cover a km in 10 minutes and Dharam can cover a km in 15 minutes. If they both participated in a race and Anurag defeated Dharam by 200m, then find the length of race.
(a) 500m (b) 600m (c) 800m
(d) 400m (e) 300m
- Vande Bharat express is 14% faster than Rajdhani express. They start from Delhi at same time and reach Varanasi at same time because there is a obstruction for Vande Bharat express of 7 minutes. Find speed of Vande Bharat express if distance between two destination is 285 km.
(a) 300 km/h (b) 318 km/h (c) 442 km/h
(d) 352 km/h (e) 342 km/h
- Excluding stoppages, the speed of a train is 48 km/hr and including stoppages it is 40 km/hr. What is the stoppages time of the train (in minutes) per hour?
(a) 12 (b) 14 (c) 20
(d) 10 (e) can't be determined
- The distance between two stations 'P' and 'Q' is 120 km. The train 'A' starts from station 'P' with $\frac{5}{6}$ of its original speed, and reached station 'Q' late by half an hour by its scheduled time. Find the original speed.(in kmph)
(a)54 (b)42 (c)40
(d)36 (e)48

- 16.** Speed of train A is 20% more than train B which is 10% faster than train C. time taken by train A is what percent less than time taken by train C to cover the same distance?
 (a) $21\frac{8}{33}\%$ (b) $26\frac{8}{33}\%$ (c) $22\frac{8}{33}\%$
 (d) $25\frac{8}{33}\%$ (e) $24\frac{8}{33}\%$
- 17.** Rohan covers first 180km at 20kmph, next 144km at 18kmph, next 168km in 14 hours and last 182km at 14kmph. Find his average speed during the whole journey.
 (a) $15\frac{7}{22}$ kmph (b) $15\frac{5}{21}$ kmph (c) $15\frac{37}{42}$ kmph
 (d) 16 kmph (e) $17\frac{5}{21}$ kmph
- 18.** Ashish travelled a certain distance by car for 2 hours at 60 km/hr, by Bus for 5 hrs at 80 km/hr and the remaining distance by bicycle at 10 km/hr for 5 hrs. Find the average speed of Ashish in the whole journey?
 (a) 45 km/hr (b) 54 km/hr (c) 47.5 km/hr
 (d) 50 km/hr (e) 55 km/hr
- 19.** Speed of Satish is 40% of speed of Aman. Aman covers 2340 m in 18 seconds. Find in how much time Satish can cover 468 m.
 (a) 8 seconds (b) 9 seconds (c) 10 seconds
 (d) 11 seconds (e) 12 seconds
- 20.** Ratio of speed of a bus to a car is 6 : 7. They start from the same point and move towards the same direction. After four hours distance between them is 28 km. Find the time in which car will cover 196 km.
 (a) 6 hours (b) 4 hours (c) 4.5 hours
 (d) 2 hours (e) 8 hours
- 21.** Train A crosses a platform of 98 m length in 24 sec. Another Train B of same length as Train A crosses a pole in 12 sec. If speed of train A is 20% more than speed of train B. Find length of train A.
 (a) 80 m (b) 65 m (c) 70 m
 (d) 75 m (e) 90 m
- 22.** A train can cross a pole and a tunnel in $\frac{1}{1200}$ hrs and 10 seconds respectively. If Difference between length of tunnel and length of train is 200 meters, then find speed of train.
 (a) 70 m/s (b) 45 m/s (c) 35 m/s
 (d) 40 m/s (e) 50 m/s
- 23.** A train at a speed of 90 kmph crosses a pole in 25 seconds less than the time it required to cross a bridge 5 times of its length at same speed. Find the length of train.
 (a) 100 meter (b) 105 meter (c) 120 meter
 (d) 125 meter (e) None of these.
- 24.** Two trains cross each other in 7 sec while moving in opposite direction and takes 35 sec while moving in same direction. If speed of slower train is 20 m/sec, then find sum of length of both trains?
 (a) 350 meters (b) 400 meters (c) 250 meters
 (d) 200 meters (e) 550 meters
- 25.** Train A crosses a pole and platform in 26 sec and 36 sec respectively. If the speed of the train is 90 kmph, find the length of the platform.
 (a) 350 m (b) 300 m (c) 450 m
 (d) 250 m (e) 200 m
- 26.** Kabir started walking at 5 kmph at 6:00 AM to reach office at 6:30 AM. But he stuck due to some reason for 5 minutes. To cover up the remaining distance on time, he took an auto having speed 30 kmph & reached on time. What is distance covered with auto.
 (a) 0.50 km (b) 0.44 km (c) 0.66 km
 (d) 0.55 km (e) 0.60 km
- 27.** A train cross a platform in 20 second which is 180-meter-long and a man in 8 seconds What time it takes to cross a bridge of 240-meter-long. (in sec)?
 (a) 12 sec (b) 30 sec (c) 24 sec
 (d) 20 sec (e) 16 sec
- 28.** Manoj and Hemant starts their journey at the same time from A and B towards B and A with speed of 36km/h and 24 km/h respectively. After reaching their destination they retrace their path towards each other. Find distance cover by Manoj, if total distance between A and B is 25 km?
 (a) 30 km (b) 45 km (c) 48 km
 (d) 50 km (e) 40 km.
- 29.** First train starts from station A at 6 am and reaches station B at 4 pm and second train started from B at 7 am and reaches A at 3 pm. Then, find the time at which both the trains meet each other.
 (a) 11: 10 am (b) 11: 05 am (c) 11: 00 am
 (d) 10: 55 am (e) 10: 50 am
- 30.** A train running at the speed of 144 km/hr crosses a man who is running at the speed of 18 km/hr in opposite direction of train in 8 sec. Find time taken by train to cross a platform, whose length is $66\frac{2}{3}\%$ more than length of train?
 (a) 36 sec (b) 24 sec (c) 12 sec
 (d) 28 sec (e) 15 sec
- 31.** A train crosses a bridge half of its length with speed of 144 km/hr in one minute. If train is running with 50% of its speed, then find in how much time train will cross a platform whose length is equal to the length of that bridge (in minutes)?
 (a) 8 (b) 6 (c) 4
 (d) 2 (e) 10

32. A 240 meters long train running at a speed of 80 km/hr passes a 280 meters long platform in T second. If train passes a tunnel in $(12.6 + T)$ sec, then find the length of tunnel?
 (a) 500 meters (b) 560 meters (c) 550 meters
 (d) 420 meters (e) 540 meters
33. A car travel between city A to B with the speed of 60 km/hr but in returning car lost its speed by x km/hr and take $1\frac{1}{3}$ hr more time. If total distance between two cities is 240 km, then find the average speed of car in whole journey ?
 (a) $\frac{370}{7}$ km/hr (b) $\frac{380}{7}$ km/hr (c) $\frac{390}{7}$ km/hr
 (d) $\frac{360}{7}$ km/hr (e) $\frac{355}{7}$ km/hr
34. A train running at the speed of 72 km/hr passed a man in 14 sec and a platform in 32 sec respectively. Find the length of platform ?
 (a) 360 meter (b) 280 meter (c) 210 meter
 (d) 240 meter (e) 200 meter
35. Train A can cross a man in $13\frac{1}{3}$ sec and 210 m long platform in 25 sec. If train B which is running which is running in same direction at speed of 97.2 km/hr crosses train A in 40 sec, then find time taken by train B to cross that platform?
 (a) $3\frac{1}{3}$ sec (b) $12\frac{1}{2}$ sec (c) $11\frac{1}{9}$ sec
 (d) $13\frac{1}{3}$ sec (e) $12\frac{2}{9}$ sec
36. A 180m. long train crosses another train of length 270 m in 10.8 seconds by running towards each other. If the ratio of speed of the first train to second train is 2 : 3. Then find the time taken by 2nd train to cross first train if both run in the same direction.
 (a) 47 (b) 26 (c) 54
 (d) 50 (e) 25
37. Train-A leaves Delhi at 8:00 A.M. and reaches Lucknow at 4:00 P.M. and train-B leaves Lucknow at 1:00 P.M. and reaches Delhi at 5:00 P.M. Find at what time both trains will meet each other?
 (a) 2:30 P.M. (b) 2:00 P.M. (c) 3:00 P.M.
 (d) 2:15 P.M. (e) 2:45 P.M.
38. Sanjay starts from his home to reach office at uniform speed of 5 kmph. After 20 minutes, Anurag starts cycling at uniform speed of 12 kmph in same direction from same point. At what distance, he will catch Sanjay? (approx)
 (a) 7 km (b) 4 km (c) 5 km
 (d) 2 km (e) 3 km
39. Ravi and Maanik started running simultaneously towards each other with speed in the ratio of 3:4. If the initial separation between is 4.2 km and they meet in 3 min, then what is the difference between their speeds?
 (a) 15 km/hr (b) 12 km/hr (c) 18 km/hr
 (d) 10 km/hr (e) 9 km/hr
40. Speed of Deepak is $\frac{3}{4}$ th of speed of Mohit . Deepak takes 60 min. more than Mohit to cover a distance of 48 km. If speed of Harry is 250% more than speed of Deepak, then find in what time Harry will cover a distance of 840 km?
 (a) 28 hr (b) 24 hr (c) 20 hr
 (d) 16 hr (e) 22 hr

Level - 2

1. A completes a journey of 540 km in 5 hours. If he travels a part of journey by train at 120 kmph and second part of journey by bus at speed of 100 kmph. Find the ratio between time taken to complete the first part and second part.
 (a) 2 : 3 (b) 3 : 2 (c) 1 : 4
 (d) 4 : 1 (e) None of these
2. Train A travelling at 72 kmph crosses another train of half of its length travelling in opposite direction at speed of 90 kmph in 6 seconds. If train A crosses a platform in 29 seconds, then what is the length of the platform?
 (a) 400 meter (b) 540 meter (c) 480 meter
 (d) 490 meter (e) 580 meter
3. A metro train A starts from Kahsmere Gate at 6:00 AM to reach Iffco Chowk at 7:00 AM while another train B starts from Iffco Chowk at 6:20 AM to reach Kashmere Gate at 7:00 AM. At what time both trains will meet each other if distance between stations is 24 km.
 (a) 6:32 AM (b) 6:36 AM (c) 6:40 AM
 (d) 6:28 AM (e) 6:30 AM
4. Trains A and B are travelling at x km/hr and $(x + 36)$ km/hr respectively. Train B crosses train A when running in the same direction in $31\frac{1}{2}$ seconds. Find the sum of speed of both the trains if they pass each other in 9 seconds while running in opposite direction
 (a) 126 km/hr (b) 120 km/hr (c) 116 km/hr
 (d) 136 km/hr (e) 115 km/hr

5. A train A of length x m takes more time to cross a 300 m platform than time taken by train B of length y m to cross a 450 m platform. If the speed of B is 50% more than the speed of A, then which of the following holds true?
 (a) $x > y$ (b) $x = y$ (c) $x < y$
 (d) Can't be determined (e) None of these
6. Train A crosses a tower with a speed of 86.4 km/h in ' t ' seconds while another train B crosses a platform of 80 m length in ' $2t$ ' seconds with a speed of 108 km/h. If train B is 100% more in length than that of train A then find the length of train B?
 (a) 300 m (b) 400 m (c) 360 m
 (d) 280 m (e) 320 m
7. Vikash and Mohit started from point A towards point Q. Distance between A and Q is 9 km. If Mohit starts after 4 min., then he will meet Vikash 1 km away from point Q at a time when Vikash is returning towards point A after reaching point Q and Vikash can cover 1 km in 6 min. find speed of Mohit in km/min.
 (a) $\frac{1}{7}$ (b) $\frac{1}{8}$ (c) $\frac{1}{9}$
 (d) $\frac{1}{6}$ (e) $\frac{1}{12}$
8. Train - A crosses train - B in 4 seconds while running in opposite direction and train - B crosses a pole in 3 seconds. Length of train - B is 60 meters. If ratio of speed of train - A to speed of train - B is 5 : 8, then find the time taken by train - B to cross train - A while running in same direction.
 (a) $17\frac{1}{3}$ seconds (b) $15\frac{2}{3}$ seconds (c) $11\frac{1}{3}$ seconds
 (d) $12\frac{2}{3}$ seconds (e) $10\frac{2}{3}$ seconds
9. Vande Bharat express is 14% faster than Rajdhani express. They start from Delhi at same time and reach Varanasi at same time because there is a obstruction for Vande Bharat express of 7 minutes. Find speed of Vande Bharat express if distance between two destination is 285 km.
 (a) 300 km/h (b) 318 km/h (c) 442 km/h
 (d) 352 km/h (e) 342 km/h
10. A train 'P' crosses a pole in 6.75 sec and a 240-meter-long platform in 15.75 sec. If train 'Q' which is 120-meter-long running in same direction crosses train 'P' in 45 sec, then find time required by train 'Q' to cross train 'P' running in opposite direction?
 (a) 6sec (b) 7sec (c) 5 sec
 (d) 9 sec (e) 10 sec
11. Train - A can cross a 400m long platform in 36 seconds. Train - B crosses train - A in 66 seconds while running in same direction and train - B crosses a pole in $\frac{72}{7}$ seconds. If ratio of length of train - A to train - B is 5 : 6, then find time taken by train - A to cross a pole.
 (a) 12 seconds (b) 17 seconds (c) 11 seconds
 (d) 14 seconds (e) 19 seconds
12. A 350 meters long train 'A' passed a pole in 17.5 sec. Train 'A' passed another train 'B' travelling in the direction opposite to 'A' in $\frac{60}{7}$ sec. If length of train 'B' is 450 meters, then in what time train 'B' will pass train 'A' when they both runs in same direction ?
 (a) 16 sec (b) 12 sec (c) 20 sec
 (d) 15 sec (e) 10 sec
13. 180 m long Train A crosses Train B of 120 m in length which is running in opposite direction in $5\frac{5}{11}$ sec. If speed of train B is 20% more than that of train A, then find the time taken by both trains to cross each other, when they running in same direction?
 (a) 60 sec (b) 58 sec (c) 55 sec
 (d) 50sec (e) 65 sec
14. Train-A crosses a pole in 9 seconds and Train-B which is 180m long and running at 150km/hr crosses Train-A in 57.6 seconds, when running in same direction. Then, find in how much time will Train-A cross Train-B when running in opposite direction?
 (a) 9.6 seconds (b) 8.2 seconds (c) 6.4 seconds
 (d) 5 seconds (e) 11.2 seconds
15. A train engine can run at 56 kmph without any wagon. Decrease in speed of engine is directly proportional to square root of number of wagons attached. Speed becomes 40 kmph on attaching 4 wagons. Find maximum no. of wagons which engine can carry.
 (a) 9 (b) 13 (c) 14
 (d) 48 (e) 49
16. Due to bad weather, a taxi driver reached late at airport by 30 minutes to pick Vijay who had to wait for 75 minutes, who reached early due to increased speed of airplane by 10%. Find the duration of flight.
 (a) 10 hr 15 min (b) 7 hr 20 min (c) 8 hr
 (d) 8 hr 15 min (e) 13 hr 45 min
17. Ritesh travels at 1 kmph to reach station 500m far from his house to catch a train. He started but after 4 minutes, he realized that he forgot a document at home so he returned with same speed. What should be his speed (in kmph) so that he catches the train?
 (a) 0.36 (b) 0.27 (c) 1.27
 (d) 1.36 (e) 1.5
18. The difference between the time taken by two trains to travel a distance of 300 km is 2 hours 30 minutes. If the difference between their speeds is 6 kmph, find the speed of slower train?(in kmph)
 (a) 25 (b) 20 (c) 18
 (d) 30 (e) 24

19. The difference between the time taken by two cars to travel a distance of 280 km is 1 hr 36 minutes. If the difference between their speed is 20 kmph. Find the speed of slower car.(in kmph)
 (a) 40 (b) 60 (c) 80
 (d) 70 (e) 50
20. A man travels from point P to Q at 90 km/hr and from Q to R at 60 km/hr. The total distance between P to R is 200 km. If his average speed is 75 km/hr, then find distance between P and Q?(in Km)
 (a) 140 (b) 120 (c) 150
 (d) 180 (e) 200
21. Anurag started 1 hr late from his home towards his office 140 km away. So, he increased his speed by 40% and reached office on time. What was the initial speed of Anurag?
 (a) 30 km/hr (b) 40 km/hr (c) 50 km/hr
 (d) 45 km/hr (e) 35 km/hr
22. Two trains A and B crosses each other while running in opposite direction in half of a minute. If train A running with double of its earlier speed and train B reduces its speed to 50% of its earlier speed, then they again crosses each other in the same time while running in opposite direction. Find the length of both train together, if speed of train - A is 36 kmph. (in m)
 (a) 500 (b) 600 (c) 400
 (d) 900 (e) 800
23. Each of two trains - A & B of different length can cross a pole in 5 seconds and when they are moving in same direction, train - A crosses train - B in $28\frac{1}{3}$ sec. If sum of their length is 0.85 km, then find the ratio of their length?
 (a) 7:11 (b) 10:7 (c) 11:13
 (d) 10:13 (e) 5:4
24. A motorcyclist covers a distance from point A to point B at an average speed of 32 kmph and return journey from point B to point A at an average speed of 60 kmph. If he takes 11.5 hours for the whole journey, then find the distance between point A and point B.
 (a) 480 km (b) 360 km (c) 240 km
 (d) 180 km (e) 300 km
25. Time taken by car to cover a certain distance from A to B is 2 hours lesser than that of bus, while both of them are travelling at their normal speed. If bus can cover 54 kms in 2 hours while travelling at its 75% of the speed. Find the ratio of speed of car to that of bus if distance between A and B is 360 km.
 (a) 4 : 5 (b) 2 : 5 (c) 2 : 3
 (d) 5 : 4 (e) 4 : 3
26. Two train are moving in opposite direction with 15 km/h and S km/h respectively, faster train has length of 150 meter which is $42\frac{6}{7}\%$ of length of slower train. If faster train start chasing slower train 250 meter behind at same time and crosses it in 9 min, then find speed of faster train? (S>15 km/h)
 (a) 25 km/h (b) 16 km/h (c) 20 km/h
 (d) 24 km/h (e) None of these.
27. Distance between A and B is 450 km. Veer & Shivam can cover distance between A and B in 'T' & (T + 4) hours respectively. If Shivam & Veer start from A at 8.00 am and 10.00 am respectively and both meet at 12.30 pm, then find the distance from A, where they meet?
 (a) 225 km (b) 175 km (c) 150 km
 (d) 125 km (e) 100 km
28. Train - A crosses a pole in 10 seconds and train - B crosses train - A in 48 seconds while running in same direction. If ratio of speed of train - A to that of train - B is 3 : 4 and train - A is 100m long than train - B, then find in how many seconds train - B will cross a pole?
 (a) 4.5 seconds (b) 7.5 seconds (c) 10.5 seconds
 (d) 12 seconds (e) 6 seconds
29. A car travel with its usual speed of x km/hr between city A and B and in returning it lost $\frac{1}{6}$ th of its usual speed. If distance between these two cities is 144 km and car takes total $\frac{33}{10}$ hours in whole journey then find the average speed of car in whole journey?
 (a) $\frac{840}{11}$ km/hr (b) $\frac{720}{11}$ km/hr (c) $\frac{640}{11}$ km/hr
 (d) $\frac{960}{11}$ km/hr (e) $\frac{600}{11}$ km/hr
30. A train covers certain distance in two parts. Distance covered in first part is 200% more than the distance covered in second part while speed of train is in the ratio 2 : 1 in first and second part respectively. If average speed of train is 64 km/hr, then find the speed of train in first part? (in kmph)
 (a) 40 (b) 80 (c) 50
 (d) 30 (e) 100
31. A train P with speed 64 km/hr crosses a pole in 27 second and an another train Q whose speed is $12\frac{1}{2}\%$ less than train P crosses a man in 36 second. If both train move in opposite direction to each other, then find in how much time will they cross each other?
 (a) 28.2 sec (b) 36.2 sec (c) 31.2 sec
 (d) 38.2sec (e) 39.2 sec

32. Train A running at the speed of 108 km/hr crosses a man, who running in the opposite direction at the speed of 12 km/hr in 7.2 sec. If speed of train A increased by 25% and it takes 48 seconds to cross another train B, which running at the speed of 90 km/hr in same direction. Find the length of train B?
 (a) 280 meters (b) 360 meters (c) 180 meters
 (d) 160 meters (e) 220 meters
33. A 240 meters long train crosses a 210 meters long train running in opposite direction in 6 sec. Ratio between speed of longer train and smaller train is 7 : 8. If faster train crosses a platform in 9 sec, then find time taken by slower train to cross a bridge, which is 60 meters more long than platform?
 (a) $\frac{142}{7}$ sec (b) $\frac{136}{7}$ sec (c) $\frac{90}{7}$ sec
 (d) $\frac{148}{7}$ sec (e) $\frac{142}{7}$ sec
34. Raman invested some amount in scheme 'P' which offer 20% C.I. p.a while some amount in scheme 'Q' which offers 8% S.I. p.a. After 2 year ratio of interest, earn from 'P' to 'Q' is 11 : 6. Amount invested by Raman in scheme 'P' is what percent of the amount invested by him in scheme 'Q'.
 (a) 50% (b) $33\frac{1}{3}\%$ (c) 25%
 (d) $66\frac{2}{3}\%$ (e) 150%
35. A passenger train leaves a station at a certain time and at a fixed speed. After, 10 hours, a superfast train leaves the same station and in the same direction moving at a uniform speed of 90 kmph. The train catches the passenger train in 5 hours. Find the speed of passenger train.
 (a) 30 kmph (b) 25 kmph (c) 28 kmph
 (d) 32 kmph (e) 35 kmph
36. Manoj takes twice the time to cover a distance 'D' km than time taken by Shreya to cover 2D km. Manoj started from his home & after 30 min, Shreya started from his house but she caught him after travelling for 20/3 km. Find speed of Shreya. (speed is considered in kmph)
 (a) 40 kmph (b) 13.33 kmph (c) 28.5 kmph
 (d) 17.77 kmph (e) None of these
37. If train - A starts from P at 8:00 am and train B starts from Q at 10:00 am towards Q and P respectively. If total distance between P to Q is 594 km and speed of train A and train B are 63 km/hr and 54 km/hr respectively, then find at what distance from Q will they cross each other?(in km)
 (a) 208 (b) 216 (c) 192
 (d) 180 (e) 224
38. Time taken by Dhoni to cover a distance of 'D' km is same as time taken by Rohit to cover '3D' km. if Virat is 50% faster than Rohit and when Dhoni & Virat travel towards each other from points D km apart then they meet after 2 hours. Find time taken by Virat to cover D km.
 (a) 2 hours (b) 3.2 hours (c) 2.44 hours
 (d) 3.67 hours (e) 2.68 hours
39. Two cars C and D start their journey from A to B and B to A respectively. Both cars meet at a point from that point P and Q reach their destination in 16 min and 36 min respectively. Find ratio of their speed?
 (a) 3:2 (b) 4:5 (c) 4:7
 (d) 9:4 (e) None of these.
40. Shatabdhi express travelling at 168 kmph and overtook Rajdhani express, traveling in the same direction in 20 seconds. If Rajdhani express had been traveling at twice its speed, then Shatabdhi express would have taken 45 seconds to overtake it. Find the length of Shatabdi express, given that its length is twice of the length of Rajdhani express?
 (a) 180 m (b) 720 m (c) 360 m
 (d) 400 m (e) 200 m

Mains Questions

1. Two trains A and B cross the same platform in 18 and 24 seconds respectively. The ratio of length of trains A and B is 8:7 and the ratio of their speeds is 3:2. Length of platform is what percent of the length of train A?
 (a) 12.5% (b) 20% (c) 30%
 (d) 15% (e) 12%
2. Train X having length 130 m and train Y having length 145 m moving in opposite direction. They enter into a tunnel which have length equal to the sum of length of both trains. Trains meet after 10 second of entering in the tunnel. What percent of train X part is left out the tunnel when it meet train Y if they have there speed in the ratio of 5 : 6.
 (a) $2\frac{11}{13}\%$ (b) $3\frac{11}{13}\%$ (c) $4\frac{1}{3}\%$
 (d) 5% (e) 8%
3. A train can travel 100% faster than a car. Both start from point A at the same time and reach point B 150 km away from A at the same time on the way however train lost about 30 minutes while stopping at a station. Find the speed of car?
 (a) 115 km/hr (b) 120 km/hr
 (c) 125 km/hr (d) 75 km/hr (e) 150 km/hr

4. A train moves at the speed of 108 km/hr, passes a platform and a bridge in 15 sec and 18 sec respectively. If the length of platform is 50% of length of bridge, then find the length of train.
 (a) 280 m (b) 360 m (c) 340 m
 (d) 320 m (e) 300 m
5. A train travelling at 72 km/hr crosses another train having half its length and travelling in opposite direction at 63 km/hr in 15 seconds. Faster train also passed a railway platform in 50 second. Length of smaller train is what percent of length of platform?
 (a) 40% (b) 35% (c) 25%
 (d) 30% (e) 45%

Directions (6-7): These questions are based on the information given below.

Train P has a length of 300 m and a speed of 72 kmph. Train Q has a length of 600 m and a speed of 90 kmph. Both enter the tunnel from opposite ends simultaneously. The length of the tunnel is 600 m.

6. Which train exits the tunnel first completely? What length of the other train is still in the tunnel at that time? (in m)
 (a) P, 75 (b) Q, 75 (c) P, 90
 (d) Q, 90 (e) Can't determine
7. Find the distance between the point where the rear ends of the trains cross each other and the point of entry of the slower train (in m).
 (a) $398\frac{1}{3}$ (b) $366\frac{2}{3}$ (c) $216\frac{2}{3}$
 (d) $233\frac{1}{3}$ (e) none of these

Directions (8-9): Aman and Chirag decided to meet each other at point B. Aman started from point A at 11 : 00 a.m. and at the same time Chirag started from point C. They move towards each other to meet at point B. Chirag take 1 hour more to reach point B relative to Aman. Speed of Chirag is 20% more than speed of Aman and distance covered by Aman $33\frac{1}{3}\%$ less than distance covered by Chirag.

8. At what time Chirag will reach at point B?
 (a) 2 : 30 P.M. (b) 3 : 00 P.M. (c) 3 : 30 P.M.
 (d) 4 : 00 P.M. (e) 4 : 30 P.M.
9. Aman would slow his speed by how much percent so that time taken by Aman and Chirag is same? (2marks)
 (a) 10% (b) 25% (c) 15%
 (d) 20% (e) None of these

Directions (10-11): Amit intended to travel a certain distance at a certain uniform speed. But after one hour, he increased his speed by 25%. As a result, in the remaining part of the time that he originally planned for the journey,

he could now cover as much distance as he initially thought he would be able to cover.

10. What is the total time taken for the journey?
 (a) 4 hrs. (b) 5 hrs (c) 6 hrs
 (d) Can't be determined (e) None of these
11. After Amit increased his speed, if he decided to terminate his journey after covering the distance he initially intended to cover and not cover the extra distance as given in the data, what is the total time taken for the journey?
 (a) 4 hr 12 min. (b) 5 hr 24 min. (c) 3 hr 36 min.
 (d) 4 hr 36 min. (e) None of these

Directions (12-13): Two trains start together from a Station A in the same direction. The second train can cover 1.25 times the distance of first train in the same time. Half an hour later, a third train starts from same station and in the same direction. It overtakes the second train exactly 90 minutes after it overtakes the first train.

12. What is the speed of third train, if the speed of the first train is 40 Km/hr?
 (a) 20 Km/hr (b) 50 Km/hr (c) 60 Km/hr
 (d) 80 Km/hr (e) none of these
13. What is the distance covered by third train till the time it overtakes the second train?
 (a) 160 kms. (b) 150 kms. (c) 140 kms.
 (d) 130 kms. (e) None of these

Directions (14-16): Cities M and N are 600 km apart. Bus A starts from city M towards N at 9 AM and bus B starts from city N towards M at the same time. Bus A travels the first $\frac{1}{3}$ rd of the distance at a speed of 40 km/h, the second $\frac{1}{3}$ rd at 60 km/h and the last $\frac{1}{3}$ rd at 40 km/h. Bus B travels the first $\frac{1}{3}$ rd of the total distance at a speed of 50 km/h, the second $\frac{1}{3}$ rd at 60 km/h and the last $\frac{1}{3}$ rd at 30 km/h.

14. When and where will the two buses cross each other after starting from their respective stations?
 (a) 6 hours 10 minutes, 270 km from city N
 (b) 5 hours 10 minutes, 270 km from city M
 (c) 6 hours 10 minutes, 270 km from city M
 (d) 5 hours 10 minutes, 270 km from city N
 (e) None of these
15. At what times Bus A and Bus B reach their destinations respectively? (2 Marks)
 (a) 10 PM, 11:20 PM
 (b) 11 PM, 10:20 PM
 (c) 11:20 PM, 10 PM
 (d) 10:20 PM, 11 PM
 (e) None of these

16. If Bus A and Bus B will be completing their return journey at constant speeds of 40 km/h and 60 km/h respectively on the next day, then how far from the previous day's meeting point they will meet? (2 Marks)
 (a) 30 km (b) 90 km (c) 60 km
 (d) 120 km (e) None of these

17. A bus starts from city M to city N at a constant speed while another bus starts at the same time from city N to city M at the same speed. After driving for 3 hours, they meet at point P. The buses start their return journey on the next day. First bus starts at a speed 20% less than its previous day's speed while 40 minutes later, second bus starts at a speed 20% more than its previous day's speed. If they meet 21 kilometers far from point P, then what is the distance between the two cities? (2 Marks)
 (a) 600 km (b) 150 km (c) 300 km
 (d) 450 km (e) none of these

Directions (18-19): Answer these questions based on the information given below.

PQ is a tunnel. A dog sits at a distance of $\frac{5}{11}$ of PQ from P. The train's whistle coming from any end of the tunnel would make the dog run. If a train approaches P and the dog runs towards P, the train would hit the dog at P. If the dog runs towards Q instead, it would hit the dog at Q.

18. Find the ratio of the speeds of the train and the speed of dog.
 (a) 5 : 2 (b) 16 : 5 (c) 11 : 1
 (d) 34 : 3 (e) None of these
19. If the speed of the train mentioned in the directions is 561 kmph and A policeman was travelling at a speed which is $76\frac{8}{17}\%$ more than the speed of the dog. The policeman crossed a thief travelling at 60 kmph in the opposite direction. He had to travel for another 6 minutes before he could find a gap in the median where he could take a U turn and start chasing the thief. After they crossed each other how long would the policeman take to catch the thief? (in minute)
 (a) 30 (b) 36 (c) 42
 (d) 45 (e) none of these

Direction (20-21): These questions are based on the information given below.

A 72 km tunnel connects two cities P and Q. There are two gutters in the tunnel. Gutter 1 is the nearest gutter to P. The distance between gutter 1 and P is $16\frac{2}{3}\%$ less than the distance between gutter 2 and Q.

20. One day, a hospital in P received information that an accident had occurred at gutter 2. An ambulance started from P at 60 km/hr and 10 minutes later it crossed gutter 1. It doubled its speed after that

- travelled to gutter 2 and returned back at that speed. If it takes a total of 2 minutes to take the patient into and out of the ambulance, what is the total time taken by the ambulance to shift the patient to the hospital?
 (a) 65 minutes (b) 67 minutes (c) 68 minutes
 (d) 69 minutes (e) None of these

21. If the distance of the tunnel increased by $66\frac{2}{3}\%$ and a cyclist starts from P to Q at 9 a.m. with a speed of 40 kmph while another cyclist starts from Q to P at a speed of 40 kmph at 10 a.m. After one hour, the first cyclist halts for 15 minutes at a place before it continues the journey while the second cyclist does not halt anywhere. At what time do the two cyclist meet?
 (a) 11:00 a.m. (b) 11 : 15 a.m. (c) 11 : 7 : 30 a.m.
 (d) 11 : 12 : 30 a.m. (e) None of these

22. A train 75 meters long overtake a person who walking at the speed of 6 km/hr in opposite direction and passed him in $7\frac{1}{2}$ sec subsequently, it overtake a second person, walking in same direction as the first person and passed him in $6\frac{3}{4}$ S. then find speed of second person?
 (a) 15 km/hr (b) 10 km/hr (c) 18 km/hr
 (d) 20 km/hr (e) 8 km/hr

23. Abhishek and Ayush start travelling in same direction at 8 km/hr and 13 km/hr respectively. After 4 hours, Abhishek doubled his speed and Ayush reduced his speed by 1 km/hr and reached the destination together. How long the entire journey last?
 (a) 9 hr (b) 8 hr (c) 4 hr
 (d) 7 hr (e) 6 hr

24. A train X departs from station A at 11.00 am for station B, which is 180 km away. Another train Y departs from station B at 11.00 am for station A. Train X travels at an average/speed of 70 kms/hr and does not stop anywhere until it arrives at station B. Train Y travels at an average speed of 50 kms/hr, but has to stop for 15 minutes at station C, which is 60 kms away from station B enroute to station A. Ignoring the lengths of the train, what is the distance, to the nearest km, from station A to the point where the trains cross each other?
 (a) 112 (b) 118 (c) 120
 (d) 140 (e) None of these

25. Train-A is heading towards city-Y from city-X and train-B is heading towards city-X from city-Y. Train-A left city-X at 6 : 00 A.M. and train-B left city-Y at 10 : 00 A.M. and speed of train-B is 80% more than that of train-A and both trains reach their respective destination at same time. If train-B meets train-A after running for $1\frac{11}{14}$ hours and speed of train-A is

60km/hr., then find at what time both trains reached their respective destinations?

- (a) 1 : 00 P.M. (b) 2 : 00 P.M. (c) 3 : 00 P.M.
(d) 6 : 00 P.M. (e) 4 : 00 P.M.

26. Ratio of distance covered (in km) by the same type of car of three different companies i.e (Quick ride, Rapido and Ola) is 7:8:5 on day1 and ratio of distance covered by that car of Rapido to that of Quick ride on day2 is 2:3. If on day2 total distance covered by the same car of Rapido and that of Quick ride is 250 km and on day1 same car of Rapido covers 'm' km then total distance covered by the car of Quick ride in 2 days becomes 290 km. Find total distance covered by car of Rapido on Day 1.

- (a) 400 km (b) 160 km (c) 140 km
(d) 240 km (e) 250 km

27. Two points A and B are 150 km apart. Kunal leaves point A towards point B by bike at uniform speed of 50 kmph. After one hour, Hemant leaves point B towards point A by car at a uniform speed of 60 kmph. Each of them stops at a point 15 km from their starting point for 12 minutes. Find the distance between point A and the point where they meet?

- (a) $\frac{1200}{11}$ km (b) $\frac{1050}{11}$ km (c) $\frac{1350}{11}$ km
(d) $\frac{850}{11}$ km (e) $\frac{1450}{11}$ km

28. Relative speed of two trains A & B is $\frac{10}{3}$ m/s while running in same direction and ratio of speed of A to that of B is 6 : 7. If both train cross each other while running in opposite direction in $\frac{120}{13}$ sec and train A can cross a platform (length of platform is twice of length of train A) in 24 sec, then find length of train B?

- (a) 240 meters (b) 210 meters (c) 180 meters
(d) 300 meters (e) 150 meters

29. Rohit started running towards the park with the speed of 10 kmph and reached there in 1 hour. One day a dog started to chase him when he had covered half distance due to which he increases his speed and reached park 15 minutes earlier. Find the time taken by him at increased speed to reach the park from home.

- (a) 45 minutes (b) 30 minutes (c) 50 minutes
(d) 35 minutes (e) 25 minutes

30. Two points A and B are 150 km apart. Kunal leaves point A towards point B by bike at uniform speed of 50 kmph. After one hour, Hemant leaves point B towards point A by car at a uniform speed of 60 kmph. Each of them stops at a point 15 km from their starting point for 12 minutes. Find the distance between point A and the point where they meet?

- (a) $\frac{1200}{11}$ km (b) $\frac{1050}{11}$ km (c) $\frac{1350}{11}$ km
(d) $\frac{850}{11}$ km (e) $\frac{1450}{11}$ km

31. Train-A can cross a 240m long platform in 11 seconds and can cross a pole in 5 seconds respectively. If speed of train - A is 60% more than that of train - B and length of train - B is 160m more than that of train - A, then find time taken by both trains to cross each other while running in same direction.

- (a) $27\frac{1}{3}$ seconds (b) $32\frac{1}{3}$ seconds (c) $19\frac{2}{3}$ seconds
(d) $37\frac{1}{3}$ seconds (e) $25\frac{2}{3}$ seconds

32. Distance between two cities A & B is 600 km. P starts from A and Q from B at same time. After two hours, P realized he was travelling slow and therefore increased his speed by $\frac{1}{4}$ th and meet Q at a point 216 km from A. Find the increased speed of P, if Q drove at a constant speed of 150 km/hr.

- (a) 125 km/hr (b) 120 km/hr (c) 80 km/hr
(d) 100 km/hr (e) None of these

Previous Year Question

1. Time taken to travel a certain distance of 'x' km at speed of 40 km/h is 2 hours more than the time taken to travel (x+20) km at speed of 60km/h. Find the time taken to travel (x+40) km at the speed of 40 km/h?

- (a) 9 hours (b) 5 hours (c) 8 hours
(d) 6 hours (e) 7.5 hours

IBPS PO Prelims 2019

2. A man covers $6\frac{1}{4}\%$ distance via bus at 80 km/hr, 25% of the distance via car at 120 km/hr., 30% distance via bicycle at 32 km/hr. and remaining distance via train at 62 km/hr. If total distance covered by man is 640km, then find the total time taken man during the entire journey.

- (a) $\frac{65}{6}$ hours (b) 13 hours (c) $\frac{44}{3}$ hours
(d) $\frac{31}{2}$ hours (e) $\frac{71}{6}$ hours

IBPS Clerk Prelims 2019

3. Train A having length 180 m crosses a platform thrice of its length in 36 sec. Train B having speed of 63 kmph crosses a standing man in 8 sec. find the time taken by both trains to cross each other when running in same direction.

- (a) 100 sec (b) 120 sec (c) 128 sec
(d) 64 sec (e) 92 sec

IBPS Clerk Mains 2019

4. If A start from P with speed 60 km/hr at 8:00 am and B starts with speed 70 km/hr. at 8 : 30 am from Q and total distance between P and Q is 680 km, find at what time they will cross each other?
 (a) 2 : 30pm (b) 1 : 30pm (c) 12 : 30pm
 (d) 3 : 00pm (e) 4 : 00pm

IBPS RRB PO Prelims 2019

5. A train travelling at 72 km/hr. crosses a platform of 160 m in 18 second and another train travelling at 90 km/hr crosses the same platform in 15 second. Find the length of another train?
 (a) 160 m (b) 180 m (c) 140 m
 (d) 200 m (e) 215 m

IBPS RRB PO Prelims 2019

6. Total distance between A and B is 792 km and Car P starts from station A at 8 a.m with speed 64 km/hr towards B and Car Q starts from station B at 11 a.m with speed 86 km/hr towards A. Find the distance from station B when both cars will meet each other ?
 (a) 430 km (b) 258 km (c) 344 km
 (d) 312 km (e) 384 km

RRB PO Mains 2019

7. 180 m long Train A crosses Train B of 120 m in length which is running in opposite direction in $5\frac{5}{11}$ sec. If speed of train B is 20% more than that of train A, then find the time taken by both trains to cross each other, when they running in same direction?
 (a) 60 sec (b) 58 sec (c) 55 sec
 (d) 50sec (e) 65 sec

RRB Clerk Mains 2019

8. Ritesh travels at 1 kmph to reach station 500m far from his house to catch a train. He started but after 4 minutes, he realized that he forgot a document at home so he returned with same speed. What should be his speed (in kmph) so that he catches the train?
 (a) 0.36 (b) 0.27 (c) 1.27
 (d) 1.36 (e) 1.5

RBI Grade B Phase I 2019

9. Length and speed of train A is 'L' meters and 108 km/hr. It crosses a platform; whose length is 60% less than the length of train A in 28 sec. If train B crosses the same platform in 24 sec running at the speed of 90 km/hr., then find the time taken by train A to cross train B running in same direction?
 (a) 172 sec (b) 198 sec (c) 196 sec
 (d) 184 sec (e) 192 sec

SBI PO Prelims 2020

10. A car can cover a distance in 4 hour at speed 60 kmph then by what percent should the speed of car be increased to cover the same distance in 2.5 hr?
 (a) 60% (b) 40% (c) 50%
 (d) 100% (e) 75%

SBI Clerk Prelims 2020

11. Two trains of length 140m & 120m are running in same direction on parallel tracks with speeds 132 kmph & 80 kmph respectively. How much time will they take to cross each other?
 (a) 7.09 sec (b) 18 sec (c) 11.7 sec
 (d) 4.42 sec (e) Cannot be determined

SBI Clerk Prelims 2020

12. A is 40% more efficient than B and both together can complete a work in $9\frac{3}{8}$ days. If A work for first five days alone and remaining work complete by B, then find in how many days total work will be completed?
 (a) $20\frac{1}{2}$ days (b) 16 days (c) $15\frac{1}{5}$ days
 (d) 20 days (e) $18\frac{1}{5}$ days

IBPS PO Prelims 2020

13. Train 'A' running at speed of 54 km/hr crosses a platform of length same as that of the train in 36 sec. If train B, which is 230 meters long crosses the same platform in 25 sec, then find speed of train B (in km/hr)?
 (a) 54 km/hr (b) 72 km/hr (c) 84 km/hr
 (d) 90 km/hr (e) 108 km/hr

IBPS PO Prelims 2020

14. Train A running at a speed of 36 km/hr crosses train B in 20 seconds. Find the speed of train B (in km/hr), if the sum of the length of train A & B is 600 meters and both trains running in the opposite direction.
 (a) 72 km/hr (b) 54 km/hr (c) 48 km/hr
 (d) 108 km/hr (e) 81 km/hr

IBPS Clerk Prelims 2020

15. A train running at the speed of 72 kmph crosses a pole in 30 seconds. Find the time taken by the same train to cross the pole with the speed of 54 kmph (in sec)?
 (a) 42 (b) 48
 (c) 54 (d) 45 (e) 40

RRB Clerk Prelims 2020

16. A train X travelling at 15 m/sec crosses another train Y travelling in opposite direction at 72 kmph in 15 seconds. Find the length of train X which is twice of that of train Y?
 (a) 400 m (b) 300 m (c) 350 m
 (d) 450 m (e) 500 m

RBI Assistant Prelims 2020

17. A person travels half of the distance at the speed of x km/h and remaining half of the distance at 4x km/h. Find the value of 'x' if the average speed is 36.8 km/h?
 (a) 21 (b) 25 (c) 24
 (d) 23 (e) 20

SBI Clerk Prelims 2019

18. Train - Y crosses Train - X while running in same direction in 120 seconds and Train - Y crosses Train - X in $\frac{40}{3}$ seconds while running in opposite direction. If Train - X is running at 120 km/hr, then find speed of Train - Y (in km/hr).

- (a) 150 (b) 180 (c) 200
(d) 160 (e) None of the above.

SBI Clerk Mains 2019

91. Two friends started for a place one by motorcycle and the other by train. The speed of motorcycle is 30 km/h and that of train is 24 km/h. The first one takes 6 h 12 min to reach the destination. Find the time of reaching of second one?

- (a) 8:00h (b) 7:25h (c) 7:50h
(d) 7:45h (e) None of these

20. The distance between places A and B is 999 km. An express train leaves place A at 6 am and runs at a speed of 55.5 km/h. The train stops on the way for 1 h 20 min. It reaches B at?

- (a) 1 : 20 am (b) 12 : 00 pm (c) 6 : 00 pm
(d) 11 : 00 pm (e) None of these

21. A train covers a distance between station A and station B in 45 min. If the speed of the train is reduced by 5 km/h, then the same distance is covered in 48 min. The distance between stations A and B is?

- (a) 60 km (b) 64 km (c) 80 km
(d) 55 km (e) No ne of these

22. The speed of a train going from Nagpur to Allahabad is 100 km/h while its speed is 150 km/h when coming back from Allahabad to Nagpur. Then, the average speed during the whole journey is?

- (a) 120 km/h (b) 125 km/h (c) 140 km/h
(d) 135 km/h (e) None of these

23. A man travels a distance of 24 km at 6 km/h another distance of 24 km at 8 km/h and a third distance of 24 km at 12 km/h. His average speed for the whole journey (in km/h) is?

- (a) $8\frac{2}{3}$ (b) 8 (c) $2\frac{10}{13}$
(d) 9 (e) None of these

24. A student goes to school at the rate of $2\frac{1}{2}$ km/h and reaches 6 min late. If he travels at the speed of 3 km/h, he is 10 min early. The distance (in km) between the school and his house is:

- (a) 5 (b) 4 (c) 3
(d) 1 (e) None of these

25. A man can reach a certain place in 30 h. If he reduced his speed by $\frac{1}{15}$ th, he goes 10 km less in that time. Find his speed per hour?

- (a) 6 km/h (b) $5\frac{1}{2}$ km/h (c) 4 km/h
(d) 5 km/h (e) None of these

26. A man takes 6 h 15 min in walking a distance and riding back to the starting place. He could walk both ways in 7h 45 min. The time taken by him to ride both ways, is:

- (a) 4 h (b) 4 h 30 min (c) 4 h 45 min
(d) 5 h (e) None of these

27. A and B run a kilometre and A wins by 25 s. A and C run a kilometre and A wins by 275 m. When B and C run the same distance, B wins by 30 s. The time taken by A to run a kilometre is?

- (a) 2 min 25 s (b) 2 min 50 s (c) 3 min 20 s
(d) 3 min 30 s (e) None of these

28. A man walks a certain distance and rides back in 4 h 30 min. He could ride both ways in 3 h. The time required by the man to walk both ways is?

- (a) 4 h 30 min (b) 4 h 35 min (c) 5 h
(d) 6 h (e) None of these

29. A train passes two persons walking in the same direction at a speed of 3 km/h and 5 km/h, respectively in 10s and 11s, respectively. The speed of the train is:

- (a) 28 km/h (b) 27 km/h (c) 25 km/h
(d) 24 km/h (e) None of these

30. A train crosses a platform in 30 s travelling with a speed of 60 km/h. If the length of the train be 200 m, then the length of the platform is:

- (a) 420 m (b) 500 m (c) 300 m
(d) 250 m (e) None of these

31. How many seconds will a 500 m long train take to cross a man walking with a speed of 3 km/h in the direction of the moving train, if the speed of the train is 63 km/h?

- (a) 25 (b) 30 (c) 40
(d) 45 (e) None of these

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Solutions

Basic Questions

1. (c): Average speed = $\frac{50+40+90}{\frac{50}{25} + \frac{40}{20} + \frac{90}{15}}$
 $= \frac{180}{2+2+6} = 18 \text{ kmph}$

2. (c): Average speed = $\frac{\text{total distance}}{\text{total time}} = \frac{5 \times 6 + 4 \times 12}{6+12}$
 $= \frac{30+48}{18} = \frac{78}{18} = \frac{13}{3} = 4\frac{1}{3} \text{ km/hr}$

3. (b): Speed = $\frac{10\frac{1}{5}}{3} = \frac{51}{5} \times \frac{1}{3} = \frac{17}{5} \text{ km/hr}$
 \therefore Required distance = speed \times time
 $= \frac{17}{5} \times 5 = 17 \text{ km}$

4. (d): Speed of the train = $\frac{110}{3} \text{ m/sec.}$
 Required time = $\frac{(165+110)}{110} \times 3$
 $= \frac{275}{110} \times 3 = 7.5 \text{ sec.}$

5. (d): (Length of the 1st train + Length of the tunnel)
 = speed \times time
 $x + 700 = \frac{72 \times 5}{18} \times (1 \times 60)$
 $x + 700 = 20 \times 60$
 $x + 700 = 1200 \Rightarrow x = 1200 - 700$
 $x = 500 \text{ metres.}$

6. (c): Speed of the train = $\frac{200+200}{20}$
 $= \frac{400}{20} = 20 \text{ m/sec}$
 $20 \times \frac{18}{5} = \text{km/hr}$
 $= 72 \text{ km/hr}$

7. (b): Since the trains are moving in opposite direction
 \therefore Relative speed = speed of first train + speed of second train
 Let speed of second train = $x \text{ km/hr}$
 $\therefore (65+x) \times \frac{5}{18} = \frac{125+125}{6}, (65+x) \times \frac{5}{18} = \frac{250}{6}$
 $(65+x) = 150 \Rightarrow x = 150 - 65 \Rightarrow x = 85 \text{ km/hr.}$

8. (c): Let usual time = t , distance = d , and speed = s
 $\therefore s = \frac{d}{t}$... (i)

and $\frac{3}{5}s = \frac{d}{t+2\frac{1}{2}}$... (ii)

From equation (i) \div equation (ii)

$$\frac{\frac{s}{\frac{3}{5}s}}{\frac{t}{t+\frac{5}{2}}} = \frac{\frac{d}{t}}{\frac{d}{t}} \Rightarrow \frac{5}{3} = \frac{t+\frac{5}{2}}{t} \Rightarrow 5t = 3t + \frac{15}{2}$$

$$2t = \frac{15}{2} \Rightarrow t = \frac{15}{4} = 3\frac{3}{4} \text{ hours}$$

9. (c): At normal speed, Let usual time = t

$$\therefore s = \frac{d}{t}$$
 ... (i)

and $\frac{7}{11}s = \frac{d}{22}$... (ii)

From equation (i) \div equation (ii)

$$\frac{\frac{s}{\frac{7}{11}s}}{\frac{t}{22}} = \frac{\frac{d}{t}}{\frac{d}{22}} \Rightarrow \frac{11}{7} = \frac{22}{t} \Rightarrow t = 14 \text{ hours.}$$

$$\therefore \text{saved time} = (22 - 14) \text{ hrs} = 8 \text{ hrs.}$$

10. (c): Let required time = t hours;

$$\therefore s = \frac{d}{t}$$
 ... (i)

$$\frac{3}{4}s = \frac{d}{(t+2)}$$
 ... (ii)

$$\frac{\frac{s}{\frac{3}{4}s}}{\frac{t}{t+2}} = \frac{\frac{d}{t}}{\frac{d}{t+2}} \Rightarrow \frac{4}{3} = \frac{t+2}{t}$$

$$4t = 3t + 6 \Rightarrow t = 6 \text{ hours}$$

11. (a): Average speed = $\frac{2xy}{x+y} = \frac{2 \times 12 \times 18}{(12+18)}$

$$= \frac{72}{5} = 14\frac{2}{5} \text{ km/hr}$$

12. (b): From the formula -

$$\therefore \text{Required ratio} = \sqrt{b} : \sqrt{a}$$

$$= \sqrt{9} : \sqrt{4} = 3 : 2$$

13. (b): Required ratio = $\sqrt{b} : \sqrt{a}$
 $= \sqrt{25} : \sqrt{16} = 5 : 4$

14. (d): Let length of the platform = x m

$$\therefore 120 \times \frac{5}{18} = \frac{320 + x}{24}$$

$$800 = 320 + x \Rightarrow x = 480 \text{ m}$$

$$\therefore \text{Speed of the man} = \frac{480}{4 \times 60} = 2.0 \text{ m/sec.}$$

15. (c): Average speed

$$= \frac{39 + 25}{(45 + 35) \times \frac{1}{60}} = \frac{64 \times 60}{80} = 48 \text{ km/hr}$$

Prelims Solutions

Level - 1

1. (d): Let speed of train be 'V m/sec'

And let length of platform be 'l meters'.

ATQ,

$$\frac{l + 220}{40} = V \quad \dots (i)$$

And,

$$\frac{220}{11} = V + 3$$

$$\Rightarrow V = 17 \quad \dots (ii)$$

Put value of (ii) in (i),

$$\frac{l + 220}{40} = 17$$

$$l = 680 - 220$$

$$l = 460 \text{ m}$$

2. (b): Let speed of Suresh be x kmph and speed of Mukesh be y kmph.

ATQ

$$2 = \frac{300}{x} - \frac{300}{y}$$

$$1 = \frac{150}{x} - \frac{150}{y} \quad \dots (i)$$

$$\Rightarrow \frac{1}{2} = \frac{300}{y} - \frac{300}{2x}$$

$$1 = \frac{600}{y} - \frac{300}{x} \quad \dots (ii)$$

From (i) and (ii)

$$\frac{150}{x} - \frac{150}{y} = \frac{600}{y} - \frac{300}{x}$$

$$\frac{x}{y} = \frac{3}{5}$$

$$\text{Let } x = 3a, y = 5a$$

$$\Rightarrow 1 = \frac{150}{3a} - \frac{150}{5a}$$

$$a = 20$$

$$\text{So } x = 60 \text{ kmph}, y = 100 \text{ kmph}$$

$$\text{Required difference} = 100 - 60 = 40 \text{ kmph}$$

3. (d): speed of train = $\frac{18 \times 1000}{15 \times 60} = 20 \text{ m/s}$

$$\text{Time taken by train to cover } 100\text{m} = \frac{100}{20} = 5 \text{ sec.}$$

As train stops for 1 min after every 20m, so it will take 4 min extra to cover 100m.

$$\text{Required time} = 4 \times 60 + 5 = 245 \text{ sec.}$$

4. (d): Time taken by train to cover a bridge = $\frac{7}{6} \times 60$

$$= 70 \text{ sec}$$

As train can cover a bridge in 70 sec and a pole in 50 sec

So, extra time taken by train is due to length of bridge.

$$\text{Speed of train} = \frac{220}{(70 - 50)}$$

$$= \frac{220}{20}$$

$$= 11 \text{ m/s}$$

$$\text{Length of train} = 50 \times 11$$

$$= 550 \text{ meters}$$

5. (a): Let speed of train be x m/s and its length be L metres

According to 1st condition

$$L = 15x \quad \dots (1)$$

According to 2nd condition

$$L + 500 = 45x \quad \dots (2)$$

From (1) and (2), we will get

$$500 = 30x$$

$$15x = 250 \text{ m}$$

Therefore, length of train is 250 metres

6. (e): actual journey time = $\frac{20}{5} = 4 \text{ hours}$

$$\text{New journey time} = \frac{40}{100} \times 4 = 1.6 \text{ hour}$$

$$\text{New speed} = \frac{20}{1.6} = 12.5 \text{ kmph}$$

$$\text{Required \%} = \frac{12.5 - 5}{5} \times 100 = 150\%$$

7. (a): Relative speed = $90 - 60 = 30 \text{ km/hr}$

Distance travelled by Shatabdi exp. In 2 hrs = $60 \times 2 = 120 \text{ km}$

Time required to cover 120 km by duronto

$$\text{exp.} = \frac{120}{30} = 4 \text{ hr}$$

Distance travelled by duronto exp. In 4 hrs = $90 \times 4 = 360 \text{ km}$

8. (a): total distance = $4 \times \frac{30}{60} + 10 \times \frac{20}{60} + 50 \times \frac{10}{60} = \frac{41}{3} \text{ kms}$
 Total time taken = $30 + 20 + 10 = 60 \text{ minutes} = 1 \text{ hour}$
 Average speed = $\frac{\frac{41}{3}}{1} = \frac{41}{3} \text{ kmph} = 13.67 \text{ kmph}$

9. (b): Distance covered by Ashish while walking = $\frac{72}{2} = 36 \text{ km}$
 Distance covered by Ashish while running = $72 - 36 = 36 \text{ km}$
 Total time required = $\frac{36}{8} + \frac{36}{12} = 4.5 + 3 = 7.5 \text{ hrs}$

10. (c): distance covered is directly proportional to speed
 When they start at same time, they will cover distance in ratio of their speeds
 Let distance covered by Kappu & Chandu be $5x \text{ km}$ & $6x \text{ km}$ respectively
 Required answer = $\frac{6x-5x}{6x+5x} \times 110 = 10 \text{ kms}$

11. (c): Let the speed of Abhishek and Rahul be $6x$ and $5x$ respectively.
 Required time = $\frac{6x \times 5}{5x} = 6 \text{ hours}$.

12. (b): Anurag's speed = $\frac{60}{10} = 6 \text{ km/hr}$
 Dharam's speed = $\frac{60}{15} = 4 \text{ km/hr}$
 ATQ,
 Let length of race be 'D' meters.
 So,
 $\frac{D}{D-200} = \frac{6}{4}$
 $\Rightarrow 2D = 1200$
 $D = 600 \text{ m}$

13. (e): let speed of Rajdhani express is $=50x \text{ km/h}$
 Speed of vande bharat express = $50x \times \frac{114}{100} = 57x \text{ km/h}$
 ATQ
 $\frac{285}{50x} - \frac{285}{57x} = \frac{7}{60}$
 $\frac{57x-50x}{50x \times 57x} = \frac{7}{60 \times 285}$
 $x = 6 \text{ km/h}$
 $57x = 342 \text{ km/h}$

14. (d): Train travels 48 km in an hour without stoppages
 $48 \text{ km} \rightarrow 60 \text{ min}$
 $1 \text{ km} \rightarrow \frac{60}{48} \text{ min}$
 $40 \text{ km} \rightarrow \frac{60}{48} \times 40 = 50 \text{ min}$
 So, stoppage time = $(60 - 50) \text{ min} = 10 \text{ min}$

15. (e): Let the original speed and time taken by train be 'x' kmph and 't' hrs respectively.
 ATQ
 $x \times t = 120 \text{ km} \dots (i)$
 Again $\frac{5}{6}(x) \left(t + \frac{1}{2}\right) = 120 \text{ km} \dots (ii)$
 By solving eqn (i) & (ii)
 $X = 48 \text{ kmph}$
 Required original speed of train = 48 kmph

16. (e): let speed of train C = $x \text{ kmph}$
 Speed of train A = $\frac{120}{100} \times \frac{110}{100} \times x = 1.32x \text{ kmph}$
 Let distance covered be $1.32x \text{ km}$
 Required % = $\frac{\frac{1.32x}{1.32x} \times \frac{1.32x}{x}}{x} \times 100 = 24 \frac{8}{33} \%$

17. (a): Total distance covered = $180 + 144 + 168 + 182 = 674 \text{ km}$
 Total time taken = $\frac{180}{20} + \frac{144}{18} + 14 + \frac{182}{14} = 9 + 8 + 14 + 13 = 44 \text{ hours}$
 Average speed = $\frac{674}{44} = 15 \frac{7}{22} \text{ kmph}$

18. (c): Distance travelled by car = $60 \times 2 = 120 \text{ km}$
 Distance travelled by bus = $80 \times 5 = 400 \text{ km}$
 Distance travelled by bicycle = $10 \times 5 = 50 \text{ km}$
 Average speed = $\frac{\text{Total distance travelled}}{\text{Total time taken}} = \frac{120+400+50}{2+5+5} = 47.5 \text{ km/hr}$

19. (b): Speed of Aman = $\frac{2340}{18} = 130 \text{ m/s}$
 Speed of Satish = $\frac{40}{100} \times 130 = 52 \text{ m/s}$
 Time taken by Satish = $\frac{468}{52} = 9 \text{ seconds}$

20. (b): Let speed of bus and car be $6x \text{ km/hr}$ and $7x \text{ km/hr}$ respectively
 So,
 $(7x - 6x) \times 4 = 28$
 $x = 7$
 Required time = $\frac{196}{7 \times 7} = 4 \text{ hours}$

21. (c): Let length of train A = length of train B = $\ell \text{ m}$
 ATQ,
 $\Rightarrow \frac{\ell+98}{24} = \frac{\ell}{12} \times \frac{120}{100}$
 $\ell = 70 \text{ m}$

22. (e): Time taken by train to cross a pole = $\frac{1}{1200} \times 60 \times 60 = 3 \text{ sec}$.
 When speed is constant then ratio of time taken is directly proportional to Distance covered
 So, Ratio of length of train to length of (train + tunnel)
 $\Rightarrow 3 : 10$
 Let length of train = $3x$

Length of tunnel = $10x - 3x = 7x$
 ATQ,
 $7x - 3x = 200$
 $4x = 200$
 So, $3x = 150$ meter
 Speed of train = $\frac{150}{3} = 50$ m/sec.

23. (d): Let the length of train be L meter.

ATQ
 $25 = \frac{5L+L}{90 \times \frac{5}{18}} - \frac{L}{90 \times \frac{5}{18}}$
 $25 = \frac{6L}{25} - \frac{L}{25}$
 $5L = 625$
 $L = \frac{625}{5} = 125$ m

24. (a): Let total length of box train is = D meter

Let speed of faster train = y m/s
 ATQ,
 $(y - 20)35 = (y + 20)7$
 $5y - 100 = y + 20$
 $4y = 120$
 $y = 30$ m/s
 $D = 35 \times (30 - 20)$
 $D = 350$ meter

25. (d): let length of the platform be L meter.

ATQ
 Length of the train = $26 \times 90 \times \frac{5}{18} = 650$ m
 Length of the platform = $36 \times 90 \times \frac{5}{18} - 650$
 $= 900 - 650 = 250$ m

26. (a): distance of office from his home

$= 5 \times \frac{30}{60} = 2.5$ kms
 Let distance covered with auto is 'x' km
 Actual journey time = $30 - 5 = 25$ minutes
 $\frac{2.5-x}{5} + \frac{x}{30} = \frac{25}{60}$
 $x = 0.50$ km

27. (c): Let length and speed of train is l m & s m/s respectively

ATQ-
 $\frac{l+180}{s} = 20$ ----- (i)
 $\frac{l}{s} = 8$ ----- (ii)
 $l = 120$ mtrs
 $S = 15$ meters / sec
 Required time = $\frac{120+240}{15} = 24$ sec

28. (b): let they meet again after t hours

So, total distance covered by them = $3 \times 25 = 75$ km
 ATQ
 $36 \times t + 24 \times t = 75$

$60 \times t = 75$

$t = \frac{75}{60} = \frac{5}{4}$ hours

Distance covered by Manoj = $36 \times t$
 $= 36 \times \frac{5}{4}$
 $= 45$ km

29. (c): Time taken by first train = 10 hr.

Time taken by second train = 8 hr.
 Let distance between these two stations be $40x$ km
 Then speed of first train = $4x$ km/h
 Speed of second train = $5x$ km/h
 In 1 h, distance travelled by first train = $4x$ km
 \therefore total time taken by both trains to meet after 6 am
 $= 1 + \frac{36}{9} = 5$ hr.
 \therefore so, both trains will meet at 11: 00 am

30. (b): Let length of train be 'L' meters

ATQ -
 $(144 + 18) \times \frac{5}{18} = \frac{L}{8}$
 $L = 360$ meters
 Length of platform = $360 + 360 \times \frac{2}{3} = 600$ meters
 Let train takes 't' sec to cross the platform
 $144 \times \frac{5}{18} = \frac{360+600}{t}$
 $40t = 960$
 $t = 24$ sec

31. (d): Let length of train be '2l' m

Length of bridge be 'l' m
 Speed of train in m/s = $144 \times \frac{5}{18} = 40 \frac{m}{s}$
 $40 = \frac{2l+l}{60}$

$l = 800$ meters

length of platform = 800 meters
 Required time = $\frac{1600+800}{20} = 120$ sec = 2 minutes

32. (b): Speed of train = $80 \times \frac{5}{18}$

$= \frac{200}{9}$ m/s

Atq,
 $\frac{200}{9} = \frac{240+280}{T}$
 $200T = 520 \times 9$

$T = 23.4$ sec
 Length of tunnel
 $= (12.6 + 23.4) \times \frac{200}{9} - 240$
 $= 800 - 240$
 $= 560$ meters

33. (d): ATQ—

$$\frac{240}{60-x} - \frac{240}{60} = \frac{4}{3}$$

$$720x = 14400 - 240x$$

$$960x = 14400$$

$$x = 15 \text{ km/hr}$$

Average speed of car

$$= \frac{2 \times 60 \times (60-15)}{(60+45)}$$

$$= \frac{360}{7} \text{ km/hr}$$

34. (a): Let length of train be L meter

ATQ—

$$\text{Speed} = 72 \times \frac{5}{18}$$

$$= 20 \text{ m/sec}$$

$$20 = \frac{L}{14}$$

$$L = 280 \text{ meter}$$

Let length of platform be P meter

$$20 = \frac{P+280}{32}$$

$$P = 640 - 280$$

$$P = 360 \text{ meter}$$

35. (e): Let length of train A be 'L' m and speed be 'V' m/s

ATQ -

$$V = \frac{3L}{40} \text{----- (i)}$$

And, $V = \frac{L+210}{25} \text{----- (ii)}$

From (i) & (ii)

$$\frac{3L}{40} = \frac{L+210}{25}$$

$$75L - 40L = 8400$$

$$L = 240 \text{ m}$$

And $V = 18 \text{ m/s}$

Let length of train B be 'S' m

$$\text{So, } \frac{97.2}{18} \times 5 - 18 = \frac{240+S}{40}$$

$$S = 120 \text{ m}$$

Required time = $\frac{210+120}{\frac{97.2}{18} \times 5} = 12 \frac{2}{9} \text{ sec}$

36. (c): Let speed of first and second train in m/second be 2x and 3x respectively.

Sum of the length of first train and second train \Rightarrow

$$180 + 270 = 450 \text{ m}$$

Sum of their speeds $\Rightarrow 2x + 3x = \frac{450}{10.8}$

$$5x = \frac{125}{3} \text{ m/s}$$

$$x = \frac{25}{3} \text{ m/s}$$

Time taken by second train to cross first train =

$$\frac{450}{3x-2x}$$

$$= \frac{450}{x} \times 3 = 54 \text{ seconds}$$

37. (b): Let distance between Delhi and Lucknow be '80x km.'

So, speed of train - A = $\frac{80x}{8}$

$$= 10x \text{ km/hr.}$$

and speed of train - B = $\frac{80x}{4}$

$$= 20x \text{ km/hr.}$$

Required time = $\frac{80x-10x \times 5}{(10x+20x)} + 1 : 00 \text{ P.M.}$

$$= \frac{30x}{30x} + 1 : 00 \text{ P.M.}$$

$$= 1 \text{ hour} + 1 : 00 \text{ P.M.}$$

$$= 2 : 00 \text{ P.M.}$$

38. (e): distance covered by Sanjay in 20 min

$$= 5 \times \frac{20}{60} = \frac{5}{3} \text{ km}$$

Time taken to catch Sanjay by Anurag

$$= \frac{\frac{5}{3}}{12-5} = \frac{5}{21} \text{ hours}$$

Distance covered by Anurag to catch Sanjay

$$= 12 \times \frac{5}{21} = \frac{20}{7} \text{ km} \approx 3 \text{ kms}$$

39. (b): Let speed of Ravi and Maanik be 3x km/hr and 4x km/hr respectively

Relative speed = $3x+4x=7x \text{ km/hr}$

$$7x \times \frac{3}{60} = 4.2$$

$$x = 12 \text{ km/hr}$$

Difference in their speed = $4x - 3x = x = 12 \text{ km/hr}$

40. (c): Let speed of Mohit be x km/hr

Therefore, speed of Deepak is $\frac{3}{4}x \text{ km/hr}$

ATQ -

$$\frac{48 \times 4}{3x} - \frac{48}{x} = 1$$

$$x = 16$$

\therefore speed of Deepak = $16 \times \frac{3}{4} = 12 \text{ km/hr}$

Speed of Harry = $12 \times \frac{350}{100}$

$$= 42 \text{ km/hr}$$

\therefore Required Time = $\frac{840}{42} = 20 \text{ hr}$

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Level - 2

1. (a): Let distance traveled by train at 120 km/h is x km.
ATQ

$$5 = \frac{x}{120} + \frac{540-x}{100}$$

$$x = 240$$

$$\therefore \text{required ratio} = \frac{240}{120} : \frac{300}{100}$$

$$= 2 : 3$$

2. (a): let length of train A be 2L.

ATQ

$$6 = \frac{3L}{72 \times \frac{5}{18} + 90 \times \frac{5}{18}}$$

$$L = \frac{45 \times 6}{3} = 90 \text{ m}$$

Now,

Let length of platform be P meter.

Now,

$$29 = \frac{P+180}{20}$$

$$P = (29 \times 20) - 180$$

$$= 400 \text{ m}$$

3. (b): time taken by train A to cover distance = 1 hr
Time taken by train B to cover distance = 40 minutes

$$\text{Speed of train A} = \frac{24}{1} = 24 \text{ kmph}$$

$$\text{Speed of train B} = 36 \text{ kmph}$$

$$\text{Distance covered by train A in (1 hr - 40 min) 20 minutes} = 24 \times \frac{20}{60} = 8 \text{ km}$$

$$\text{Time taken to cross each other} = \frac{24-8}{24+36} = \frac{16}{60} \text{ hr} = 16 \text{ min}$$

$$\text{Time of crossing} = 6:20 + 0:16 = 6:36 \text{ AM}$$

4. (a): Difference of speed = 36km/h = 10m/s.
Sum of length of both trains = 10×31.5 = 315m
When, running in opposite direction,

$$\text{Sum of speed} = \frac{315}{9} = 35 \text{ m/s.}$$

ATQ,

$$x \times \frac{5}{18} + (x + 36) \times \frac{5}{18} = 35$$

$$\Rightarrow 2x + 36 = \frac{35 \times 18}{5} = 126$$

$$\Rightarrow x = 45 \text{ km/h.}$$

$$\text{and } (x+36) = 81 \text{ km/h.}$$

$$\text{Sum of speed of both trains} = 81+45 = 126 \text{ km/h.}$$

$$\text{Or sum of speed} = \frac{315}{9} = 35 \text{ m/s} = 126 \text{ km/hr.}$$

5. (d): Time taken by train A to cross 300 m platform =

$$\frac{x+300}{\text{speed of A}}$$

Time taken by train B to cross a platform of 450 m

$$= \frac{y+450}{\text{speed of B}}$$

Let the speed of train A be a m/s and speed of train B will be $\frac{3a}{2}$ m/s

Atq,

$$\frac{x+300}{a} > \frac{y+450}{\frac{3a}{2}}$$

$$\Rightarrow \frac{x+300}{a} > \frac{y}{3a/2} + \frac{300}{a}$$

$$\Rightarrow \frac{x}{a} > \frac{2y}{3a}$$

$$\Rightarrow x > \frac{2y}{3}$$

6. (e): Let length of train A = 'x' m
And length of train B = $x \times 2 = 2x \text{ m}$

ATQ,

$$86.4 \times \frac{5}{18} \times t = x \quad \dots(i)$$

$$\text{And, } 108 \times \frac{5}{18} \times 2t = 2x + 80 \quad \dots(ii)$$

On solving (i) & (ii)

$$x = 160 \text{ m}$$

$$\Rightarrow \text{Length of train B} = 320 \text{ m}$$

7. (a): Total distance covered by Vikash = 9+1=10 km.
Time taken by Vikash = 10×6

$$= 60 \text{ min}$$

$$\text{So, time taken by Mohit} = 60-4=56 \text{ min}$$

$$\text{Distance covered by Mohit} = 9-1$$

$$= 8 \text{ km}$$

$$\text{Speed of Mohit} = \frac{8}{56}$$

$$= \frac{1}{7} \text{ km/min.}$$

8. (a): Let length of train - A be l meters.
Let speed of train - A & train - B be 5x m/sec and 8x m/sec respectively.

ATQ,

$$\Rightarrow 8x = \frac{60}{3} \Rightarrow 8x = 20 \Rightarrow x = 2.5$$

$$\text{Hence, speed of train - A} = 5x = 12.5 \text{ m/sec}$$

$$\text{and speed of train - B} = 8x = 20 \text{ m/sec}$$

Now,

$$20 + 12.5 = \frac{60+l}{4}$$

$$130 = 60 + l$$

$$l = 70 \text{ meters}$$

$$\text{So, required time} = \frac{60+70}{20-12.5} = \frac{130}{7.5} = 17\frac{1}{3} \text{ seconds}$$

9. (e): let speed of Rajdhani express is = 50x km/h
Speed of vande bharat express = 50x × $\frac{114}{100} = 57x \text{ km/h}$

ATQ

$$\frac{285}{50x} - \frac{285}{57x} = \frac{7}{60}$$

$$\frac{57x-50x}{50x \times 57x} = \frac{7}{60 \times 285}$$

$$x = 6 \text{ km/h}$$

$$57x = 342 \frac{\text{km}}{\text{h}}$$

10. (c): Let length of train 'P' is L meter and speed be 's' m/s
 ATQ -

$$S = \frac{L}{6.75} \dots\dots\dots (i)$$
 Also, $s = \frac{L+240}{15.75} \dots\dots\dots (ii)$
 From (i) & (ii) we get -
 $L = 180 \text{ m}$
 And, from (i), $s = \frac{80}{3} \text{ m/s}$
 Let speed of train 'Q' be 'v' m/s

$$(v - \frac{80}{3}) = \frac{180+120}{45}$$

$$v = \frac{100}{3} \text{ m/s}$$
 When train 'Q' and train 'P' running in opposite direction, let total time taken by 'Q' to cross 'P' be 't' sec

$$(\frac{100}{3} + \frac{80}{3}) = \frac{180+120}{t}$$
 $180t = 900$
 $t = 5 \text{ sec}$

11. (a): Let length of train - A & train - B be '5x' & '6x' meters respectively.
 And let speed of train - A & train - B be 'V₁ m/s' & 'V₂ m/s' respectively,
 ATQ,

$$\frac{5x + 400}{36} = V_1 \dots (i)$$
 And, $V_2 - V_1 = \frac{5x + 6x}{66}$
 $V_2 - V_1 = \frac{x}{6}$
 $V_1 = V_2 - \frac{x}{6} \dots (ii)$
 Now,
 $\frac{6x}{72} = V_2$
 $\frac{6x \times 7}{72} = V_2$
 $\frac{7x}{12} = V_2 \dots (iii)$
 On solving (ii) and (iii), we get:
 $V_1 = \frac{5x}{12} \dots (iv)$
 On solving (i) and (iv), we get:
 $x = 40 \text{ m}$
 So, length of train - A = 5x = 200 m
 And speed of train - A = $\frac{5x}{12} = \frac{200}{12} = \frac{50}{3} \text{ m/sec}$
 Now, required time = $\frac{200}{\frac{50}{3}} = 12 \text{ seconds.}$

12. (d): Let speed of train A = S_a
 ATQ—

$$S_a = \frac{350}{17.5} = 20 \text{ m/s}$$
 Let speed of train B = S_b
 ATQ—

$$20 + S_b = \frac{(350+450) \times 7}{60}$$

$$S_b = \frac{800 \times 7}{60} - 20$$

$$S_b = \frac{220}{3} \text{ m/s}$$
 Relative speed when train A and B running in same direction

$$= \frac{220}{3} - 20$$

$$= \frac{160}{3} \text{ m/s}$$
 Required time = $\frac{(350+450) \times 3}{160} = 15 \text{ sec}$

13. (a): Let speed of train A be 5x km/hr
 Then speed of train B = 6x km/hr
 ATQ—

$$(6x + 5x) \times \frac{5}{18} = \frac{120+180}{\frac{60}{11}}$$
 $x = 18$
 Required time = $\frac{120+180}{(108-90) \times \frac{5}{18}} = 60 \text{ sec}$

14. (c): Let length of Train A be 'x' meters and speed of Train A be 'V' m/sec.
 So,
 $\frac{x}{V} = 9$
 $x = 9V \dots(i)$
 Now,
 $\frac{x+180}{150 \times \frac{5}{18} - V} = 57.6$
 $\Rightarrow \frac{3(x+180)}{125-3V} = 57.6 \dots(ii)$
 Put value of x in (ii)
 $\frac{3(9V+180)}{125-3V} = 57.6$
 $\Rightarrow \frac{3V+60}{125-3V} = 6.4$
 $3V+60 = 800 - 19.2V$
 $\Rightarrow V = \frac{100}{3} \text{ meter/sec}$
 Put value of V in (i)
 $x = 9 \times \frac{100}{3}$
 $x = 300 \text{ meters}$
 Required time = $\frac{180+300}{\frac{100}{3} + 150 \times \frac{5}{18}}$
 $= \frac{480}{75} = 6.4 \text{ seconds}$

15. (d): let decrease in speed be D
 ATQ, $D \propto \sqrt{N}$
 $D = k \sqrt{N}$
 $56 - 40 = 16 = k \sqrt{4} \Rightarrow k = 8$
 Maximum reduction in speed will be 56 kmph.
 $56 = 8 \sqrt{N} \Rightarrow N = 49$
 On attaching 49 wagons speed becomes 0 kmph.
 Wagons that engine can carry = 49 - 1 = 48.

16. (d): Plane reach early by 75 - 30 = 45 minutes
 Let original speed of airplane be '10s km/hr.' and original time taken by airplane be 't hours'.
 Let distance covered by airplane be 'D km'.
 ATQ,

$$D = 10s \times t \dots(i)$$

$$D = 10s \times \frac{110}{100} \times \left(t - \frac{45}{60}\right) \dots(ii)$$

On solving (i) & (ii), we get:

$$t = 8 \text{ hours } 15 \text{ minutes}$$

17. (d): speed = $1 \times \frac{5}{18} \times 60 = \frac{50}{3} \text{ m/min}$

Time taken to reach station (time to catch train) =

$$\frac{500}{\frac{50}{3}} = 30 \text{ min}$$

Time left to catch train = $30 - 4 - 4 = 22 \text{ min}$

In this time, he is going back to home and has to reach station

Total distance to be covered = 500 m

$$\text{Required speed} = \frac{500}{22} \times \frac{60}{1000} = 1.36 \text{ kmph}$$

18. (e): Let the speed of slower train be 'x' kmph

Then speed of faster train will be '(x+6)' kmph

ATQ

$$\frac{300}{x} - \frac{300}{x+6} = \frac{5}{2}$$

$$120 \times 6 = x(x+6)$$

$$x^2 + 6x - 720 = 0$$

Taking positive value of x we get $x = 24 \text{ kmph}$

So speed of slower train = 24 kmph

19. (e): Let the speed of slower car = x kmph

then, speed of other car = (x + 20) kmph

Atq,

$$\frac{280}{x} - \frac{280}{x+20} = \frac{8}{5}$$

$$\Rightarrow 175 \left[\frac{x+20-x}{(x)(x+20)} \right] = 1$$

$$\Rightarrow x^2 + 20x - 3500 = 0$$

$$\Rightarrow x^2 + 70x - 50x - 3500 = 0$$

So, $x = 50 \text{ kmph}$

20. (b): Speed of man while travelling from P to Q = 90 km/hr

Speed of man while travelling from Q to R = 60 km/hr

Ratio of speed of man from P-Q and Q-R is 3: 2

Distance travelled between P and Q = $\frac{200}{5} \times 3 = 120 \text{ km}$

21. (b): Let Anurag's initial speed be v km/hr

So, with increased speed he covered same distance in 1 hr less

$$\frac{140}{v} - \frac{140}{1.4v} = 1$$

$$\frac{140}{v} - \frac{100}{v} = 1$$

$$\frac{40}{v} = 1$$

V = 40 km/hr

22. (d): Let the speed and length of train A be 'a' m/s and 'c' m respectively and length and speed of train B be 'd' m and 'b' m/s respectively

Then ATQ

$$\frac{c+d}{a+b} = 30 \dots\dots(i)$$

$$\text{And, } \frac{c+d}{2a+0.5b} = 30 \dots\dots(ii)$$

On dividing eq(i) and eq(ii) we get

$$a + b = 2a + 0.5b \Rightarrow a = 0.5b$$

$$\text{Given } a = 36 \text{ kmph} = \frac{10m}{s}$$

$$\text{So } a = 10 \frac{m}{s} \text{ and } b = 20 \frac{m}{s}$$

$$\text{So } (c + d) = 30(30) = 900 \text{ m}$$

Required length of both trains = 900 m

23. (b): let speed of trains - A & B are x m/s and y m/s respectively.

ATQ

$$5x + 5y = 850$$

$$x + y = 170 \dots\dots(i)$$

And

$$x - y = \frac{850}{3}$$

$$x - y = 30 \dots\dots(ii)$$

From (i) and (ii)

$$x = 100 \text{ m/s and } y = 70 \text{ m/s}$$

$$\text{Required ratio} = \frac{5 \times 100}{5 \times 70} = 10:7$$

24. (c): Let the distance between point A and point B be D km.

ATQ

$$11.5 = \frac{D}{32} + \frac{D}{60}$$

$$\frac{23}{2} = D \left[\frac{15+8}{480} \right] = D \left[\frac{23}{480} \right]$$

$$D = \frac{480}{2} = 240 \text{ km}$$

25. (d): Let the speed of bus is x km/hr.

ATQ,

$$\frac{54}{0.75x} = 2 \text{ hours}$$

$$\Rightarrow \frac{54 \times 100}{75x} = 2$$

$$\Rightarrow \frac{72}{x} = 2 \Rightarrow x = 36 \text{ km/hr}$$

Now time taken by bus to cover 360 km is $\frac{360}{36} = 10 \text{ hours}$

∴ Car will take 8 hours to cover same distance.

$$\text{Speed of car} = \frac{360}{8} = 45 \text{ km/hr}$$

$$\text{Ratio of speed [car : bus]} = 45 : 36 = 5 : 4$$

26. (c): let length of slower train = x km/h

ATQ

$$x \times \frac{300}{700} = 150$$

$$x = 350 \text{ m}$$

$$\text{And } (S - 15) \times \frac{5}{18} = \frac{(150+350+250)}{(9 \times 60)}$$

$$S - 15 = \frac{750}{540} \times \frac{18}{5}$$

$$S = 5 + 15$$

$$S = 20 \text{ km/h}$$

27. (a): Given distance between A and B is 450 km.

$$\text{Speed of Shivam} = \frac{450}{(T+4)}$$

$$\text{Speed of Veer} = \frac{450}{T}$$

ATQ,

Shivam started from A at 8:00am

and Veer started from A at 10:00 am

They both met at 12:30 pm i.e.

$$\frac{450}{(T+4)} \times \frac{9}{2} = \frac{450}{T} \times \frac{5}{2}$$

$$\Rightarrow 9T = 5(T+4)$$

$$\Rightarrow 4T = 20$$

$$T = 5$$

So, speed of Shivam = 50 kmph.

Required distance from A to where they both met

$$\Rightarrow 50 \times \frac{9}{2} = 225 \text{ km}$$

28. (a): Let speed of train-A and train-B be '3y m/sec' and '4y m/sec' respectively.

And let length of train-B be 'l meters'.

So, length of train-A = (l + 100) meters

ATQ,

$$\frac{l+100}{3y} = 10$$

$$l = 30y - 100$$

And,

$$\frac{l+100}{4y-3y} = 48$$

$$\frac{2l+100}{y} = 48$$

$$\Rightarrow l = 24y - 50$$

On solving (i) & (ii), we get:

$$30y - 100 = 24y - 50$$

$$6y = 50$$

$$y = \frac{25}{3}$$

Put value of y in (i)

$$l = 30 \times \frac{25}{3} - 100$$

$$= 150$$

$$\text{Required time} = \frac{150}{4 \times \frac{25}{3}}$$

$$= \frac{150}{100} \times 3$$

$$= 4.5 \text{ seconds}$$

OR

Let speed of train-A and train-B be '3y m/sec' and '4y m/sec' respectively.

Length of train-A = 3y × 10 = 30y meter

Length of train-A and train-B together = (4y - 3y) × 48 = 48y meter

Length of train B = 48y - 30y = 18y meter

$$\text{Required time} = \frac{18y}{4y} = 4.5 \text{ sec}$$

29. (d): ATQ,

$$\frac{144}{x} + \frac{144}{5x} = \frac{33}{10}$$

$$\frac{720+864}{5x} = \frac{33}{10}$$

$$33x = 1584 \times 2$$

$$x = \frac{1584 \times 2}{33}$$

$$x = 96 \text{ km/hr}$$

$$\text{Average speed of car} = \frac{2 \times 96 \times 96 \times \frac{5}{6}}{96 + 96 \times \frac{5}{6}} = \frac{960}{11} \text{ km/h}$$

30. (b): Let, total distance = 4x

Let, speed of train in second part = y

⇒ Speed of train in first part = 2y

Distance covered by train in first part = 3x

Distance covered by train in second part = x

ATQ,

$$64 = \frac{4x}{\frac{3x}{2y} + \frac{x}{y}}$$

$$\Rightarrow \frac{64}{4} = \frac{1}{\frac{3+2}{2y}}$$

$$\Rightarrow 2y = 16 \times 5$$

$$\Rightarrow 2y = 80 \text{ kmph}$$

Speed of train in first part = 2y = 80 kmph

31. (c): Length of train P = $64 \times \frac{5}{18} \times 27$
= 480 m

Length of train Q = $64 \times \frac{7}{8} \times \frac{5}{18} \times 36$
= 560 m

Relative speed = $(64 + 64 \times \frac{7}{8}) \times \frac{5}{18}$
= $\frac{100}{3}$ m/s

Train P and train Q will cross each other in

$$= \frac{(480+560)3}{100}$$

$$= 31.2 \text{ sec}$$

32. (b): Let length of train A be L meters

$$(108 + 12) \times \frac{5}{18} = \frac{L}{7.2}$$

$$L = 240 \text{ meters}$$

New speed of train A = $108 \times \frac{125}{100} = 135 \text{ km/hr}$

Let length of train B be S meters

$$(135 - 90) \times \frac{5}{18} = \frac{240+S}{48}$$

$$S = 360 \text{ meters}$$

33. (c): Let speed of longer train and smaller train be 7x and 8x respectively.

ATQ—

$$(7x + 8x) = \frac{(240+210)}{6}$$

$$90x = 450$$

$$x = 5$$

Speed of longer train = 5 × 7 = 35 m/s

Speed of smaller train = 5 × 8 = 40 m/s

Let length of platform be l meter

$$40 = \frac{l+210}{9}$$

$$40 \times 9 = l + 210$$

$$l=150$$

Then, length of bridge = $150 + 60 = 210$ meters

Let time taken by slower train to cross bridge be T sec.

$$T = \frac{210+240}{35}$$

$$35T = 660$$

$$T = \frac{90}{7} \text{ sec.}$$

- 34. (d):** Let, amount invested in scheme 'P' and amount invested in scheme 'Q' be 'x' and 'y' respectively.

ATQ,

$$\frac{x \times \left[\left(\frac{120}{100} \right)^2 - 1 \right]}{y \times \frac{8 \times 2}{100}} = \frac{11}{6}$$

$$\Rightarrow \frac{x \times 0.44}{y \times 0.16} = \frac{11}{6}$$

$$\Rightarrow \frac{x}{y} = \frac{2}{3}$$

$$\text{Required \%} = \frac{2}{3} \times 100$$

$$= 66\frac{2}{3} \%$$

- 35. (a):** let speed of passenger train be S kmph.

Distance travelled by superfast train in 5 hr = $90 \times 5 = 450$ km

Therefore, passenger train takes 15 hr to cover the distance of 450 km

$$\text{Speed of passenger train} = \frac{450}{15} = 30 \text{ km/hr}$$

- 36. (a):** let speed of Manoj & Shreya be x & y kmph respectively

Let Manoj covers D km in t hours

$$\text{ATQ, } x = \frac{D}{t} \text{ kmph}$$

$$y = \frac{2D}{\frac{t}{2}} = \frac{4D}{t} \text{ kmph}$$

$$x : y = 1 : 4 \text{ or } a : 4a$$

Since distance travelled by both will be same (Shreya catches him)

Let time taken by Shreya to cover $20/3$ km be k hours

$$x \left(k + \frac{30}{60} \right) = yk$$

$$ak + \frac{a}{2} = 4ak$$

$$k = \frac{1}{6} \text{ hours} = 10 \text{ min}$$

$$\text{Speed of Shreya} = \frac{20}{3} \times 6 = 40 \text{ kmph}$$

- 37. (b):** Here, the total distance between P to Q is 594 km

$$\text{Relative Speed} = (63+54) \text{ km/hr}$$

$$= 117 \text{ km/hr}$$

$$\text{Distance travelled by Train A in 2 hrs} = 63 \times 2 = 126 \text{ km}$$

$$\text{Remaining distance} = 594 - 126$$

$$= 468 \text{ km}$$

$$\text{Time required to cover the remaining distance} = \frac{468}{117}$$

$$= 4 \text{ hrs}$$

$$\text{Distance travelled by Train B in 4 hr} = 54 \times 4 = 216 \text{ km}$$

Both train will meet at 216 km distance from Q

- 38. (c):** when time is same then speed is directly proportional to distance covered

Let speed of Dhoni, Rohit & Virat be x kmph, y kmph & z kmph respectively

$$x : y = 1 : 3 \text{ or } a : 3a$$

$$z = \frac{150}{100} \times 3 = 4.5a \text{ kmph}$$

$$\text{ATQ, } \frac{D}{a+4.5a} = 2$$

$$D = 11a \text{ km}$$

$$\text{Required time} = \frac{D}{4.5a} = \frac{11a}{4.5a} = 2.44 \text{ hours}$$

- 39. (a):** let speed of car P and Q are a km/min and b km/min respectively

Let both cars meet after t min

So, distance covered by P in t min and 16min will be equal to distance covered by Q in 36min and t min respectively

ATQ

$$at = 36b \dots \dots (i)$$

$$\text{And } (bt = 16a) \dots \dots (ii)$$

Applying $\frac{i}{ii}$

$$\frac{at}{bt} = \frac{36b}{16a}$$

$$\frac{a^2}{b^2} = \frac{36}{16}$$

$$\frac{a}{b} = \frac{3}{2}$$

$$a : b = 3 : 2$$

- 40. (d):** Let speed of Rajdhani express be s m/s

And length of Rajdhani express be l m

Then, length of Shatabdi express be $2l$ m

$$\text{Speed of Shatabdi express} = 168 \times \frac{5}{18} = \frac{140}{3} \text{ m/s}$$

ATQ -

$$\frac{2l+l}{20} = \frac{140}{3} - s \dots \dots (i)$$

$$\frac{2l+l}{45} = \frac{140}{3} - 2s \dots \dots (ii)$$

From (i) we put the value of s in (ii) and we get-

$$l = 200 \text{ m}$$

$$\text{So, length of Shatabdi express} = 200 \times 2 = 400 \text{ m}$$

Mains Solutions

1. **(a);** Let length of platform = t meters
Length of train A and train B is $8x$ and $7x$ respectively.

Speed of train A and train B is $3y$ and $2y$ respectively.

$$\therefore \frac{\frac{t+8x}{18}}{\frac{t+7x}{24}} = \frac{3y}{2y}$$

$$\Rightarrow x = t$$

$$\text{Required percentage} = \frac{x}{8x} \times 100 = 12.5\%$$

2. **(b);** Speed of train X and Y $5x$ and $6x$ respectively.
Length of tunnel $\rightarrow 130 + 145 = 275$ m.

Speed of trains per second

$$= \frac{275}{10} = 27.5 \text{ m/s}$$

$$5x + 6x = 27.5 \Rightarrow x = 2.5$$

speed of train X $\rightarrow 12.5$ m/s

Speed of train Y $\rightarrow 15$ m/s

Distance cover by train X in tunnel = $12.5 \times 10 = 125$ m.

Length of train X leaves out = $130 - 125 = 5$ m

$$\text{Required}\% = \frac{5}{130} \times 100 = 3\frac{11}{13}\%$$

3. **(e);** Let speed of car will be x km/hr

$$\text{Speed of train} = \frac{200x}{100}$$

$$= 2x \text{ km/hr}$$

$$\text{ATQ, } \frac{150}{x} - \frac{150}{2x} = \frac{30}{60}$$

$$(300 - 150) 60 = 60X$$

$$X = 150 \text{ km/hr}$$

4. **(b);** Let's length of train is X meter and length of bridge and platform are $2L$ and L meter respectively

$$\text{Speed of train} = 108 \times \frac{5}{18} = 30 \text{ m/s}$$

When train passed the bridge

Distance covered = $X + 2L$

$$X + 2L = 540 \dots(i)$$

When train passes the platform

Distance covered = $X + L$

$$X + L = 450 \dots(ii)$$

From (i) and (ii)

$$L = 90 \text{ meter}$$

$$X = 360 \text{ meter}$$

5. **(d);** Let length of faster train is 2ℓ and slower train is ℓ meter respectively.

ATQ,

$$\frac{(72+63)5}{18} = \frac{2\ell+\ell}{15}$$

$$\frac{135 \times 5}{18} = \frac{3\ell}{15}$$

$$\ell = 187.5$$

Let length of platform is X meter

$$\frac{72 \times 5}{18} = \frac{187.5 \times 2 + X}{50}$$

$$X = 1000 - 375$$

$$X = 625 \text{ meter}$$

$$\text{Required} = \frac{187.5}{625} \times 100 = 30\%$$

6. **(a);** Time taken by P to cross the tunnel = $\frac{900}{72 \times \frac{5}{18}}$

$$= 45 \text{ seconds}$$

$$\text{Time taken by Q to cross the tunnel} = \frac{1200}{90 \times \frac{5}{18}}$$

$$= 48 \text{ seconds}$$

\therefore P exits the tunnel first. When P exits, Q will have travelled a distance of $90 \times \frac{5}{18} \times 45$

$$= 1125 \text{ m.}$$

\therefore 75 m of Q would still be inside the tunnel.

7. **(b);** The rear ends of the trains will cross each other when the trains completely cross each other.

This will happen after. $\frac{1500}{(72+90) \frac{5}{18}}$ seconds.

(Relative distance = $600 + 300 + 600 = 1500$)

$$= \frac{100}{3} \text{ seconds}$$

Distance travelled by the slower train in this time

$$= \frac{100}{3} (72) \left(\frac{5}{18}\right) = 666\frac{2}{3} \text{ m}$$

Distance between the point where the rear ends of the trains cross each other and the point of entry of the slower train = $666\frac{2}{3} - 300$

$$= 366\frac{2}{3} \text{ meter}$$

8. **(d);** Let distance covered by Chirag = $3z$

Distance covered by Aman = $2z$

Speed of Aman = x

Speed of Chirag = $1.2x$

	Aman	Chirag
S	x	$1.2x$
D	$2z$	$3z$
T	$\frac{D}{S}$	$\frac{D}{S}$

$$T = \frac{2z}{x} : \frac{3z}{1.2x}$$

$$\frac{2}{x} : \frac{2.5}{1.2x}$$

$$\frac{2}{x} : \frac{2.5}{1.2x} \times 1.2x$$

$$2 : 2.5$$

$$\frac{2}{2.5} = 0.8$$

$$\frac{2}{2.5} = 0.8 \times 2 = 1.6$$

Time taken by Aman = $2 \times 2 = 4$ hr
 Time taken by Chirag = $2.5 \times 2 = 5$ hr
 Chirag reach at point B = $11 : 00 + 5$ hr
 = $4 : 00$ p.m

9. (d); Time taken by Aman = $\frac{2z}{x}$

ATQ,

$\frac{2z}{x}$ should be equal to $\frac{3z}{1.2x}$

Let, Aman slow his speed by a%

$\therefore \frac{2z}{[1-\frac{a}{100}]x} = \frac{3z}{1.2x}$

$2.4 = 3 [1-\frac{a}{100}]$

$0.8 = 1-\frac{a}{100}$

$a = 20\%$

A man should slow his speed by 20% to reach at the same time that of Chirag.

10. (b); Let, originally planned time be 't' hrs.

And original speed be 'x' kmph.

Then,

ATQ,

$t \times x = (t - 1) \frac{5}{4}x$

$\Rightarrow t = 5$ hrs.

11. (a); Part of the distance covered in 1 hr. = $\frac{1}{5}$

With, increased speed he can cover whole journey in 4 hr.

To cover $\frac{4}{5}$ th of the journey he needs $4 \times \frac{4}{5}$
 = 3.2 hrs.

Total time taken = $1 + 3.2 = 4.2$ hrs.

= 4 hrs 12 minutes

12. (c); Ratio of distance covered by second train to that of first train = $1.25 : 1$

= $5 : 4$

Since time is same,

Ratio of their speeds is also $5 : 4$

Speed of second train = $40 \times \frac{5}{4} = 50$ km/hr.

Distance covered by first train till half an hour = 20 km.

Let, third train takes 't' hrs. to overtake first train.

And speed of third train be x km/hr.

Then, $\frac{20}{x-40} = t$ (i)

Distance covered by second train till half an hour = 25 km.

$\frac{25}{x-50} = t + \frac{3}{2}$ (ii)

Solving (i) and (ii)

$x = 60$ km/hr, $t = 1$

13. (b); Distance covered by third train = $60 \times (1 + \frac{3}{2})$ km

= $60 \times \frac{5}{2}$

= 150 km.

14. (c); Bus A travels first $\frac{1}{3}$ rd of the distance in $\frac{200}{40}$

= 5 hours

Bus B travels first $\frac{1}{3}$ rd of the distance in $\frac{200}{50}$

= 4 hours

In $5 - 4 = 1$ hour, Bus B travels another 60 km

Now, the distance between Buses A and B after 5 hours = $600 - (200 + 200 + 60) = 140$ km

140 km is covered by both the buses in $\frac{140}{60+60}$

= $1\frac{1}{6}$ hours

Hence, they will cross each other after = $5 + 1\frac{1}{6} =$

$6\frac{1}{6}$ hours = 6 hours 10 minutes

And, the point of crossing is $200 + \frac{7}{6} \times 60 = 200 +$

$70 = 270$ km from city M

15. (d); Time taken by Bus A to reach the destination

= $\frac{200}{40} + \frac{200}{60} + \frac{200}{40} = 5 + \frac{10}{3} + 5$

= 13 hours 20 minutes

Time taken by Bus B to reach the destination

= $\frac{200}{50} + \frac{200}{60} + \frac{200}{30} = 4 + \frac{10}{3} + \frac{20}{3} = 14$ hours

Hence Bus A and Bus B reach their respective destinations at 10:20 PM and 11 PM respectively.

16. (b); Time taken by both the buses to meet on the next

day = $\frac{600}{40+60} = 6$ hours

Distance travelled by bus B in 6 hours = $6 \times 60 = 360$ km

So, the next day's meeting point will be 360 km from city M

Hence, Distance between both the meeting points = $360 - 270 = 90$ km

17. (d); Let the speed of both the buses be x km/h

\therefore Total Distance = $3x + 3x = 6x$ km

Speed of first bus = 20% less than previous day's speed = $\frac{4}{5}x$ km/h

Speed of second bus = 20% more than previous day's speed = $\frac{6}{5}x$ km/h

First bus leaves 40 minutes earlier than the second.

Let the time taken by the first bus be y hours.

$$\text{Total distance} = \frac{4}{5}xy + \frac{6}{5}x\left(y - \frac{2}{3}\right) = 6x$$

$$\Rightarrow y = \frac{17}{5} \text{ hours}$$

$$\text{Distance travelled by the first bus} = \frac{17}{5} \times \frac{4}{5}x$$

$$= \frac{68}{25}x \text{ km}$$

Distance travelled by second bus

$$= \left(\frac{17}{5} - \frac{2}{3}\right) \times \frac{6}{5}x = \frac{82}{25}x \text{ km}$$

According to the question,

Distance travelled by second bus

$$= \frac{82}{25}x = 3x + 21$$

$$\Rightarrow \frac{7}{25}x = 21$$

$$\Rightarrow x = 75 \text{ km/h}$$

$$\therefore \text{Total Distance} = 6x = 450 \text{ km}$$

- 18. (c);** Let the length of the tunnel be x m. Let the speeds of the train and the dog be t m/sec and d m/sec respectively.

Let us say that the train is approaching the tunnel from P, would be y meters from P.

$$\frac{y}{t} = \frac{5x}{11x} \rightarrow (1)$$

$$\frac{y+x}{t} = \frac{6x}{11x} \rightarrow (2)$$

Dividing (2) by (1)

$$\frac{y+x}{y} = \frac{6}{5}$$

$$y = 5x$$

$$\frac{t}{d} = \frac{y}{5x} = 11:1$$

- 19. (b);** Speed of train = 561 kmph

$$\text{Speed of dog} = \frac{561}{11} \times 1 = 51 \text{ kmph}$$

$$\text{Speed of the policeman} = 176 \frac{8}{17} \% \text{ of } 51$$

$$= 90 \text{ kmph}$$

Distance travelled by the policeman in 6 minutes

$$= (90) \left(\frac{6}{60}\right) = 9 \text{ km}$$

Distance travelled by the thief in 6 minutes

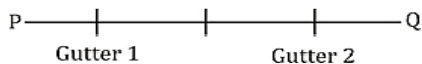
$$= (60) \left(\frac{6}{60}\right) = 6 \text{ km}$$

When the policeman took the U turn, he was 15 km behind the thief. He would overtake the thief in

$$\frac{15}{90-60} \text{ hours} = \frac{1}{2} \text{ hr}$$

\therefore The policeman would catch the thief 36 minutes after they cross each other

- 20. (b);**



$$\text{Distance from P to gutter 1} = 60 \times \frac{10}{60} = 10 \text{ km.}$$

$$\text{This is } \frac{5}{6} \text{ (Distance between gutter 2 and Q)}$$

\therefore Distance between Q and Gutter 2 = 12 km.

Distance between Gutter 1 and 2 = 72 - 12 - 10 = 50 km.

Total time of travel of the ambulance at twice the speed

$$= \frac{50 \times 2 + 10}{120} = \frac{11}{12} \text{ hours} = 55 \text{ minutes.}$$

Total time of travel of the ambulance = (55 + 10) = 65 minutes.

$$\text{Total time taken} = 65 + 2 = 67.$$

- 21. (c);** At 10 : 15 a.m.

In one hour 15 min i.e. upto 10:15 Am total distance travelled by both is 40 + 10 km

$$\text{They will meet after} = \frac{120-50}{80}$$

$$= \frac{70}{80} = \frac{7}{8} \text{ hrs} = \frac{7}{8} \times 60 \text{ minutes}$$

$$\frac{105}{2} = 52 \text{ minutes } 30 \text{ seconds}$$

They will meet at 10 : 15 a.m. + 52 minutes 30 sec i.e. 11 : 07 : 30 a.m.

- 22. (b); Case I -**

$$\text{Relative speed} = \frac{75}{\frac{15}{2}} = 10 \text{ m/s}$$

$$= 10 \times \frac{18}{5} = 36 \text{ km/hr}$$

$$\text{Speed of train} = 36 - 6 = 30 \text{ km/hr}$$

Case II-

$$\text{Relative speed} = \frac{75}{\frac{27}{4}} = 100 \text{ m/s}$$

$$= \frac{100}{9} \times \frac{18}{5} = 40 \text{ km/hr}$$

$$\text{Speed of second person} = 40 - 30 = 10 \text{ km/hr}$$

- 23. (a);** Distance travelled by Abhishek in 4 hours

$$= 8 \times 4 = 32 \text{ km}$$

Distance travelled by Ayush in 4 hours = 13 \times 4 = 52 km

$$\text{New speed of Abhishek} = 8 \times 2 = 16 \text{ km/hr}$$

$$\text{New speed of Ayush} = 13 - 1 = 12 \text{ km/hr}$$

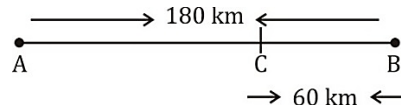
$$\text{Relative speed} = 16 - 12 = 4 \text{ km/hr}$$

$$\text{Distance between both} = 52 - 32 = 20 \text{ km}$$

$$\text{Required total time} = 4 + \frac{20}{4}$$

$$= 4 + 5 = 9 \text{ hr}$$

- 24. (a);**



\leftarrow 11.00 am Y

X 11.00 a.m. \rightarrow

Time taken by Y for distance cover from B to C with stoppages

$$= \left(\frac{6}{5} + \frac{1}{4}\right) \text{ hrs} = \frac{24+5}{20} = \frac{29}{20} \text{ hrs.}$$

Say they cross each other at x distance from A

$$\therefore \frac{x}{70} = \frac{29}{20} + \frac{120-x}{50}$$

$$\begin{aligned} \therefore \frac{x}{50} + \frac{x}{70} &= \frac{29}{20} + \frac{12}{5} \\ \Rightarrow \frac{12x}{350} &= \frac{29+48}{20} \Rightarrow \frac{12x}{35} = \frac{77}{2} \\ \therefore x &= \frac{77}{2} \times \frac{35}{12} = 112.29 \approx 112 \text{ km} \end{aligned}$$

- 25. (c):** Speed of train - B = $60 \times \frac{180}{100} = 108 \text{ km/hr}$.
Let distance between city - X and city - Y be 'D km' and let time taken by train - A to reach city - Y from city - X be 't hours'

ATQ,
 $\frac{D}{60} = t \quad \dots \text{ (i)}$

And,
 $\frac{D - 60 \times 4}{60 + 108} = \frac{25}{14}$
 $\Rightarrow D - 240 = 300$
 $D = 540 \text{ km} \quad \dots \text{ (ii)}$

Put value of (ii) in (i):

$$\frac{540}{60} = t$$

t = 9 hours

So, required time = 6 : 00 A.M. + 9 hours = 3 : 00 P.M

- 26. (b):** Distance covered by Rapido on day1 = $m \text{ km}$
Then total distance covered on day 1 =

$$\frac{m}{8} \times 20 \text{ km} \quad \frac{2}{3}$$

ATQ
 $\frac{m}{8} \times 20 \times \frac{7}{20} + \frac{3}{5} \times 250 = 290$
 $m = 160 \text{ km}$

- 27. (b):** Time taken by Kunal to reach stopping point =
 $\frac{15}{50} \times 60 = 18 \text{ minutes}$
Kunal stays at this point for 12 min so total time = 18 + 12 = 30 minutes
Distance covered by Kunal before Hemant leaves point B = $\frac{30}{60} \times 50 + 15 = 40 \text{ km}$
Time taken by Hemant to reach his stopping point = $\frac{15}{60} \times 60 = 15 \text{ minutes}$
Hemant stays at this point for 12 min so total time = 15 + 12 = 27 minutes
Distance covered by Kunal in 27 minutes =
 $\frac{27}{60} \times 50 = 22.5 \text{ km}$
Now the distance remaining is = $150 - (40 + 22.5 + 15) = 72.5 \text{ km}$
Time taken by them to meet each other in rest of distance = $\frac{72.5}{50+60} = \frac{29}{44} \text{ hour}$
Distance between point A and meeting point = $40 + 22.5 + 50 \times \frac{29}{44} = \frac{1050}{11} \text{ km}$

- 28. (a):** Let speed of A & B be 6s m/sec & 7s m/sec respectively

$$\begin{aligned} \text{So, } 7s - 6s &= \frac{10}{3} \\ s &= \frac{10}{3} \text{ m/s} \end{aligned}$$

$$\text{Speed of train A} = 6 \times \frac{10}{3} = 20 \text{ m/s}$$

$$\text{And, speed of train B} = 7 \times \frac{10}{3} = \frac{70}{3} \text{ m/s}$$

Let length of train A & B be x meter & y meter respectively

ATQ -
 $\frac{13(x+y)}{120} = \frac{130}{3}$

$$x + y = 400 \text{ meters}$$

Now, length of platform = 2x

$$\frac{x+2x}{24} = 20$$

$$x = 160 \text{ meters}$$

$$\text{So, length of train B} = 400 - 160 = 240 \text{ meters}$$

- 29. (b):** distance = $10 \times 1 = 10 \text{ km}$

$$\begin{aligned} \text{Time taken to cover half (5km) distance} &= \frac{5}{10} = \\ &30 \text{ minutes} \end{aligned}$$

$$\begin{aligned} \text{Time taken to cover rest 5 km} &= 30 - 15 = \\ &15 \text{ minutes} \end{aligned}$$

$$\text{Increased speed} = \frac{5}{15} \times 60 = 20 \text{ kmph}$$

$$\text{Time taken at increased speed} = \frac{10}{20} =$$

$$30 \text{ minutes}$$

Alternatively,

at increased speed he saved 15 minutes to cover half distance.

For whole distance, he could save 30 minutes at increased speed.

$$\begin{aligned} \text{Time taken at increased speed} &= 60 - 30 = \\ &30 \text{ minutes} \end{aligned}$$

- 30. (b):** Time taken by Kunal to reach stopping point =
 $\frac{15}{50} \times 60 = 18 \text{ minutes}$

$$\begin{aligned} \text{Kunal stays at this point for 12 min so total time} &= 18 + 12 = 30 \text{ minutes} \end{aligned}$$

Distance covered by Kunal before Hemant leaves

$$\text{point B} = \frac{30}{60} \times 50 + 15 = 40 \text{ km}$$

Time taken by Hemant to reach his stopping

$$\text{point} = \frac{15}{60} \times 60 = 15 \text{ minutes}$$

$$\begin{aligned} \text{Hemant stays at this point for 12 min so total time} &= 15 + 12 = 27 \text{ minutes} \end{aligned}$$

Distance covered by Kunal in 27 minutes =

$$\frac{27}{60} \times 50 = 22.5 \text{ km}$$

$$\begin{aligned} \text{Now the distance remaining is} &= 150 - (40 + 22.5 \\ &+ 15) = 72.5 \text{ km} \end{aligned}$$

$$\begin{aligned} \text{Time taken by them to meet each other in rest of distance} &= \frac{72.5}{50+60} = \frac{29}{44} \text{ hour} \end{aligned}$$

Distance between point A and meeting point

$$= 40 + 22.5 + 50 \times \frac{29}{44} = \frac{1050}{11} \text{ km}$$

31. (d): Let length and speed of train – A be 'l meters' and 'V m/sec' respectively.

$$\text{ATQ,} \\ = \frac{l+240}{11} = V \text{ (i)}$$

$$\text{And, } \frac{l}{5} = V \text{ (ii)}$$

On solving (i) & (ii), we get:

$$\frac{l+240}{11} = \frac{l}{5}$$

$$5l + 1200 = 11l$$

$$\Rightarrow l = 200 \text{ m (iii)}$$

Put value of (iii) in (ii):

$$V = 40 \text{ m/sec}$$

$$\text{So, length of train – B} = l + 160 = 360 \text{ m}$$

$$\text{And speed of train – B} = 40 \times \frac{100}{160} = 25 \text{ m/sec}$$

$$\text{Hence, required time} = \frac{360+200}{40-25} = \frac{560}{15} \text{ seconds} = 37\frac{1}{3} \text{ seconds}$$

32. (d): Let initial speed of P be 's' km/hr

Distance cover by P in two hours = 2s km

$$\text{Distance cover by Q in two hours} = 150 \times 3 = 300 \text{ km/hr}$$

When both meet P had travelled a distance of 216 km.

Distance cover by P with 25% increased speed = (216 – 2s) km

$$\text{And his increased speed} = s\left(\frac{5}{4}\right) = \frac{5s}{4} \text{ km/hr}$$

If P cover 216 km, then Q cover total 384 km

After two hours = 384 – 300 = 84 km

$$\text{Time taken by Q to cover 84 km} = \frac{84}{150} = \frac{14}{25} \text{ hours}$$

ATQ –

$$\frac{(216-2s)}{\frac{5s}{4}} = \frac{14}{25}$$

$$(216 - 2s) = \frac{14 \times 5s}{24 \times 4}$$

$$216 = \frac{7}{10}s + 2s$$

$$27s = 2160$$

$$S = 80 \text{ km/hr}$$

$$\text{So, increased speed of P} = 80 \times \frac{5}{4} = 100 \text{ km/hr}$$

Previous Year Question

1. (c): ATQ

$$\frac{x}{40} - \frac{x+20}{60} = 2$$

$$x = 280 \text{ km}$$

$$\text{Required time} = \frac{320}{40} = 8 \text{ hours}$$

2. (e): Distance covered by bus = $\frac{25}{400} \times 640$
= 40km

$$\text{Distance covered by car} = \frac{25}{100} \times 640$$

$$= 160 \text{ km}$$

Distance covered by bicycle

$$= \frac{30}{100} \times 640 = 192 \text{ km}$$

And distance covered by train

$$= (640 - (40 + 160 + 192)) = 248 \text{ km}$$

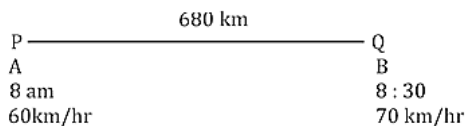
$$\text{Required time} = \frac{40}{80} + \frac{160}{120} + \frac{192}{32} + \frac{248}{62} = \frac{71}{6} \text{ hours}$$

3. (c): Speed of train A = $\frac{4 \times 180}{36} = 20 \text{ m/s} = 72 \text{ kmph}$

$$\text{Length of train B} = 63 \times \frac{5}{18} \times 8 = 140 \text{ m}$$

$$\text{Required time} = \frac{180+140}{(72-63) \times \frac{5}{18}} = 128 \text{ sec}$$

4. (b):



Dist travelled by A in $\frac{1}{2}$ hr = 30 km

Remaining distance to be covered = 680 – 30

$$= 650 \text{ km}$$

$$\text{Relative speed} = 60 + 70 = 130$$

$$\therefore \text{time taken} = \frac{650}{130} = 5 \text{ hr}$$

$$\therefore \text{time} = 8 : 30 + 5 \text{ hr} = 1 : 30 \text{ pm}$$

5. (e): Speed of 1st train = $72 \times \frac{5}{18} = 20 \text{ m/s}$

$$\therefore \text{Dist travelled by 1st train} = 20 \times 18 = 360 \text{ m}$$

$$\therefore \text{length of train (1st)} = 360 - 160 = 200 \text{ m}$$

$$\text{Speed of 2nd train} = 90 \times \frac{5}{18} = 25 \text{ m/s}$$

$$\therefore \text{Distance travelled} = 25 \times 15 = 375 \text{ m}$$

$$\therefore \text{length of 2nd train} = 375 - 160 = 215 \text{ m}$$

6. (c): Relative speed of car = 64 + 86 = 150 km/hr

$$\text{Distance travelled by Car P in 3 hrs} = 64 \times 3 = 192 \text{ km}$$

$$\text{Remaining distance} = 792 - 192 = 600 \text{ km}$$

Time taken to cover remaining distance where they will meet each other = $\frac{600}{150} = 4 \text{ hrs}$

$$\text{Distance travelled by Car Q from station B in 4 hrs} = 86 \times 4 = 344 \text{ km}$$

7. (a): Let speed of train A be 5x km/hr

Then speed of train B = 6x km/hr

ATQ—

$$(6x + 5x) \times \frac{5}{18} = \frac{120+180}{\frac{60}{11}} \Rightarrow$$

$$x = 18$$

$$\text{Required time} = \frac{120+180}{(108-90) \times \frac{5}{18}} = 60 \text{ sec}$$

8. (d): speed = $1 \times \frac{5}{18} \times 60 = \frac{50}{3}$ m/min
 Time taken to reach station (time to catch train) = $\frac{500}{\frac{50}{3}} = 30$ min
 Time left to catch train = $30 - 4 - 4 = 22$ min
 In this time, he is going back to home and has to reach station
 Total distance to be covered = 500m
 Required speed = $\frac{500}{22} \times \frac{60}{1000} = 1.36$ kmph

9. (e): ATQ -
 $\frac{L+L \times \frac{40}{100}}{108 \times \frac{5}{18}} = 28$
 $1.4L = 840$
 $L = 600$ meters
 And, length of platform = $0.4 \times 600 = 240$ meters
 Let length of train B = X meters
 $\frac{X+240}{24} = 90 \times \frac{5}{18}$
 $X = 360$ meters
 Required time = $\frac{600+360}{(108-90) \times \frac{5}{18}} = \frac{960}{5} = 192$ sec

10. (a): distance = 240 kms
 Required speed = $\frac{240}{2.5} = 96$ kmph
 Required % = $\frac{96-60}{60} \times 100 = 60\%$

11. (b): required time = $\frac{140+120}{(132-80) \times \frac{5}{18}}$
 $= \frac{260 \times 18}{52 \times 5} = 18$ sec

12. (a): Let efficiency of B = 5x unit/day
 So, efficiency of A = $5x \times \frac{140}{100} = 7x$ unit/day
 Total work = $(7x + 5x) \times \frac{75}{8} = \frac{225x}{2}$ unit
 Total work done by A in 5 days = $7x \times 5 = 35x$ unit
 Total required days = $5 + \frac{\frac{225x}{2} - 35x}{5x} = 20 \frac{1}{2}$ days

13. (b): Let length of train 'A' and platform each be 'L' meters
 ATQ -
 $\frac{L+L}{36} = 54 \times \frac{5}{18}$
 $L = 270$ meters
 Let speed of train B be 's' km/hr
 $\frac{230+270}{25} = s \times \frac{5}{18}$
 $S = 72$ km/hr

14. (a): Let speed of train B be s km/hr
 ATQ -
 $20(36 + s) \times \frac{5}{18} = 600$
 $3600 + 100s = 10800$
 $100s = 7200$
 $S = 72$ km/hr

15. (e): Let length of train be 'l' meters
 ATQ -
 $72 \times \frac{5}{18} = \frac{l}{30}$
 $l = 600$ meters
 Required time = $\frac{600}{54 \times \frac{5}{18}} = 40$ sec

16. (c): Let length of the train X be 2a meter.
 ATQ
 $15 = \frac{2a+a}{15+72 \times \frac{5}{18}} \Rightarrow 15 = \frac{3a}{35} \Rightarrow a = 175$ m
 So, length of train X = $2a = 350$ m

17. (d): Let the distance be D km
 ATQ
 $\frac{D}{\left(\frac{D}{2x} + \frac{D}{8x}\right)} = 36.8$
 $x=23$

18. (a): let speed of train Y be 's' kmph & length of train X & Y be a & b m respectively
 ATQ, $\frac{a+b}{120} = (s - 120) \times \frac{5}{18}$ (i)
 $\frac{a+b}{\frac{40}{3}} = (s + 120) \times \frac{5}{18}$ (ii)
 On dividing (i) by (ii)
 $\frac{1}{9} = \frac{s-120}{s+120}$
 $S = 150$ kmph

19. (d): Distance = km $30 \times 6 \frac{12}{60} = 30 \times 6 \frac{1}{5} = 186$ km
 Time taken = $\frac{186}{24} = 7 : 45$ h

20. (a): Time taken to reach B = $\frac{999}{55.5} + 1 \frac{1}{3}$
 $= 18 + 1$ hr 20 min = 19 hr 20 min
 It reaches B at 1 : 20 am

21. (a): Let the distance between A and B be x.
 $\frac{x \times 60}{45} - \frac{x \times 60}{48} = 5 \Rightarrow \frac{4x}{3} - \frac{5x}{4} = 5$
 $\frac{16x - 15x}{12} = 5 \Rightarrow x = 60$ km

22. (a): Average speed = $\frac{2 \times 100 \times 150}{100 + 150}$ [∴ using formula average speed $\frac{2xy}{x+y} =] = 120$ km/h

23. (b): Total time = $\frac{24}{6} + \frac{24}{8} + \frac{24}{12} = 4 + 3 + 2 = 9$ h
 Average speed = $\frac{\text{total distance}}{\text{total time}} = \frac{72}{9} = 8$ km/hr

24. (b): Let the distance be x.
 According to the question
 $\frac{2x}{5} - \frac{x}{3} = \frac{16}{60} \Rightarrow \frac{6x - 5x}{15} = \frac{16}{60} \Rightarrow x = 4$ km

25. (d): Let the distance be x and speed be y

$$\text{Reduced speed} = y - \frac{y}{15}$$

According to the question

$$\therefore \frac{x}{y} = \frac{(x-10)15}{14y}$$

$$14x = 15x - 150 \Rightarrow x = 150 \text{ km}$$

$$\therefore \frac{x}{y} = 30 \text{ h} \Rightarrow \frac{150}{30} y = 5 \text{ km/h}$$

26. (c): Let the time taken by Riding be R and walking be W

$$R + W = 6\frac{1}{4} \Rightarrow 2W = 7\frac{3}{4} \Rightarrow W$$

$$R = \frac{25}{4} - \frac{31}{8} \Rightarrow R = \frac{19}{8}$$

$$2R = \frac{38}{8} = 4\frac{3}{4}$$

Time taken in riding both ways = 4h 45min

27. (a): A and B run a kilometer and A wins by 25 seconds.

$$A = x \Rightarrow B = x + 25 \Rightarrow C = x + 55$$

A and C run a kilometer and A wins by 275m

We know B's time (from above) = $x + 25$ sec

B wins over C by 30 sec, C's time = $x + 55$ sec

A and C run a kilometer and A wins by 275m

it takes C to run 275 in 55 sec.

Speed of C = 5m/s

time taken by C = 200 sec

$$x + 55 = 200 \text{ } \therefore x = 145 \text{ sec}$$

Time taken by A is 2 min 25 seconds.

28. (d): Let the time taken to walk = W

And ride = $R \Rightarrow W + R = 4.5 \text{ hr}$

$$2R = 3h \Rightarrow R = 1.5h \text{ } \therefore 2W = 2(4.5 - 1.5) = 6h$$

Time for man to walk both ways 6 h.

29. (c): Let the speed of train be x km/h

Relative speed of first person with the train

$$= (x - 3) \text{ km/h}$$

Relative speed of second person with the train

$$= (x - 5) \text{ km/h}$$

According to the question

$$\Rightarrow (x - 3) \times \frac{5}{18} \times 10 = (x - 5) \times \frac{5}{18} \times 11$$

$$50x - 150 = 55x - 275$$

$$5x = 125 \Rightarrow x = 25 \text{ km/h}$$

30. (c): Distance covered by train in 30 seconds

$$= 60 \times \frac{5}{18} \times 30 = 500\text{m}$$

$$\text{Length of the platform} = (500 - 200)\text{m} = 300\text{m}$$

31. (b): Relative speed of train with respect to the person

$$= (63 - 3) \times \frac{5}{18} \text{ m/s} = \frac{50}{3} \text{ m/s}$$

$$\text{Time taken} = \frac{500}{50} \times 3 = 30 \text{ seconds}$$

adda247



The chapter of boat and stream is based on the application of time and distance. There are two terms which are frequently used in this chapter are downstream and upstream.

- Downstream** → When boat is moving along the direction of the stream.
- Upstream** → When boat is moving against the direction of the stream.

Basic formula: If 'x' be the speed of boat in still water and 'y' be the speed of stream.

(i) **Downstream speed (v) = (x + y) km/h**

(ii) **Upstream speed (u) = (x - y) km/h**

Where Downstream Speed is 'v' and upstream speed is 'u'.

(iii) **Speed of boat in still water, (x) = $\frac{1}{2}(u + v)$**

(iv) **Speed of stream, (y) = $\frac{1}{2}(v - u)$**

Note: If the speed of water in river is zero, then the water is considered to be still.

Example: A man row with a speed of 8 km/h in still water. Find the downstream and upstream speed of boat, if the speed of stream is 4 km/h. ?

Sol. Downstream speed = $(x + y)$ km/h = $(8 + 4) = 12$ km/h
Upstream speed = $(x - y)$ km/h = $(8 - 4) = 4$ km/h

Concept 1: If the speed of boat in still water is x km/h and speed of stream is y km/h. If time taken to go and come back from a point is T, the distance between both points = $\frac{T(x^2 - y^2)}{2x}$ km

Example: A man can row 14 km/h in still water. When the stream is running at 2 km/h, it takes him 7 hour to row to a place and to come back. How far is the place ?

Sol. Required distance = $\frac{7(14^2 - 2^2)}{2 \times 14}$ km = $\frac{7 \times 192}{2 \times 14} = 48$ km

Concept 2: A person can row a certain distance downstream in t_1 h and returns upstream the same distance in t_2 h. When the stream flows at the rate of 's' km/h.

Then the speed of man = $\frac{s(t_1 + t_2)}{t_2 - t_1}$ km/h

Example: Sonu can row a certain distance is 8 h and can return the same distance is 12h. If the stream of flows at the rate of 8 km/h, then find the speed of Sonu is still water ?

Sol: Speed of man = $\frac{8(8+12)}{12-8}$ km/h = $\frac{8 \times 20}{4} = 40$ km/h

Concept 3: If the speed of boat in still water is x km/h and river is flowing with a speed of $\frac{x+y}{x} y$ km/h, then average speed in going to a certain place and coming back to starting point is given by km/h.

Example: A man can row in still water with a speed of 6 km/h to go to a certain place and to come back. Find the average speed for the whole journey, if the river is flowing with a speed of 3 km/h ?

Sol. Average speed = km/h = $\frac{(6+3)(6-3)}{6}$ km/h = $\frac{9 \times 3}{6} = 4.5$ km/h

Concept 4: If a man can row d_1 km upstream and e_1 km downstream in T_1 hours. Also, he can row d_2 km upstream and e_2 km downstream in T_2 hours. Then, the upstream speed of man

= $\left(\frac{d_1 e_2 - d_2 e_1}{e_2 T_1 - e_1 T_2} \right)$ km/h \Rightarrow Downstream speed of man = $\left(\frac{d_1 e_2 - d_2 e_1}{d_1 T_2 - d_2 T_1} \right)$ km/h

Example: A man can row 30 km upstream and 44 km downstream in 10 hrs. Also, he can row 40 km upstream and 55 km downstream in 13 hrs. Find the rate of current and speed of man in still water ?

Sol. Upstream speed of man = $\frac{30 \times 55 - 40 \times 44}{55 \times 10 - 44 \times 13} = \frac{-110}{-22} = 5 \text{ km/h}$

Downstream speed of man = $\frac{30 \times 55 - 40 \times 44}{30 \times 13 - 40 \times 10} = \frac{-110}{-10} = 11 \text{ km/h}$

Speed of man = $\frac{5+11}{2} = 8 \text{ km/h} \Rightarrow$ Speed of stream = $\frac{11-5}{2} = 3 \text{ km/h}$

Solved Example

1. A man can row upstream at 10 km/hr and downstream at 16 km/hr. Find the speed of man in still water ?

Sol. Let the speed of the man in still water be x km/hr and speed of the stream be y km/hr.

According to the question,

$$x + y = 16 \dots(i) \text{ and } x - y = 10 \dots (ii)$$

Adding eq. (i) with eq. (ii), we have

$$2x = 26 \Rightarrow x = 13 \text{ km/hr}$$

Speed of the man in still water = 13 km/hr.

2. A man can row upstream at 10 km/hr and downstream at 16 km/hr. Find the rate of the current?

Sol. Let the speed of the man in still water be x km/hr and the rate of the current be y km/hr

According to the question,

$$\text{Downstream speed} = x + y = 16 \text{ km/hr} \dots (i)$$

$$\text{Upstream} = x - y = 10 \text{ km/hr} \dots (ii)$$

Subtracting eq. (ii) from eq. (i), we have

$$2y = 6 \text{ km/hr or } y = 3 \text{ km/hr}$$

\therefore Speed of the current = 3 km/hr

3. A stream running at 2 km/hr, a motorboat goes 10 km upstream and comeback to the starting point in 55 minutes. Find the speed of the motorboat in still water.

Sol. Let the speed of the motorboat in still water be x km/hr.

$$\frac{10}{x+2} + \frac{10}{x-2} = \frac{55}{60}$$

$$\text{or, } 240x = 11x^2 - 44$$

$$\text{or, } 11x^2 - 240x - 44 = 0$$

$$\therefore (x - 22)(11x + 2) = 0$$

So, $x = 22 \text{ km/hr}$ (neglect the -ve value)

\therefore Speed of the motorboat in still water = 22 km/hr.

4. Ramesh can row a certain distance downstream in 6 hours and return the same distance in 9 hours. If the stream flows at the rate of 3 km per hour find the speed of Ramesh in still water.

Sol. Let the speed of Ramesh in still water be x km/hr.

Then his upstream speed = $(x - 3) \text{ km/hr}$

Downstream speed = $(x + 3) \text{ km/hr}$.

Now, we are given that up and down journey are equal, therefore,

$$(x + 3)6 = (x - 3)9 \text{ or, } 6x + 18 = 9x - 27$$

or, $3x = 45; \therefore x = 15 \text{ km/hr}$

5. The speed of a boat in still water is 11 km/h and the speed of the stream is 3 km/h. The boat takes a total of 11 hours to cover a distance up and down of a fixed destination. What is the fixed distance ?

Sol. Let the fixed distance be l km.

Speed of the boat downstream = $11 + 3 = 14 \text{ km/h}$

Time taken to cover l km downstream = $\frac{l}{14}$ hours.

Now the speed of the boat upstream = $11 - 3 = 8 \text{ km/h}$

Time taken to cover l km upstream = $\frac{l}{8}$ hours

From the question :

$$\frac{l}{14} + \frac{l}{8} = 11 \text{ or, } \frac{7l+4l}{56} = 11 \text{ or, } l = 11 \times \frac{56}{11} = 56 \text{ km}$$

6. A steamer takes one hour more to go 48 km upstream than the time to go 60 km downstream. If the steamer takes equal time to cover 30 km downstream and 18 km upstream then find the ratio of the speed of the boat in still water and the speed of the stream.

Sol. Let the speed of the boat in still water = x km/h.

Speed of the stream is y km/h

So, The speed of steamer downstream = $x + y$ km/h

and the speed of the steamer upstream = $x - y$ km/h

$$\text{In first situation, } \frac{48}{x-y} - \frac{60}{x+y} = 1 \dots (i)$$

$$\text{and in second situation } \frac{30}{x+y} = \frac{18}{x-y}$$

$$\text{or, } \frac{60}{x+y} = \frac{36}{x-y} \dots (ii)$$

$$\text{from eq. (i) and (ii) } \frac{48}{x+y} - \frac{36}{x-y} = 1$$

$$\text{or, } \frac{12}{x-y} = 1 \text{ or, } x - y = 12 \dots (iii)$$

$$\text{Again from eq. (i), } \frac{48}{12} - \frac{60}{x+y} = 1$$

$$\text{or, } 4 - 1 = \frac{60}{x+y} \text{ or, } x + y = 20 \dots (iv)$$

Solving eq. (iii) and (iv), $x = 16$ and $y = 4$

$$\text{So required ratio} = \frac{x}{y} = \frac{16}{4} = 4 : 1$$

Basic Questions

1. A boat goes 14 km upstream in 42 minutes. The speed of stream is 4 km/h. The speed of boat in still water is
(a) 24 km/h (b) 25 km/h (c) 30 km/h
(d) 23 km/h (e) None of these
2. The speed of a boat in still water is 7 km/h. If its speed in downstream is 10 km/h. Then the speed of stream is
(a) 7 km/h (b) 3 km/h (c) 10 km/h
(d) 6 km/h (e) None of these
3. Aditya can row with stream at 10 km/h and against the stream at 6 km/h. His speed in still water is
(a) 16 km/h (b) 6 km/h (c) 8 km/h
(d) 10 km/h (e) None of these
4. Speed of man is 12 km/h in still water. If the rate of current is 4 km/h, then the effective speed of the man upstream is
(a) 6 km/h (b) 7 km/h (c) 5 km/h
(d) 8 km/h (e) None of these
5. A man moves downstream at a rate of 14 km/h and upstream at a rate of 6 km/h. Speed of boat in still water is
(a) 4 km/h (b) 10 km/h (c) 16 km/h
(d) 2 km/h (e) None of these
6. A man moves 20 km down stream in 5 hours and 10 km up stream in same time. The speed of stream
(a) 4 km/h (b) 1 km/h (c) 1.6 km/h
(d) done (e) None of these
7. A boat travels 18 km towards upstream in 6 hours. How long (In Hrs) will it take to cover the same distance downstream the speed current is one fourth the speed of boat in still water.
(a) 3 (b) 4 (c) 3.6
(d) 3.4 (e) None of these
8. A person can row with the stream at 8 km/h and against the stream at 4 km/h. The speed of the current is (In km/hr)
(a) 1 (b) 2 (c) 1.5
(d) 4 (e) None of these
9. When the speed of a boat in still water is 4 km/h and the rate of stream is 2 km/h, find upstream speed of the boat ?
(a) 6 km/h (b) 5 km/h (c) 2 km/h
(d) 7 km/h (e) None of these
10. If the speed of a swimmer in still water is 9 km/h. Find the downstream speed of the swimmer, when the river is flowing with the speed of 6 km/h ?
(a) 15 km/h (b) 18 km/h (c) 3 km/h
(d) 12 km/h (e) None of these

Prelims Questions

Level - 1

1. A man can row at 14 km/hr. in still water and speed of stream is 2 km/hr. If it takes him 7 hr. to row to a place & to come back, then find how far is the place?
(a) 36 km (b) 48 km (c) 28 km
(d) 54 km (e) 42 km
2. Speed of boat in still water is six times of speed of stream. If boat covers 105 km in upstream in 7 hours, then find the speed of boat in still water.
(a) 18 km/hr. (b) 25 km/hr. (c) 15 km/hr.
(d) 16 km/hr. (e) 24 km/hr.
3. A boat can row 10 km in 5/6th of an hour in downstream and 12 km in upstream in 90 minutes. Find the speed of stream and speed of boat in still water.(in kmph)
(a) 12,2 (b) 16,4 (c) 4,8
(d) 2,8 (e) 2,10
4. A boat takes a total of 6 hours 24 minutes to cover 60 km in upstream and 60 km in downstream. If sum of upstream speed of boat and downstream speed of boat is 40 km/hr., then find the speed of current.
(a) 5 km/hr. (b) 9 km/hr. (c) 4 km/hr.
(d) 7 km/hr. (e) 3 km/hr.
5. The speed of the boat in still water is 15 km/hr. If the boat travels 54 km each in downstream and upstream in 7.5 hrs, then find the time taken by the boat to travel 48 km in upstream?
(a) 8 hrs (b) 6 hrs (c) 3 hrs
(d) 5 hrs (e) 4 hrs
6. Speed of boat in still water is 200% more than speed of boat in upstream which is equal to 36km/h, find time taken by boat to cover 800 meter in downstream direction?
(a) 16 sec (b) 10 sec (c) 8sec
(d) 5 sec (e) 12 sec

7. A boat goes 220 km downstream and 108 km upstream in 20 hr. Speed of the boat in still water is 4 times the speed of the stream. Find the sum of time taken by the boat to go 40 km in downstream and 48 km upstream?
 (a) 8 hrs (b) 10 hrs (c) 6 hrs
 (d) 9 hrs (e) None of these
8. If A boats takes 9 hours more to travel 65 km in upstream then to travel 60 km in downstream. If speed of boat in still water is $2\frac{7}{9}$ m/sec then find speed of stream in (km/hr).
 (a) 7 (b) 4 (c) 8
 (d) 5 (e) 6
9. A boat covers 36 km in downstream in 4 hrs. if the speed of the current is $\frac{1}{3}$ rd of its downstream speed, then in what time will it cover a distance of 78 km upstream?
 (a) 30 hrs (b) 26 hrs (c) 28 hrs
 (d) 24 hrs (e) 32 hrs
10. A boat can cover 48 km in downstream in 1 h 30 min less time than that of 36 km in upstream. Find the ratio of speed of boat in still water to speed of stream?
 (a) 3 : 1 (b) 4 : 1 (c) 3 : 2
 (d) 2 : 1 (e) can't be determined
11. Sanjay can cover a distance of 30 km in upstream and 45 km in downstream in 13 hours. At the same speed, he can travel 24 km upstream and 30 km downstream in 10 hours. What is the speed of the water current?
 (a) 9 km/hr (b) 8 km /hr (c) 6 km/hr
 (d) 4 km/hr (e) 12 km/hr
12. A boat takes 90 minutes less to travel 36 km downstream than to travel the same distance upstream. If the speed of the boat in still water is 10 km/h then speed of the stream is:
 (a) 4 km/h (b) 3 km/h (c) 2.5 km/h
 (d) 2 km/h (e) 3.5 km/h
13. A boat covers a distance of 10.8 km upstream in 36minutes and the speed of boat in still water is 21kmph. Find the time taken by boat to cover 60km downstream?
 (a) 2 hours 15 minutes
 (b) 2 hours 30 minutes
 (c) 1 hour 48 minutes
 (d) 2 hours
 (e) 2 hours 40 minutes
14. The total time taken by a boat to cover 48 km downstream and 36 km upstream is 10 hours. If the speed of boat in still water is 9 kmph, Find the time taken by boat to cover 60 km downstream?
 (a) 4 hours
 (b) 3 hours 40 minutes
 (c) 6 hours
 (d) 5 hours 20 minutes
 (e) 5 hours
15. A boat can cover 36 km upstream and 55 km downstream in 11 hrs and 48 km upstream and 77 km downstream in 15 hrs, then find the speed of the boat in still water?
 (a) 8 km/hr (b) 6.5 km/hr (c) 7.5 km/hr
 (d) 8.5 km/hr (e) 9 km/hr
16. A boat which has a speed of 6 km/hr in still water cover 2 km in upstream in 30 minutes. How much distance it could cover in 1 hour 24 minutes in downstream?
 (a) 14 km (b) 13.3 km (c) 10.5 km
 (d) 11.9 km (e) none of these
17. Speed of boat in still water is 12 meter/sec and speed of current is 10 meter/sec. Find total time taken by boat to cover 550 meter if boat goes $\frac{1}{5}$ th of distance in upstream and rest in downstream?
 (a) 1 min 5 sec (b) 1 min 30 sec (c) 1 min 15 sec
 (d) 120 sec (e) 85 sec
18. Manoj starts swimming in upstream from point P after 12 sec he swims back towards point P and after 12 sec he reaches at point Q. If distance between P and Q is 144 meters, find speed of current?
 (a) 8 m/s (b) 6 m/s (c) 11 m/s
 (d) 12 m/s (e) None of these.
19. A man can row 60 km in downstream and 35 km in upstream in 9 hours. Also, he can row 49 km in upstream and 75 km in downstream in 12 hours. Find the rate of the current.
 (a) 6 kmph (b) 3 kmph (c) 7.5 kmph
 (d) 4 kmph (e) 2 kmph
20. Ratio between speed of boat in still water to speed of stream is 5 : 1. If boat travels 48 km upstream in 3 hours less than 144 km downstream, then find the speed of boat in still water?
 (a) 12 kmph (b) 24 kmph (c) 20 kmph
 (d) 16 kmph (e) 10 kmph
21. A boat can cover certain distance in upstream in 16 minutes and the same distance in still water in 12 minutes. Find the time taken by boat to cover same distance in downstream.
 (a) 8 minutes (b) 9.6 minutes (c) 10 minutes
 (d) 8.8 minutes (e) 9.4 minutes

22. A boat can cover 160 km downstream in half of the time in which it can cover the same distance upstream. If in three hours boat can cover 96 km downstream, then find the speed of stream?
 (a) 4 km/hr (b) 16 km/hr (c) 12 km/hr
 (d) 8 km/hr (e) None of these
23. Speed of boat in still water is 37.5% less than the speed of the boat in downstream and boat covers 30 km in upstream in 5 hours, then find time taken by boat to cover 84 km in downstream?
 (a) 3.5 hr (b) 3 hr (c) 4.5 hr
 (d) 4 hr (e) 5 hr
24. Difference between downstream and upstream speed of a boat is 6 km/h. Find the total time taken by boat to cover 30 km in upstream if it takes 7 hours to cover a distance of 20 km both in downstream and upstream?
 (a) $7\frac{1}{2}$ hr (b) 9 hr (c) 8 hr
 (d) 10 hr (e) None of these
25. To cover a certain distance D in downstream, slower boat took 50% more time than the faster boat. If speed of slower boat in still water is 40% less than that of faster boat in still water then find the ratio of speed of stream to that of faster boat in still water.
 (a) 1: 4 (b) 1: 5 (c) 2: 7
 (d) 1: 3 (e) 3: 8
26. Ratio of upstream speed to that of downstream speed is 3:5. If speed of boat in still water is 24 km/hr then in how much time boat will cover 36 km in upstream and 60 km in downstream together?
 (a) 4 hours (b) 5 hours (c) 3 hours
 (d) 6 hours (e) 4.5 hours
27. Ratio of speed of a boat in upstream to in downstream is 11 : 14. If boat travel 12 km in upstream and 28 km downstream in 2 hour, then find the speed of stream is what percent of speed of boat in downstream.
 (a) $11\frac{5}{7}\%$ (b) 12% (c) $13\frac{7}{11}\%$
 (d) 13% (e) $10\frac{5}{7}\%$
28. The time take by a boat in upstream is double than the time taken by it in downstream, but distance covered by it in upstream is only 75% of distance covered by it in downstream. Find the ratio of speed of boat in still water to speed of current.
 (a) 5 : 11 (b) 11 : 7 (c) 7 : 11
 (d) 11 : 3 (e) 11 : 5
29. If ratio between speed of boat in still water and speed of stream is 2 : 1 and difference between upstream and downstream speed is 8 km/hr, then find total time taken by boat to cover 48 km distance in downstream and 32 km distance in upstream?
 (a) 10 hours (b) 12 hours (c) 16 hours
 (d) 18 hours (e) 20 hours
30. A boat takes a total of 10 hours to cover 84 km in upstream & 84 km in downstream. If speed of boat in still water is 12 km/hr. more than speed of stream, then find total time taken by boat to cover 196 km in downstream and 132 km in upstream.
 (a) 20 hours (b) 18 hours (c) 22 hours
 (d) 28 hours (e) 26 hours

Level - 2

1. A boat takes 92 min less to travel a distance from A to B downstream than time taken by the same boat in upstream from B to C. if the distance between A and B is 6 km less than B and C, find the distance between A and B. Given that speed of the boat in still water is 24 kmph and speed of current is 6 kmph.
 (a) 54 km (b) 60 km (c) 50 km
 (d) 64 km (e) 75 km
2. Time taken by boat to cover 48 km in upstream is 200% of the time taken by boat to cover 48 km in downstream. If sum of time taken by boat to cover 48 km distance in upstream and same distance in downstream is 9 hours, then find speed of boat?
 (a) 8 km/hr (b) 10 km/hr (c) 12 km/hr
 (d) 4 km/hr (e) 6 km/hr
3. A boat can cover 144 km in downstream and 96 km in upstream in total 12 hours. If ratio of speed of boat in still water to speed of stream is 5 : 1, then find distance covered by boat in 5 hours in upstream is what percent more than distance covered by boat in 3 hours in downstream?
 (a) $9\frac{1}{11}\%$ (b) $16\frac{2}{3}\%$ (c) $11\frac{1}{9}\%$
 (d) 30% (e) 10%
4. Time taken by boat to cover D km in upstream is 4 hours more than the time taken by same boat to cover D km in downstream. Speed of boat in still water is 250% of speed of stream. If same boat covers 162km in upstream in 9 hours, then find the value of D.
 (a) 134 (b) 156 (c) 168
 (d) 189 (e) None of the above.

5. Speed of boat in downstream is twice the speed of boat in upstream, if boat cover 96 km in downstream and 72 km upstream in total 20 hours. Find still water speed of boat?

- (a) 6km/hr (b) 8km/hr (c) 7km/hr
(d) 9 km/hr (e) 12km/hr

Direction (6- 7):- Ratio of upstream and downstream speed of a boat (A) is 7 : 11 and boat cover 70 km upstream in 5 hours. Boat (B) takes 10 hours to cover 120 km in upstream. (speed of stream is same for both boat)

6. Find total time taken by boat B to cover 80 km in downstream & same distance in upstream?

- (a) $10\frac{2}{3}$ hours (b) $12\frac{2}{3}$ hours (c) $8\frac{2}{3}$ hours
(d) $10\frac{1}{3}$ hours (e) None of these

7. If speed of boat C in still water is 25% more than that of speed of boat B in still water, then find ratio of speed of boat A to speed of boat C in still water?

- (a) 7 : 10 (b) 9 : 11 (c) 9 : 8
(d) 8 : 9 (e) 9 : 10

8. A boat which takes 6 hr to travel 105 km in still water, goes 364 km in upstream and return back to the initial point. If rate of stream is $\frac{9}{26}$ th of upstream speed of boat, then find how much approximate time did it take in the entire journey?

- (a) 48 hrs (b) 40 hrs (c) 52 hrs
(d) 45 hrs (e) 56 hrs

9. The speed of a boat in still water is 15 kmph, rate of current is 3 kmph. While moving with the stream the boat covers 108 km, then find out how much distance can be covered in same time while moving against the stream?(in km)

- (a)76 (b)72 (c)70
(d)80 (e)96

10. Time taken by a boat to cover (D-11) km in upstream is 5 times of the time taken by boat to cover (D-21) km in downstream. If ratio of speed of current to speed of boat in downstream is 1 : 3 and boat can cover (D-8) km in upstream in 14 hours, then, find speed of boat in still water?

- (a) 6 kmph (b) 4 kmph (c) 8 kmph
(d) 5 kmph (e) 7 kmph

11. The ratio of speed of boat in still water to speed of stream is 11 : 1. If the boat takes 1 hour more to cover 220 km upstream than to cover same distance in still water. Then find the speed of boat in still water.

- (a) 22 km/hr (b) 18 km/hr (c) 15 km/hr
(d) 20 km/hr (e) 25 km/hr

12. A boat cover 11.2 km distance in downstream in 48 minutes. If ratio between speed of boat in still water to speed of stream is 3 : 1, then find in what time boat will cover 42 km of distance in downstream and in upstream?

- (a) 7 hours (b) 5 hours (c) 9 hours
(d) 10hours (e) 3 hours

13. A Boat is moving in downstream and speed of Boat in still water is 5 times speed of current. After 16 km due to technical problem speed of boat (in still water) reduced by 20 % and it cover 40 km distance with this speed. If average speed of whole journey is $\frac{7}{20}$ km/min, then find speed of current.

- (a) $4\frac{1}{8}$ km/hr (b) $2\frac{7}{10}$ km/hr (c) 4 km/hr
(d) 5 km/hr (e) $4\frac{3}{8}$ km/hr

14. Ratio of time taken to cover (A +5) km in downstream to that of time taken to cover (A - 7) km in upstream is 5:12.If ratio of speed of boat in upstream to that of stream is 2 : 3 and difference of time taken by the boat to travel (A-1) km in upstream and that of in downstream is 6 hr then find the speed of boat in still water?

- (a) 4.5 km/hr (b) 5.5 km/hr (c) 7.5 km/hr
(d) 4 km/hr (e) 6 km/hr

Directions (15-19): Read the given information carefully and answer the following questions.

A boat covers certain distance in three parts i.e. upstream, downstream and in still water. Ratio of distance covered in downstream to upstream is 7:3 and total distance covered is 375 km. When boat goes downstream it consume 25% less fuel per km while moving in upstream it consumes $12\frac{1}{2}$ % more fuel per km than that of in still water and it cover 175km in still water. Now, after reaching its destination, boat returns to initial point covering the same path and it takes $\frac{10}{3}$ lit more fuel in return journey.

15. If in return journey boat takes 5hr 30 min more to cover upstream than downstream and speed of boat in downstream is 40km/h, then find speed of boat in upstream?

- (a) 10 km/h (b) 15 km/h (c) 20 km/h
(d) 25 km/h (e) None of these.

16. How much fuel is consumed in covering downstream distance in whole journey? (approx.)

- (a) 15 lit (b) 17 lit (c) 18 lit
(d) 12 lit (e) 10 lit

17. Total Distance covered in still water is how much percent more or less than total distance covered in upstream in whole journey?

- (a) 50% (b) 100% (c) 150%
(d) 75% (e) 125%

- 18.** What is the rate of consumption of fuel of boat in upstream?
 (a) 7 km in 1 lit (b) 8 km in 1 lit (c) 10 km in 1 lit
 (d) 12 km in 1 lit (e) 9 km in 1 lit
- 19.** If fuel costs 81 rupee per liter, then find money spent on fuel to cover distance still water in return journey?
 (a) Rs. 1550 (b) Rs. 1575 (c) Rs. 1350
 (d) Rs. 1275 (e) Rs. 1250
- 20.** Speed of a boat in still water is 20 km/hr and speed of current is 4 km/hr, if time taken by boat to cover a distance of $(d - 40)$ km upstream is one hour more than the time taken by boat to cover a distance of $(d - 24)$ km in downstream, then find time taken by boat to cover a distance of $(d + 48)$ km in downstream and in upstream both?
 (a) 16.5 hours (b) 17 hours (c) 18 hours
 (d) 17.5 hours (e) 18.5 hours
- 21.** In a River there are two boats A and B, where boat A covers 240 km in downstream and boat B covers 240 km in upstream. Boat B takes equal time as boat A takes in covering the given distance. If sum of speed of boat A in still water and boat B in still water is 64 km/hr and speed of water current is 4 km/hr then find the speed of boat B in still water?
 (a) 32 km/hr (b) 36 km/hr (c) 40 km/hr
 (d) 42 km/hr (e) 48 km/hr
- 22.** Two banks are located on a river and are 28 km apart. Leaving one of the bank of the river for the other, a boat returns to the first bank of the river in 370 minutes, spending 40 min of that time in taking the passengers at the second bank of the river. Find the speed of the boat in still water if the speed of the river flow is 3 km/h?(in kmph)
 (a) 8 (b) 7 (c) 6
 (d) 9 (e) 11
- 23.** A boat covers $(D + 80)$ km in downstream and 'D' km upstream in total $13\frac{1}{3}$ hours. Sum of speed of the boat in upstream and downstream is 48 km/hr and speed of boat in still water is 300% more than speed of stream, Time taken by boat to cover $(D + 30)$ km in upstream.
 (a) $12\frac{1}{3}$ hours (b) $6\frac{1}{3}$ hours (c) $8\frac{1}{3}$ hours
 (d) $10\frac{1}{3}$ hours (e) None of these
- 24.** Upstream speed of boat is $33\frac{1}{3}\%$ less than downstream speed of boat and it covers 360 km in downstream in 'T' hours. When speed of boat in still water increased by 6 km/hr, the downstream distance covered by boat in same time 'T' is increased by 60 km. Find distance covered by boat in $(T - 2)$ hours in upstream?
 (a) 256 km (b) 192 km (c) 196 km
 (d) 200 km (e) None of these
- 25.** A boat goes certain distance downstream and then return $\frac{3}{4}$ th of the distance upstream. It takes $\frac{3}{2}$ of the time in upstream than in downstream. If boat increases its speed by $33\frac{1}{3}\%$ and cover a distance of 60 km in downstream and then return upstream in 16 hours, find increased speed of boat?
 (a) 6 km/hr (b) 14 km/hr (c) 16 km/hr
 (d) 12 km/hr (e) 8 km/hr
- 26.** A cruise ship X is 380 m long and travels at a speed of 32 kmph in still water. Another cruise ship Y which is 180 m long travels at 40 kmph in still water. The two ships pass each other traveling in opposite directions, in a region where the speed of current is 8m/s. How long (in seconds) will it take them to pass each other?
 (a) 42 sec (b) 28 sec (c) 35 sec
 (d) 24 sec (e) 21 sec
- 27.** A boat takes double times in covering same distance in upstream that of downstream, if boat cover 96 km in downstream and 72 upstream in total 20 hours. Find still water speed of boat ?
 (a) 6km/hr (b) 8km/hr (c) 7km/hr
 (d) 9 km/hr (e) 12km/hr
- 28.** Speed of motorboat in still water is 45 km/h. If the motorboat travels 80 km along the stream in 1 h 20 min, then the time taken by it to cover the same distance against the stream will be
 (a) 4 h 20 min (b) 3 h 40 min (c) 2 h 40 min
 (d) 2 h 55 min (e) None of these
- 29.** Speed of boat in still water is 5 km/h. While river is flowing with a speed of 2 km/h and time taken to cover a certain distance upstream is 2 h more than time taken to cover the same distance downstream. Find the distance?
 (a) 10.5 km (b) 11 km (c) 10.9 km
 (d) 15 km (e) None of the above
- 30.** A man can row at 10 km/h in still water. If he takes total 5 h to go to a place 24 km away and return, then the speed of the water current is -
 (a) 2 km/h (b) 3 km/h (c) $\frac{1}{2}$ km/h
 (d) 1 km/h (e) None of these
- 31.** A steamer goes downstream from one port to another in 4 h. It covers the same distance upstream in 5 h. If the speed of the stream is 2 km/h, then find the distance between the two ports.
 (a) 50 km (b) 60 km (c) 70 km
 (d) 80 km (e) None of these

Mains Questions

1. If sum of upstream and downstream speed of boat is 72 km/hr. and if the boat travels 105 km upstream in 3 hours 30 min. then find the time taken to travel 126 km downstream
 (a) 3 hours (b) 3 hours 20 min
 (c) 2 hours (d) 2 hours 32 min
 (e) None of these
2. A boat goes a certain distance downstream and then returns and covers 40% of distance covered in downstream. Ratio of time taken in covering downstream and upstream distances is 3 : 2. If speed of boat in still water is reduced by 50% then it covers 60 km downstream in 10 hours. Find the speed of boat in still water.
 (a) 9 km/hr (b) 8 km/hr (c) 6 km/hr
 (d) 10 km/hr (e) 12 km/hr
3. A boat goes 28 km downstream to a certain point and while on returning from that point it covered only 75% of distance covered in downstream. If boat takes 3 hr more to cover distance in upstream than distance covered in downstream then find the speed of boat in still water (km/hr) if speed of current is $\frac{5}{9}$ m/sec?
 (a) 3 km/hr (b) 4 km/hr
 (c) 5 km/hr (d) 6 km/hr
 (e) 7 km/hr
4. A boat goes 28 km upstream and while in returning downstream it covered 25% more distance than distance covered in upstream. If boat takes $4\frac{1}{2}$ hr more to cover upstream than downstream. Find the speed of current (in km/hr), if speed of boat in still water is $2\frac{1}{2}$ m/s?
 (a) 6 km/hr (b) 5 km/hr (c) 3 km/hr
 (d) 2 km/hr (e) 7 km/hr
5. A man can swim at the rate of 12 km/hr in still water and rate of flow of river is 4 km/hr. A wooden log started to flow with the speed of river and man also started to swim downstream from same place and at same time. Man after covering 100 km downstream, returns and started to swim upstream. Man meet the wooden log at a distance of x from starting point. Find x.
 (a) 50 km (b) 60 km (c) 80 km
 (d) 85 km (e) 90 km
6. A motorboat went downstream for 28 km and immediately returned. It took the boat twice as long to make the return trip. If the speed of the river flow were twice, the journey in downstream and back would take 672 minutes. Find the speed of the boat in still water and the speed of the river flow.

- (a) 9 km/hr, 3 km/hr
- (b) 9 km/hr, 6 km/hr
- (c) 8 km/hr, 2 km/hr
- (d) 12 km/hr, 3 km/hr
- (e) None of these

Directions (7-8): The ratio of time taken by Hunny and Bunny to swim a certain distance downstream in a river is 3 : 4 respectively. The time taken by Bunny to cover a certain distance upstream is 50% more than the time taken by him to cover the same distance downstream.

7. What is the ratio of speed of Hunny to that of Bunny?
 (a) 7 : 5 (b) 7 : 9 (c) 2 : 5
 (d) 6 : 7 (e) None of these
8. Both of them hired a boat that runs with a speed equal to the sum of their individual speeds. If Hunny can cover a straight path in still water of length 14 km in 60 minutes, then find the time taken by both of them to travel a distance of 48 km to and fro by the hired boat?
 (a) $5\frac{4}{143}$ hr. (b) $2\frac{4}{143}$ hr. (c) $3\frac{4}{143}$ hr.
 (d) $4\frac{4}{143}$ hr. (e) none of these

Directions (9-10): Ramesh and Suresh decided to meet at a common point at the same time in the river. Ramesh had to travel 42 km upstream in the river and Suresh had to travel $35\frac{5}{7}\%$ less distance downstream than that of Ramesh to meet at a common point. They both sets off in their respective boats at the same time and speed of Ramesh's boat is 20 km/hr more than the speed of Suresh boat. It is given that Suresh covers 280 km upstream in 35 hours.

9. Find the speed of stream of river?
 (a) 6 km/hr (b) 8 km/hr (c) 5 km/hr
 (d) 10 km/hr (e) 4 km/hr
10. After meeting, if they decided to return to their original places but Ramesh travelled for 19 km and Suresh travelled for 16 km, then what is the sum of time taken by both in covering these distances?
 (a) 150 min (b) 120 min (c) 180 min
 (d) 90 min (e) 60 min
11. A river flows from city X to city Z and city Y lies exactly in the middle of city X and Z. A person travelled from city X to Y by boat and from city Y to Z by bus. The speed of boat in still water is 5 times the speed of stream of the river. Next day, he returned to city X from Z by bus and took 1 hour less than the previous day. If he had travelled the whole distance by boat on the second, he would have taken 12 hours. What is ratio of

speed of bus to the speed of boat in still water? (Assume all the speeds to be constant on both the days)

- (a) 8 : 5 (b) 5 : 8 (c) 5 : 3
(d) 3 : 5 (e) Cannot be determined

12. A motorboat travelling at some speed, can cover 25 km upstream and 39 km downstream in 8 h. At the same speed, it can travel 35 km upstream and 52 km downstream in 11 h. The speed of the stream is:

- (a) 2 km/h (b) 3 km/h (c) 4 km/h
(d) 5 km/h (e) None of these

13. A man can row a boat at a speed of 8 kmph in still water. He was rowing the boat downstream from one point to another. After travelling half of the distance the motor of the boat failed and stopped working. He travelled on the boat along the stream and reached his destination taking six hours more than the usual time. The speed of the stream is 2 kmph. What is the distance between the two points?

- (a) 20 km/h (b) 30 km/h (c) 24 km/h
(d) 28 km/h (e) None of these

14. A, B and C are situated at the bank of river which is flowing at a constant rate. B is at an equal distance with A and C. A swimmer Avinash takes 10 h to swim from A to B and B to A. Also, he takes 8 h to swim from A to C in downstream. What is the ratio of speed of Avinash in still water and speed of stream?

- (a) 5 : 4 (b) 3 : 5 (c) 2 : 5
(d) 1 : 2 (e) None of these

15. A river is flowing at a speed of 5 km/h in a particular direction. A man, who can swim at a speed of 20 km/h in still water, starts swimming along the direction of flow of the river from point A and reaches another point B which is at a distance of 30 km from the starting point A. On reaching point B, the man turns back and starts swimming against the direction of flow of the river and stops after reaching point A. The total time taken by the man to complete his journey is

- (a) 2 h 30 min (b) 3 h 12 min (c) 3 h 30 min
(d) 3 h 45 min (e) None of these

Previous Year Question

1. The ratio of speed of boat in still water to speed of stream is 8 : 1. It takes 4 hours by boat to cover 54 km in downstream & 42 km in upstream. Find the downstream speed of boat.

- (a) 25 kmph (b) 24 kmph (c) 21 kmph
(d) 27 kmph (e) 23 kmph

IBPS PO Prelims 2019

2. Time taken by a boat to cover 162 km each in downstream and in upstream is 14 hours and 24 minutes. If speed of stream is 6 km/hr., then find the time taken by boat to cover 240 km in upstream.

- (a) $7\frac{1}{3}$ hours (b) $18\frac{2}{3}$ hours (c) $9\frac{1}{3}$ hours
(d) $16\frac{2}{3}$ hours (e) $13\frac{1}{3}$ hours

IBPS Clerk Prelims 2019

3. A boat takes 4 hrs to cover 'D' km in upstream and takes 3 hours to cover 'D-2' km in downstream. If speed of stream is 2 kmph, then find distance covered by boat in upstream in 3 hrs.

- (a) 44 km (b) 48 km (c) 42 km
(d) 56 km (e) 54 km

IBPS Clerk Mains 2019

4. Difference of speed of boat in downstream and upstream is 7km/hr and the time taken by the boat to travel 45 km in downstream is 80 minutes more than the time taken to travel 13 km in upstream. Due to cyclone, speed of current becomes twice and thus it

can cover D km in upstream in time which is equal to new speed of current. Find D? (**Note:** speed of boat in still water is multiple of 5)

- (a) 30 (b) 24 (c) 18
(d) 21 (e) 27

IBPS Clerk Mains 2019

5. If a boat travels 18 km more in downstream than in upstream in 3 hr. and if the speed of the Boat in still water is 20 km/hr. find the distance travelled by boat in downstream in 4 hr. ?

- (a) 86 (b) 92 (c) 68
(d) 96 (e) None of these

IBPS RRB PO Prelims 2019

6. A boat covers 36 km in upstream in 2 hours and 66 km in downstream in 3 hours. Find the speed of boat in still water?

- (a) 21km/h (b) 19 km/h (c) 20.5 km/h
(d) $20\frac{\text{km}}{\text{h}}$ (e) $19.5\frac{\text{km}}{\text{h}}$

RRB Clerk Prelims 2019

7. Speed of boat in still water is 37.5% less than the speed of the boat in downstream and boat covers 30 km in upstream in 5 hours, then find time taken by boat to cover 84 km in downstream?

- (a) 3.5 hr (b) 3 hr (c) 4.5 hr
(d) 4 hr (e) 5 hr

RRB Clerk Mains 2019

8. The time take by a boat in upstream is double than the time taken by it in downstream, but distance covered by it in upstream is only 75% of distance covered by it in downstream. Find the ratio of speed of boat in still water to speed of current.

- (a) 5 : 11 (b) 11 : 7 (c) 7 : 11
(d) 11 : 3 (e) 11 : 5

SBI PO Prelims 2020

9. A boat can cover 28 km downstream in 42 min. ratio of speed of boat in still water to speed of stream is 7 : 3. Find difference between time taken by boat to cover 60 km downstream & 40 km upstream.

- (a) 2.25 hr (b) 1 hr (c) 1.5 hr
(d) 0.4 hr (e) 0.9 hr

SBI Clerk Prelims 2020

10. Speed of a boat in still water is 12 kmph and speed of stream is 'x' kmph. If in traveling 270 km upstream boat takes $66\frac{2}{3}\%$ more time than traveling 270 km downstream, then find the value of 'x'.

- (a) 2 kmph (b) 4 kmph (c) 1 kmph
(d) 3 kmph (e) 6 kmph

IBPS PO Prelims 2020

11. The downstream speed of a boat is 5 km/hr more than its upstream speed and the ratio of the speed of the boat in still water to the speed of the stream is 19: 5. Find the total time taken by boat to travel 42 km downstream and 31.5 km upstream?

- (a) 7 $\frac{1}{2}$ hr (b) 8 hr (c) 9 hr
(d) 9 $\frac{1}{2}$ hr (e) 10 hr

IBPS Clerk Prelims 2020

12. Speed of boat in still water is six times of speed of stream. If boat covers 210 km in upstream in 7 hours, then find the downstream speed of boat?

- (a) 42 km/hr. (b) 36 km/hr. (c) 30 km/hr.
(d) 32 km/hr. (e) 24 km/hr.

IBPS RRB PO Prelims 2020

13. The upstream speed and downstream speed of a boat is 10 kmph and 14 kmph respectively and boat travelled for T hours & 6 hours in upstream and downstream respectively. If the distance travelled in downstream is 44 km more than upstream, then find the value of 'T'

- (a) 4 (b) 3
(c) 6 (d) 5 (e) 8

RRB Clerk Prelims 2020

14. Difference between downstream speed and upstream speed is 4 kmph. If speed of boat in still water is 7 times the speed of current, then what is the time taken by the boat to cover 48 km in downstream?

- (a) 6 hours (b) 5 hours (c) 4 hours
(d) 2 hours (e) 3 hours

RBI Assistant Prelims 2020

15. Ratio of speed of boat in still water to the speed of current is 10:1. Ratio of time taken by the boat to cover D km in downstream to the time taken by the boat to cover (D-45) km in upstream is 3:2. Then find the value of D?

- (a) 60 km (b) 87 km (c) 99 km
(d) 108 km (e) 90 km

SBI PO Prelims 2019

16. Find the total distance covered by boat in each upstream and downstream in 7 hours if the speed of boat in still water and speed of current is 21 km/h and 3 km/h respectively?

- (a) 280 km (b) 294 km (c) 315 km
(d) 301 km (e) 322 km

SBI Clerk Prelims 2019

17. The current of a stream runs at the rate of 4 km in an hour. A boat goes 6 km and comes back to the starting point in 2 h. The speed of the boat in still water is:

- (a) 6km/h (b) 8km/h (c) 7.5km/h
(d) 6.8km/h (e) None of these

18. A man can row 15 km/h downstream and 9 km/h upstream. The speed of the boat in still water is:

- (a) 8km/h (b) 10km/h (c) 15km/h
(d) 12km/h (e) None of these

19. A boat running downstream covers a distance of 20 km in 2 h while it covers the same distance upstream in 5h. Then, speed of the boat in still water is :

- (a) 7km/h (b) 8km/h (c) 9km/h
(d) 10km/h (e) None of these

20. In a fixed time, a boy swims double the distance along the current that he swims against the current. If the speed of the current is 3 km/h, then find the rate of swimming in still water ?

- (a) 6km/h (b) 9km/h (c) 10km/h
(d) 12km/h (e) None of these

21. A boat goes 20 km downstream in 1 h and the same distance upstream in 2h. The speed of the boat in still water is :

- (a) 15km/h (b) 10km/h (c) 5km/h
(d) 7.5km/h (e) None of these

22. A man can row 30km downstream and return in a total of 8 h. If the speed of the boat in still water is 4 times the speed of the current, then speed of the current is :

- (a) 1km/h (b) 2km/h (c) 4km/h
(d) 3km/h (e) None of these

Solutions

Basic Questions

1. (a): Let speed of boat in still water = x

$$\text{Then, } \frac{14}{x-4} = \frac{42}{60} \Rightarrow x = 24 \text{ km/h}$$

2. (b): Let the speed of the stream is y km/h.

$$\text{Then, } y + 7 = 10 \Rightarrow y = 3 \text{ km/h}$$

3. (c): Let speed of boat = x km/h

Speed of stream = y km/h

$$\text{Then, } x + y = 10 \Rightarrow x - y = 6$$

$$\Rightarrow 2x = 16 \Rightarrow x = 8 \text{ km/h}$$

4. (d): Speed of the man upstream (v) = $12 - 4 = 8$ km/h

5. (b): Let speed of boat in still water = x km/hr

Speed of stream = y km/hr

$$x + y = 14 \Rightarrow x - y = 6 \Rightarrow 2x = 20$$

$$\Rightarrow x = 10 \text{ km/h}$$

6. (b): Let speed of boat in still water = x

Speed of stream = y

$$\frac{20}{x+y} = 5 \Rightarrow x + y = 4 \quad \dots (1)$$

$$\frac{10}{x-y} = 5 \Rightarrow x - y = 2 \quad \dots (2)$$

From (1) and (2), $2x = 6$ $\therefore x = 3$

$$y = 1 \text{ km/h}$$

7. (c): Let speed of boat in still water = x

$$\text{From question, Given } y = \frac{1}{4}x$$

$$\text{Then } \frac{18}{x - \frac{x}{4}} = 6 \Rightarrow 3 = \frac{3x}{4} \Rightarrow x = 4$$

Then the time it take to cover the same distance

$$\text{downstream} = \frac{18}{4+1} = \frac{18}{5} = 3.6 \text{ hr.}$$

8. (b): Let the speed of boat = x

Speed of stream = y

$$x + y = 8 \text{ km/h } \text{ \& } x - y = 4 \text{ km}$$

$$2x = 12 \Rightarrow x = 6 \text{ \& } y = 2 \text{ km/h}$$

9. (c): Given $x = 4$ km/h $y = 2$ km/h

$$\text{Upstream rate} = 4 - 2 = 2 \text{ km/h}$$

10. (a): Given $x = 9$, $y = 6$

$$\text{Then downstream speed of the swimmer} \\ = 9 + 6 = 15 \text{ km/h}$$

Prelims Solutions

Level - 1

1. (b): Let the distance covered by man between two places is 'D'

Atq.

$$7 = \frac{D}{16} + \frac{D}{12}$$

$$7 = D \left[\frac{3+4}{48} \right]$$

$$D = 48 \text{ km}$$

2. (a): Let speed of stream be x km/hr.

So, speed of boat in still water = $6x$ km/hr.

ATQ,

$$\frac{105}{7} = (6x - x)$$

$$\Rightarrow 5x = 15$$

$$x = 3$$

So, required speed = $6x$

$$= 18 \text{ km/hr.}$$

3. (e): Let the boat speed in still water be 'b' kmph and speed of stream be 'c' kmph.

Then downstream speed = $(b + c)$ kmph

Upstream speed = $(b - c)$ kmph

ATQ

$$\frac{10}{b+c} = \frac{5}{6}$$

$$b + c = 12 \dots (i)$$

$$\text{Again } \frac{12}{b-c} = \frac{3}{2}$$

$$(b - c) = 8 \dots \dots (ii)$$

On solving above equation we get

$$b = 10 \text{ kmph}$$

$$c = 2 \text{ kmph}$$

4. (a): Let speed of boat in still water be 'x km/hr.' and speed of stream be 'y km/hr.'

ATQ,

$$(x + y) + (x - y) = 40$$

$$\Rightarrow x = 20 \text{ km/hr.}$$

Now,

$$\frac{60}{(20+y)} + \frac{60}{(20-y)} = 6 + \frac{2}{5}$$

$$\frac{1200 - 60y + 1200 + 60y}{400 - y^2} = \frac{32}{5}$$

$$\Rightarrow 12000 = 12800 - 32y^2 \Rightarrow y^2 = 25$$

$$y = 5 \text{ km/hr.}$$

5. (e): Let speed of stream be u km/hr

According to the question,

$$\frac{54}{15+u} + \frac{54}{15-u} = 7.5$$

$$\frac{18}{15+u} + \frac{18}{15-u} = \frac{5}{2}$$

$$\frac{18(15-u+15+u)}{(15+u)(15-u)} = \frac{5}{2}$$

$$216 = 225 - u^2$$

$$u^2 = 9$$

$$u = 3 \text{ km/hr}$$

Time required to travel 48 km in upstream = $\frac{48}{15-3} = \frac{48}{12} = 4$ hrs

6. (a): speed of boat in upstream = $36 \times \frac{5}{18} = 10$ m/s

Speed of boat in still water = $10 \times \frac{300}{100} = 30$ m/s

Speed of current = $30 - 10 = 20$ m/s

Speed of boat in downstream = $20 + 30 = 50$ m/s

Required time = $\frac{800}{50} = 16$ sec.

7. (c): let speed of stream be x km/hr

Speed of boat in still water = $4x$ km/hr

$$\frac{220}{4x+x} + \frac{108}{4x-x} = 20$$

$$\frac{220}{5x} + \frac{108}{3x} = 20$$

$$\frac{44}{x} + \frac{36}{x} = 20$$

$$\frac{80}{x} = 20$$

$$x = 4 \text{ km/hr}$$

Speed of stream = 4 km/hr

Speed of boat in still water = $4x = 16$ km/hr

Reqd. sum = $\frac{40}{20} + \frac{48}{12} = 2 + 4 = 6$ hrs

8. (d): Speed of boat in still water = $\frac{25}{9} \times \frac{18}{5} = 10$ km/hr

Let speed of stream be x km/hr

$$\text{So, } \frac{65}{10-x} - \frac{60}{10+x} = 9$$

$$65(10+x) - 60(10-x) = 9(100-x^2)$$

$$650 + 65x - 600 + 60x = 900 - 9x^2$$

$$125x + 50 = 900 - 9x^2$$

$$9x^2 + 125x - 850 = 0$$

$$9x^2 + 170x - 45x - 850 = 0$$

$$x(9x+170) - 5(9x+170)$$

$$\Rightarrow x = 5 \text{ km/h}$$

9. (b): Downstream speed = $\frac{36}{4} = 9$ km/hr

Speed of the current = $\frac{1}{3} \times 9 = 3$ km/hr

Speed of the boat = $9 - 3 = 6$ km/hr

Now, Upstream speed = $6 - 3 = 3$ km/hr

Total time taken = $\frac{78}{3} = 26$ hr

10. (e): Let speed of boat in still water = B km/h

Let speed of stream = W km/h

Atq,

$$\frac{36}{B-W} - \frac{48}{B+W} = \frac{3}{2}$$

$$\Rightarrow \frac{12}{B-W} - \frac{16}{B+W} = \frac{1}{2}$$

$$\Rightarrow 24(B+W) - 32(B-W) = B^2 - W^2$$

$$\Rightarrow 56W - 8B = B^2 - W^2$$

So, ratio of $B : W$ can't be determined

11. (c): Let speed of the boat in still water and speed of the current be x km/hr and y km/hr respectively.

ATQ

$$\frac{30}{x-y} + \frac{45}{x+y} = 13 \dots \dots (i)$$

$$\frac{24}{x-y} + \frac{30}{x+y} = 10 \dots \dots (ii)$$

By equating (i) and (ii)

$$\frac{300}{x-y} + \frac{450}{x+y} = \frac{312}{x-y} + \frac{390}{x+y}$$

$$\frac{60}{x+y} = \frac{12}{x-y}$$

$$\frac{x}{y} = \frac{3}{2}$$

Let $x = 3a$ and $y = 2a$

$$\text{Now, } \frac{30}{3a-2a} + \frac{45}{3a+2a} = 13$$

$$\frac{30}{a} + \frac{45}{5a} = 13$$

$$a = 3$$

\therefore speed of the current = 6 km/hr

12. (d): Suppose speed of the stream = x km/h

Speed of the boat in still water = 10 km/h

\therefore Boat will travel with the stream (downstream)

at $(10+x)$ km/h and boat will travel against the

stream (upstream) at $(10-x)$ km/h.

Now, from the question,

$$\frac{36}{10+x} + \frac{90}{60} = \frac{36}{10-x}$$

$$\Rightarrow x = 2 \text{ km/h}$$

13. (b): Let speed of current be x kmph

ATQ,

$$\frac{10.8}{(21-x)} = \frac{36}{60}$$

$$\Rightarrow x = 3 \text{ kmph}$$

Now, downstream speed = $21 + 3 = 24$ kmph

Total time taken = $\frac{60}{24}$

= 2 hours 30 minutes

14. (e): Let x be the speed of current.

$$\text{ATQ, } \frac{48}{9+x} + \frac{36}{9-x} = 10$$

$$\Rightarrow 48(9-x) + 36(9+x) = 10(81-x^2)$$

$$\Rightarrow 10x^2 - 12x - 54 = 0$$

$$\Rightarrow x = 3, \frac{-9}{5}$$

So, speed of current = 3 kmph

Required time taken = $\frac{60}{9+3} = 5$ hours

- 15. (d):** Let the upstream speed of the boat = u
 And let downstream speed of the boat = d
 Also, let the speed of the boat in still water be b
 Now $\frac{36}{u} + \frac{55}{d} = 11$... (i)
 Also
 $\frac{48}{u} + \frac{77}{d} = 15$... (ii)
 Solving eqn. (i) and (ii)
 $d = 11$
 $u = 6$
 $\therefore b = \frac{u+d}{2} = \frac{11+6}{2} = 8.5$ kmph
- 16. (e):** Let speed of stream = x km/h
 Speed of stream = $\frac{2}{6-x} = \frac{1}{2}$
 Speed of stream = 2 km/h
 Speed in downward = 8 km/h
 Distance cover in downward
 $= 8 \times \frac{7}{5} = 11.2$ km
- 17. (c):** Required time = $\frac{\frac{1}{5} \times 550}{(12-10)} + \frac{\frac{4}{5} \times 550}{(12+10)}$
 $= \frac{110}{2} + \frac{440}{22}$
 $= 55 + 20$
 $= 75$ sec
 Or, 1 min 15 sec
- 18. (b):** let speed of stream and speed of Manoj in still water are x m/s and y m/s respectively.
 ATQ
 $(y + x)12 - (y - x)12 = 144$
 $24x = 144$
 $x = 6 \frac{m}{s}$
- 19. (d):** Let speed of boat in still water and speed of current be x km/hr and y km/hr respectively.
 ATQ,
 $9 = \frac{60}{x+y} + \frac{35}{x-y}$ (i)
 $12 = \frac{75}{x+y} + \frac{49}{x-y}$ (ii)
 From (i) and (ii)
 $x + y = 15$
 $\& x - y = 7$
 \therefore speed of current = 4 kmph
- 20. (c):** Let the speed of boat in still water = $5x$ kmph
 Speed of stream = x kmph
 ATQ,
 $\frac{144}{5x+x} - \frac{48}{5x-x} = 3$
 $\frac{144}{6x} - \frac{48}{4x} = 3$
 $24 - 12 = 3x$
 $x = 4$
 Speed of boat in still water = $5x = 5 \times 4 = 20$ kmph

- 21. (b):** Let speed of boat in still water = x km/min
 Speed of stream = y km/min
 And distance = D km
 ATQ,
 $(x - y)16 = 12x$
 $x = 4y$
 Let Required time be 'T' min

 ATQ,
 $12x = T(x + y)$
 $T = \frac{48y}{5y} = 9.6$ minutes
- 22. (d):** Let speed of boat be ' x ' km/hr and speed of stream ' y ' km/hr
 ATQ -
 $\frac{160}{x-y} = 2 \times \frac{160}{x+y}$
 $x + y = 2x - 2y$
 $x = 3y$
 And, $\frac{96}{3} = x + y$
 $32 = x + y$
 $4y = 32$
 $y = 8$ km/hr
- 23. (a):** Let the speed of boat in downstream be $8x$ km/hr
 Then speed of boat in still water = $5x$ km/hr
 Speed of boat in upstream = $5x - (8x - 5x) = 2x$ km/hr
 ATQ
 $\frac{30}{5} = 2x$
 $x = 3$
 Required time = $\frac{84}{24} = 3.5$ hrs.
- 24. (a):** Let upstream speed of the boat be x km/h
 Then downstream speed of the boat = $(x+6)$ km/h
 ATQ
 $\frac{20}{x} + \frac{20}{x+6} = 7$
 $x = 4$
 Required time = 7.5 hr
- 25. (b):** Let speed of faster boat in still water = $5x$ km/h
 Speed of slower boat in still water = $\frac{5x \times 60}{100} = 3x$ km/h
 Speed of stream be y km/h
 Time taken by faster boat be t hour
 ATQ,
 $(5x + y) \times t = (3x + y) \times \frac{3}{2}t$
 $10x + 2y = 9x + 3y$
 $x = y$
 required ratio = 1:5

26. (a): Let upstream speed = $3x$ km/hr and
Downstream speed = $5x$ km/hr
ATQ,
Speed of boat = $\frac{5x+3x}{2} = 4x$
 $4x=24$
 $x=6$
Upstream speed = $3 \times 6 = 18$ kmph
Downstream speed = $5 \times 6 = 30$ kmph
Required time = $\frac{36}{18} + \frac{60}{30}$
 $=2+2 = 4$ hours

27. (e): Let Speed of boat in upstream and in downstream be $11x$ kmph and $14x$ kmph respectively speed of boat in still water $\rightarrow \frac{11x+14x}{2} = 12.5x$ kmph
Speed of stream = $1.5x$ kmph
Required % = $\frac{1.5x}{14x} \times 100 = 10\frac{5}{7}\%$

28. (e): Let still water speed of boat is x km/hr and speed of current y km/hr
ATQ—
Let d be the distance covered by boat in downstream.
 $\frac{\frac{3d}{4}}{(x-y)} = 2 \frac{d}{(x+y)}$
 $\frac{x}{y} = \frac{11}{5}$
 $x : y = 11 : 5$

29. (b): Let speed of boat in still water and speed of stream be $2a$ km/hr & a km/hr respectively
ATQ –
 $(2a + a) - (2a - a) = 8$
 $2a = 8$
 $a = 4$ km/hr
Downstream speed = $(2 \times 4 + 4) = 12$ km/hr
Upstream speed = $(2 \times 4 - 4) = 4$ km/hr
Required time = $\frac{48}{12} + \frac{32}{4} = 12$ hours

30. (b): Let speed of stream be ' x km/hr.'
So, speed of boat in still water = $(x + 12)$ km/hr.
Atq,
 $\frac{84}{(x+x+12)} + \frac{84}{(x+12-x)} = 10$
 $\frac{84}{(2x+12)} + \frac{84}{12} = 10$
 $\frac{42}{x+6} = 3$
 $x + 6 = 14$
 $x = 8$
Required time = $\frac{196}{(x+x+12)} + \frac{132}{(x+12-x)}$
 $= \frac{196}{28} + 11$
 $= 7 + 11$
 $= 18$ hrs.

Level - 2

1. (a): let distance between A and B = D km
So, distance between B and C = $D + 6$ km
ATQ
 $\frac{92}{60} = \frac{D+6}{(24-6)} - \frac{D}{(24+6)}$
 $\frac{92}{60} = \frac{D+6}{18} - \frac{D}{30}$
 $138 = 2D + 30$
 $D = 54$ km

2. (c): Let speed of boat and stream be ' x ' & ' y ' km/hr respectively.
And let time taken by boat to cover 48 km in downstream be ' t ' hours.
So, time taken by boat to cover 48 km in upstream = $2t$ hours.
ATQ,
 $t + 2t = 9$
 $\Rightarrow t = 3$ hours.
Now,
 $\frac{48}{x+y} = t$
 $\frac{48}{x+y} = 3$
 $x + y = 16$... (i)

And,
 $\frac{48}{x-y} = 2t$
 $\frac{48}{x-y} = 6$
 $\Rightarrow x - y = 8$... (ii)
On solving (i) and (ii), we get:
 $x = 12$ km/hr.

3. (c): Let speed of boat and speed of stream be $5s$ and s respectively
ATQ –
 $\frac{144}{5s+s} + \frac{96}{5s-s} = 12$
 $\frac{24}{s} + \frac{24}{s} = 12$
 $12s = 48$
 $S = 4$ km/hr
Speed of boat = $4 \times 5 = 20$ km/hr
Total distance covered by boat in 5 hours in upstream = $(20 - 4) \times 5 = 80$ km
Total distance covered by boat in 3 hours in downstream = $(20 + 4) \times 3 = 72$ km
Required percentage = $\frac{80-72}{72} \times 100 = 11\frac{1}{9}\%$

4. (e): Let speed of stream be $2x$ km/hr.
 So, speed of boat in still water = $2x \times \frac{250}{100} = 5x$ km/hr.
 ATQ,
 $\frac{162}{5x - 2x} = 9$
 $\Rightarrow 3x = 18$
 $x = 6$... (i)
 Now,
 $\frac{D}{(5x - 2x)} - \frac{D}{(5x + 2x)} = 4$
 $\frac{D}{3x} - \frac{D}{7x} = 4$... (ii)
 Put value of (i) in (ii):
 $\frac{D}{18} - \frac{D}{42} = 4$
 $\frac{7D - 3D}{126} = 4$
 $\Rightarrow D = 126$ km

5. (d): Let still water speed of boat be x km/hr and speed of current be y km/hr
 ATQ—
 $(x + y) = 2(x - y)$
 $x = 3y$
 ATQ—
 $\frac{96}{(3y + y)} + \frac{72}{(3y - y)} = 20$
 $\frac{96 + 144}{4y} = 20$
 $y = \frac{240}{80}$
 $y = 3$ km/hr
 $x = 3 \times 3 = 9$ km/hr

Solutions (6 - 7):

For boat A

Upstream speed = $\frac{70}{5} = 14$ km/h
 Downstream speed = $\frac{14}{7} \times 11 = 22$ km/h
 Speed in still water = $\frac{14 + 22}{2} = 18$ km/h
 Speed of stream = $\frac{22 - 14}{2} = 4$ km/h

For boat B

Upstream speed = $\frac{120}{10} = 12$ km/h
 Downstream speed = $12 + 2 \times 4 = 20$ km/h
 Speed in still water = $\frac{12 + 20}{2} = 16$ km/h

6. (a): Required time = $\frac{80}{20} + \frac{80}{12}$
 $= 4 + \frac{20}{3}$
 $= 10\frac{2}{3}$ hours
7. (e): Speed of boat C in still water = $16 \times \frac{5}{4} = 20$ km/hr
 Required ratio = $\frac{18}{20} = 9 : 10$
8. (d): In still water, the speed of boat = $\frac{105}{6} = 17.5$ km/hr.
 And let the rate of stream be V km/hr
 According to the question,

$$\frac{V}{(17.5 - V)} = \frac{9}{26}$$

$$26V = 157.5 - 9V$$

$$35V = 157.5$$

$$V = 4.5 \text{ km/hr}$$

Total time taken to travel 364 km roundtrip

$$= \frac{364}{(17.5 - 4.5)} + \frac{364}{(17.5 + 4.5)}$$

$$= \frac{364}{13} + \frac{364}{22}$$

$$= 44.54 \text{ hrs}$$

$$= 45 \text{ hrs. (approx.)}$$

9. (b): Given upstream and downstream speed of boat is 12 kmph and 18 kmph.
 Time taken by boat while moving with the stream = $\frac{108}{18} = 6$ hrs.
 Distance covered in same time while moving against the stream = $(12 \times 6) = 72$ km

10. (b): Let speed of boat in still water = x kmph
 And speed of current = y kmph
 \therefore upstream speed = $(x - y)$ kmph
 Downstream speed = $(x + y)$ kmph
 ATQ,
 $\frac{D - 11}{x - y} = \frac{5(D - 21)}{x + y}$... (i) [using time = $\frac{\text{Distance}}{\text{Speed}}$]

Also,
 $\frac{y}{x + y} = \frac{1}{3}$
 $\Rightarrow x + y = 3y$
 $\Rightarrow x = 2y$... (ii)

From (i) & (ii)
 $\frac{D - 11}{2y - y} = \frac{5(D - 21)}{2y + y}$
 $D - 11 = \frac{5(D - 21)}{3}$
 $3D - 33 = 5D - 105$
 $2D = 72$
 $D = 36$ km

Also,
 $\frac{D - 8}{x - y} = 14$ [using time = $\frac{\text{Distance}}{\text{speed}}$]
 $\frac{36 - 8}{2y - y} = 14$
 $y = \frac{28}{14} = 2$ kmph
 Speed of boat in still water = $x = 2y$
 $= 2 \times 2 = 4$ kmph

11. (a): Let speed of boat in still water = $11x$
 Speed of stream = x
 Now ATQ,
 $\frac{220}{(11x - x)} - \frac{220}{11x} = 1$
 $\frac{220}{10x} - \frac{220}{11x} = 1$
 $\frac{1}{x}(22 - 20) = 1$
 $x = 2$
 So speed of boat in still water = $11 \times 2 = 22$ km/hr

12. (c): Downstream speed of boat = $11.2 \times \frac{60}{48} = 14 \text{ km/hr}$
 Speed of boat = $14 \times \frac{3}{4} = 10.5 \text{ km/hr}$
 Speed of current = $14 \times \frac{1}{4} = 3.5 \text{ km/hr}$
 Required time = $\frac{42}{(10.5+3.5)} + \frac{42}{(10.5-3.5)}$
 = 3 + 6
 = 9 hours

13. (c): Let speed of current be C km/hr
 So, speed of Boat in still water = 5C km/hr
 After technical problem, speed of Boat (in still water) = $5C \times \frac{4}{5} = 4C$
 ATQ
 $\Rightarrow \frac{16}{5C+C} + \frac{40}{4C+C} = \frac{56}{\frac{7}{20} \times 60}$
 $\Rightarrow \frac{16}{6C} + \frac{40}{5C} = \frac{56}{21}$
 $\Rightarrow C = 4 \text{ km/hr.}$

14. (c): Let upstream speed be 2x km/hr & speed of stream be 3x km/hr
 Then downstream speed = 8x km/hr
 ATQ
 $\frac{\frac{(A+5)}{8x}}{\frac{A-7}{2x}} = \frac{5}{12}$
 $A = 25 \text{ km}$
 And
 $\frac{(A-1)}{2x} - \frac{A-1}{8x} = 6$
 $x = 1.5$
 Speed of boat in still water = $5x = 7.5 \text{ km/hr}$

Solution (15-19):

distance covered in still water between initial point and destination point = 175 km
 distance covered in upstream between initial point and destination point = $\frac{375-175}{10} \times 3 = 60 \text{ km}$
 distance covered in downstream between initial point and destination point = $200 - 60 = 140$
 let fuel consumption in still water = 8x lit per km
 then, fuel consumption in upstream
 = $8x \times \frac{9}{8} = 9x \text{ lit per km}$
 and fuel consumption in downstream
 = $8x \times \frac{75}{100} = 6x \text{ lit per km}$
 ATQ
 In return journey downstream distance will become upstream distance and vice-versa
 $175 \times 8x + 140 \times 9x + 60 \times 6x - 175 \times 8x - 140 \times 6x - 60 \times 9x = \frac{10}{3}$
 $1620x - 1380x = \frac{10}{3}$
 $x = \frac{1}{72}$

15. (c): In return journey downstream distance will become upstream distance and vice-versa
 Let speed of boat in upstream = S km/h
 ATQ
 $\frac{140}{S} - \frac{60}{40} = \frac{11}{2}$
 $\frac{140}{S} = 7$
 $S = 20 \text{ km/h}$

16. (b): total distance covered in downstream = 140 + 60 = 200 km
 Rate of fuel consumption = $6x = 6 \times \frac{1}{72} = \frac{1}{12}$
 Fuel required = $\frac{200}{12} = 16.67 \approx 17 \text{ lit.}$

17. (d): total distance covered in still water = 175 + 175 = 350 km
 Total distance covered in upstream
 = 140 + 60 = 200 km
 Required percentage = $\frac{350-200}{200} \times 100 = 75\%$

18. (b): rate of fuel consumption in upstream
 = $9x = 9 \times \frac{1}{72} = \frac{1}{8}$
 8 km in 1 lit

19. (b): distance covered in still water in return journey = 175 km
 Required sum = $175 \times 8 \times \frac{1}{72} \times 81 = \text{Rs. } 1575$

20. (d): Downstream speed = 20 + 4 = 24 km/hr
 Upstream speed = 20 - 4 = 16 km/hr
 ATQ—
 $\frac{(d-40)}{16} - \frac{(d-24)}{24} = 1$
 $\frac{3d-120-2d+48}{48} = 1$
 $d = 120 \text{ km}$
 let boat will take T hours to cover a distance of (d + 48) km in downstream and in upstream both
 $T = \frac{120+48}{24} + \frac{120+48}{16}$
 $T = 7 + 10.5$
 $T = 17.5 \text{ hours}$

21. (b): Let still water speed of boat A is x km/hr
 So, speed of boat B in still water = (64 - x) km/hr
 ATQ—
 $\frac{240}{(64-x-4)} = \frac{240}{(x+4)}$
 $\frac{240}{(60-x)} = \frac{240}{(x+4)}$
 $x + 4 = 60 - x$
 $2x = 56$
 $x = 28 \text{ km/hr}$
 Speed of boat B in still water = (64 - 28) = 36 km/hr

- 22. (e):** Let the speed of the boat in still water be 'x' kmph.
 Actual travel time = $370 - 40 = 330 \text{ min} = \frac{11}{2} \text{ hr}$
 ATQ
 $\frac{28}{x+3} + \frac{28}{x-3} = \frac{11}{2}$
 $(112x) = 11(x^2 - 9)$
 $11x^2 - 112x - 99 = 0$
 $x = 11 \text{ kmph}$
 So the speed of the boat in still water is 11 kmph.
- 23. (c):** Let speed of boat in still water be x km/hr and speed of stream be y km/hr
 ATQ -
 $(x + y) + (x - y) = 48$
 $2x = 48$
 $x = 24 \text{ km/hr}$
 $y = 24 \times \frac{100}{400} = 6 \text{ km/hr}$
 $\frac{D+80}{24+6} + \frac{D}{24-6} = \frac{40}{3}$
 $\frac{3D+240+5D}{90} = \frac{40}{3}$
 $5D = 1200 - 240$
 $D = 120 \text{ km}$
 Required time = $\frac{150}{(24-6)} = 8 \frac{1}{3} \text{ hours}$
- 24. (b):** Let speed of boat in downstream = 6x km/hr.
 Upstream speed of boat = 4x km/hr.
 Now,
 $360 = T \times 6x$ ----- (i)
 When speed of boat in still water increased by 6 km/hr, the downstream distance covered by boat in same time "T" is increased by 60 km
 So, downstream speed also increased by 6 km/hr.
 $(6x + 6) \times T = 360 + 60$ ----- (ii)
 From (i) & (ii) we get
 $T = 10 \text{ hours}$
 And, $x = 6$
 Required distance = $(10 - 2) \times (4 \times 6) = 192 \text{ km}$
- 25. (e):** Let distance travelled by boat in downstream be D and speed of boat in still water be x km/hr and speed of current be y km/hr
 ATQ,
 $\frac{\frac{3}{4} \times D}{(x-y)} = \frac{3}{2} \times \frac{D}{(x+y)}$
 $\frac{1}{2(x-y)} = \frac{1}{x+y}$
 $x = 3y$
 New speed of boat = $3y + 3y \times \frac{1}{3}$
 $= 4y \text{ km/hr}$
 $\frac{60}{(4y+y)} + \frac{60}{(4y-y)} = 16$
 $\frac{12}{y} + \frac{20}{y} = 16$
 $y = \frac{32}{16} = 2 \text{ km/hr}$
 Increased speed of boat = $4 \times 2 = 8 \text{ km/hr}$

- 26. (b):** When they are passing each other, total distance will be $(380+180) \text{ m} = 560 \text{ m}$.
 Speed of X = $32 \times \frac{5}{18} = 8.89 \text{ m/s}$
 Speed of Y = $40 \times \frac{5}{18} = 11.11 \text{ m/s}$
 Speed of current will be added to one's speed and will be reduced from the other's speed hence, cause no change in the net speed.
 Net speed = $(8.89+11.11) = 20 \text{ m/s}$.
 Required time = $560/20 = 28 \text{ sec}$.
- 27. (d):** Let still water speed of boat be x km/hr and speed of current be y km/hr
 ATQ—
 $(x + y) = 2(x - y)$
 $x = 3y$
 ATQ—
 $\frac{96}{(3y+y)} + \frac{72}{(3y-y)} = 20$
 $\frac{96+144}{4y} = 20$
 $y = \frac{240}{80}$
 $y = 3 \text{ km/hr}$
 $x = 3 \times 3 = 9 \text{ km/hr}$
- 28. (c):** Speed of motor boat in still water = 45 km/h
 Time taken to travel along the stream
 $= 1 \text{ hr } 20 \text{ min} = 1 \frac{20}{60} = 1 \frac{1}{3} = \frac{4}{3} \text{ hr}$.
 Let speed of current = y km/h
 Then According to question,
 $\frac{80}{45+y} = \frac{4}{3} \Rightarrow 60 = 45 + y \Rightarrow y = 15 \text{ km/h}$
 Then required time = $\frac{80}{45-15} = \frac{80}{45-15}$
 $= \frac{80}{30} \times 60 \text{ min} = 160 \text{ min} = 2 \text{ hr } 40 \text{ min}$.
- 29. (a):** Speed of boat in still water = 5 km/h
 speed of current = 2 km/h
 Let distance = d
 $\frac{d}{5-2} = 2 + \frac{d}{5+2} \Rightarrow \frac{d}{3} = 2 + \frac{d}{7}$
 $\frac{d}{3} - \frac{d}{7} = 2 \Rightarrow d = 10.5 \text{ km}$.
- 30. (a):** Speed of boat in still water = 10 km/h
 Let speed of current = y km/h
 $\frac{24}{10+y} + \frac{24}{10-y} = 5 \Rightarrow 24 \left(\frac{10+y+10-y}{(10+y)(10-y)} \right) = 5$
 $\frac{24 \times 20}{100-y^2} = 5 \Rightarrow 100 - y^2 = 96 \Rightarrow y^2 = 4$
 $y = 2 \text{ (Neglect -ve sign)}$

31. (d): Speed of the stream = 2 km/h
 Let speed of the boat in still water = x km/h
 And distance between two boats = d km
 Then $\frac{d}{x+2} = 4 \Rightarrow d - 4x = 8$... (1)

$\frac{d}{x-2} = 5 \Rightarrow d - 5x = -10$... (2)
 From eq. (1) and (2)
 $d - 4x - d + 5x = 8 + 10 \Rightarrow x = 18$
 From eq. (1)
 $d - 18 \times 4 = 8 \Rightarrow d = 80$ km/h

Mains Solutions

1. (a): Let speed of boat in still water = x km/hr
 And speed of current = y km/hr
 ATQ,
 $x - y + x + y = 72$
 $2x = 72$
 $x = 36$ km/hr
 and $x - y = \frac{105}{3.5} = 30$ km/hr
 $y = 6$ km/hr
 Downstream = $x + y = 42$ km/hr
 $X + y = \frac{126}{t}$
 $t = \frac{126}{42} = 3$ hours.

2. (b): Let speed of boat in still water and speed of current be respectively x km/hr and y km/hr
 And Let time taken to cover given distance in downstream and upstream be = 3m hours and 2m hours
 40% of distance in upstream is covered in 2 m hour
 100% of distance upstream is covered in 5m hours
 According to question
 $\frac{x-y}{x+y} = \frac{3}{5}$
 $5x - 5y = 3x + 3y \Rightarrow \frac{x}{y} = \frac{4}{1}$
 And
 $\frac{60}{(\frac{x}{2} + y)} = 10$
 $\frac{x}{2} + y = 6$
 $\frac{4y}{2} + y = 6$
 $6y = 12 \Rightarrow y = 2$ km/hr
 so, $x = 8$ km/hr

3. (c): Speed of current = $\frac{5}{9} \times \frac{18}{5}$
 = 2 km/hr
 Let's speed of boat in still water = x km/hr
 ATQ, $\frac{28 \times \frac{3}{4}}{(x-2)} - \frac{28}{(x+2)} = 3$
 $21x + 42 - 28x + 56 = 3x^2 - 12$
 $-7x + 98 = 3x^2 - 12$
 $3x^2 + 7x - 110 = 0$
 $x = 5$ km/hr

4. (b): Speed of boat in still water = $\frac{5}{2} \times \frac{18}{5} = 9$ km/hr
 And Let Speed of current is Y km/hr
 ATQ -
 $\Rightarrow \frac{28}{9-Y} - \frac{28 \times \frac{125}{100}}{(9+Y)} = \frac{9}{2}$
 $\Rightarrow 50Y + 56Y - 630 + 70Y = 9(81 - Y^2)$
 $\Rightarrow 9Y^2 + 126Y - 855 = 0$
 $\Rightarrow 9Y^2 + 171Y - 45Y - 855 = 0$
 $\Rightarrow 9Y(Y + 19) - 45(Y + 19) = 0$
 $\Rightarrow Y = 5$ km/hr

5. (a): Time taken will be same when both meet log will flow with speed of river flow so,
 $\frac{100}{12+4} + \frac{100-x}{12-4} = \frac{x}{4}$
 $\frac{100}{16} + \frac{100-x}{8} = \frac{x}{4}$
 $\frac{16}{100+200-2x} = \frac{x}{4}$
 $1200 - 8x = 16x$
 $1200 = 24x$
 $x = 50$ km

6. (a): Let speed boat = x km/h
 Let speed of stream = y km/h
 Condition I
 $2 \times \frac{28}{x+y} = \frac{28}{x-y} \Rightarrow \frac{x}{y} = \frac{3}{1}$
 $x=3n, y=n$
 Condition II
 $\frac{28}{(3n+2n)} + \frac{28}{(3n-2n)} = \frac{672}{60}$
 $\Rightarrow \frac{28}{5n} + \frac{28}{n} = \frac{672}{60}$
 $\Rightarrow \frac{5n+28 \times 5}{5n} = \frac{672}{60} \Rightarrow n = 3$
 Speed of boat = 9kmph
 Speed of stream = 3kmph

7. (a): Let, speed of Hunny be ' a '
 Speed of Bunny be ' b '
 And speed of stream be ' r ',
 ATQ,
 $\frac{D}{a+r} : \frac{D}{b+r} = \frac{3}{4}$
 Or, $\frac{b+r}{a+r} = \frac{3}{4}$ (i)
 Also, for a distance D_1 ,
 $\frac{D_1}{b-r} = \frac{3}{2} \left(\frac{D_1}{b+r} \right)$
 or, $2b + 2r = 3b - 3r$
 or, $b = 5r$

putting this in (i),

$$\frac{6r}{a+r} = \frac{3}{4}$$

$$\text{or, } 3a + 3r = 24r$$

$$\text{or, } a = 7r$$

$$\text{ratio of their speed} = 7r : 5r = 7 : 5$$

8. (d): Speed of Hunny = $\frac{14}{1} = 14$ km/hr

Then, speed of Bunny = $14 \times \frac{5}{7} = 10$ km/hr

$$\text{Required time taken} = \frac{48}{24-2} + \frac{48}{24+2}$$

$$= 4\frac{4}{143} \text{ hr.}$$

9. (c): Distance, Suresh had to cover

$$= \left(1 - \frac{5}{14}\right) \times 42 = 27 \text{ km}$$

Let speed of Suresh = x km/hr

And speed of stream = y km/hr

Then,

$$\frac{42}{(x+20)-y} = \frac{27}{x+y}$$

$$42x + 42y = 27x + 540 - 27y$$

$$15x + 69y = 540$$

$$5x + 23y = 180 \quad \dots(i)$$

Also,

$$\frac{280}{x-y} = 35$$

$$x - y = 8 \quad \dots(ii)$$

$$x - y = 8 \quad \dots(ii)$$

Solving (i) and (ii)

$$x = 13 \text{ km/hr}$$

$$y = 5 \text{ km/hr}$$

10. (a): In return Journey Ramesh will travel downstream and Suresh will travel upstream

And

$$\text{Speed of Suresh} = 13 \text{ km/hr}$$

$$\text{Speed of Ramesh} = 33 \text{ km/hr}$$

So,

$$\frac{19}{33+5} + \frac{16}{13-5}$$

$$\frac{19}{38} + \frac{16}{8} = 0.5 + 2 = 2.5 \text{ hr}$$

$$= 150 \text{ min.}$$

11. (a): Let the distance between city X and Y; and city Y and Z be x km each.

And speeds of bus, stream and boat in still water be b , a and $5a$ km/h.

$$\text{Downstream speed} = 5a + a = 6a \text{ km/h}$$

$$\text{Upstream speed} = 5a - a = 4a \text{ km/h}$$

According to the question,

$$\frac{x}{6a} + \frac{x}{4a} = \frac{2x}{b} + 1$$

$$\Rightarrow \frac{x}{6a} = \frac{x}{b} + 1 \quad \dots(i)$$

And,

$$\frac{2x}{4a} = 12$$

$$\Rightarrow x = 24a$$

Putting value of x in equation (i)

$$4 = \frac{24a}{b} + 1$$

$$\Rightarrow \frac{24a}{b} = 3 \Rightarrow \frac{a}{b} = \frac{1}{8}$$

Ratio of speed of bus to the speed of boat in still water

$$= \frac{\text{Speed of bus}}{\text{Speed of boat in still water}}$$

$$= \frac{b}{5a} = \frac{8}{5} = 8 : 5$$

12. (c): $\frac{25}{x-y} + \frac{39}{x+y} = 8 \quad \dots (1)$

$$\frac{35}{x-y} + \frac{52}{x+y} = 11 \quad \dots (2)$$

$$\text{Let } x - y = A, x + y = B$$

$$\frac{25}{A} + \frac{39}{B} = 8 \quad \dots (3)$$

$$\frac{35}{A} + \frac{52}{B} = 11 \quad \dots (4)$$

$$\text{Eq. (3)} \times 7 - \text{eq. (4)} \times 5$$

$$\left(\frac{175}{A} + \frac{273}{B} = 56\right) - \left(\frac{175}{A} + \frac{260}{B} = 55\right)$$

$$B = 13$$

Put it in eq. (3)

$$\frac{25}{A} + 3 = 8 \Rightarrow A = 5 \Rightarrow x - y = 5 \quad \dots(a)$$

$$x + y = 13 \quad \dots(b)$$

From equation (a) and (b)

$$x = 9, y = 4$$

$$\text{Speed of stream} = 4 \text{ km/hr.}$$

13. (b): Let d be the distance between two points

$$\frac{(d/2)}{10} + \frac{(d/2)}{2} = \frac{d}{10} + 6$$

$$\frac{d}{20} + \frac{d}{4} - \frac{d}{10} = 6 \Rightarrow d = 6 \left(\frac{20}{4}\right) = 30 \text{ km}$$

14. (e): $\frac{d}{x+y} + \frac{d}{x-y} = 10 \quad \dots (1)$

$$\frac{2d}{x+y} = 8 \Rightarrow 4(x+y) = d \quad \dots (2)$$

$$\text{From (1)} \quad d \times \frac{x-y+x+y}{(x+y)(x-y)} = 10$$

$$d \times 2x = 10(x+y)(x-y)$$

$$xd = 5(x+y)(x-y)$$

$$\text{From (2), } xd = 5 \times \frac{d}{4} \times (x-y) \Rightarrow x \frac{5}{4} = x - \frac{5}{4}y$$

$$x = 5y \Rightarrow \frac{x}{y} = \frac{5}{1}$$

15. (b): Given, $x = 20$ km/h $y = 5$ km/h

$$\text{Total time taken} = \frac{30}{25} + \frac{30}{15} = 2 + \frac{6}{5}$$

$$= \frac{16}{5} \text{ hr} = \frac{16}{5} \times 60 \text{ min} = 192 \text{ min} = 3 \text{ h } 12 \text{ min}$$

Previous Year Question

1. **(d):** let speed of boat in still water & stream be $8x$ kmph & x kmph respectively

$$\text{ATQ, } \frac{54}{8x+x} + \frac{42}{8x-x} = 4$$

$$\frac{6}{x} + \frac{6}{x} = 4 \Rightarrow x = 3$$

Downstream speed = $8x + x = 27$ kmph

2. **(e):** Let speed of boat in still water be x km/hr.

$$\text{ATQ, } \frac{162}{x+6} + \frac{162}{x-6} = \frac{72}{5}$$

$$x = 24 \text{ kmph}$$

$$\text{Required time} = \frac{240}{24-6} = 13\frac{1}{3} \text{ hours}$$

3. **(c):** Let speed of boat in still water be s kmph

$$\text{ATQ, } \frac{D}{4} = s - 2$$

$$D = 4s - 8 \dots\dots\dots(i)$$

$$\text{Also, } \frac{D-2}{3} = s + 2$$

$$D = 3s + 8 \dots\dots\dots(ii)$$

From (i) & (ii):

$$S = 16 \text{ kmph}$$

$$\text{Required distance} = 3(16 - 2) = 42 \text{ km}$$

4. **(d):** Let the speed of boat in still water be x km/hr and that of speed of current be y km/hr

ATQ

$$x + y - (x - y) = 7$$

$$y = 3.5 \text{ km/hr}$$

$$\frac{45}{x+3.5} - \frac{13}{x-3.5} = \frac{80}{60}$$

$x = 10$ & 14 (14 is neglected because x should be multiple of 5)

$$\therefore x = 10 \text{ km/h}$$

New speed of current = 7 km/hr

$$\text{Distance travelled in upstream} = 7 \times (10 - 7) = 21 \text{ km}$$

5. **(b):** $(D_s - D_u) 3 = 18 \text{ km}$

Different in 1 hr. = 6 km

D_s and D_u

\therefore Speed of boat in still water = 20 km/hr .

$D_s = 23 \text{ km/hr}$, $D_u = 17 \text{ km/hr}$.

Distance travelled = $4 \times 23 = 92 \text{ km}$

6. **(d):** Upstream speed of boat = 18 km/hr

Downstream speed of boat = 22 km/hr

$$\text{Speed of boat in still water} = \frac{18+22}{2} = 20 \text{ km/h}$$

7. **(a):** Let the speed of boat in downstream be $8x$ km/hr

Then speed of boat in still water = $5x$ km/hr

Speed of boat in upstream = $5x - (8x - 5x)$

$$= 2x \text{ km/hr}$$

$$\text{ATQ } \frac{30}{5} = 2x \Rightarrow x = 3$$

$$\text{Required time} = \frac{84}{24} = 3.5 \text{ hrs.}$$

8. **(e):** Let still water speed of boat is x km/hr and speed of current y km/hr

ATQ—

Let d be the distance covered by boat in downstream.

$$\frac{\frac{3d}{4}}{(x-y)} = 2 \frac{d}{(x+y)}$$

$$\frac{x}{y} = \frac{11}{5}$$

$$x : y = 11 : 5$$

9. **(b):** let speed of boat in still water & speed of stream be $7x$ & $3x$ kmph respectively

$$\text{ATQ, } \frac{28}{7x+3x} = \frac{42}{60}$$

$$x = 4$$

$$\text{Required difference} = \frac{40}{7x-3x} - \frac{60}{7x+3x} = \frac{4}{x} = 1 \text{ hour}$$

10. **(d):** Speed of boat in still water = 12 kmph

Speed of Stream = x kmph

ATQ,

$$\frac{270}{(12-x)} = \left(100 + 66\frac{2}{3}\right)\% \text{ of } \frac{270}{12+x}$$

$$\Rightarrow \frac{270}{12-x} = \left(1 + \frac{2}{3}\right) \times \frac{270}{12+x}$$

$$\Rightarrow \frac{270}{12-x} = \frac{5}{3} \times \frac{270}{12+x}$$

$$\Rightarrow (12+x) \times 3 = 5 \times (12-x)$$

$$\Rightarrow x = 3$$

So, speed of stream = $x = 3$ kmph

11. **(b):** Let the speed of boat in still water be x km/hr and that of stream be y km/hr.

ATQ

$$(x + y) - (x - y) = 5$$

$$\Rightarrow y = 2.5 \text{ km/hr}$$

$$x = 2.5 \times \frac{19}{5} = 9.5 \text{ km/hr}$$

$$\text{Required time} = \frac{42}{(9.5+2.5)} + \frac{31.5}{(9.5-2.5)} = 8 \text{ hr}$$

12. **(a):** Let speed of stream be x km/hr.

So, speed of boat in still water = $6x$ km/hr.

ATQ,

$$\frac{210}{7} = (6x - x)$$

$$\Rightarrow 5x = 30$$

$$x = 6 \text{ km/hr}$$

So, required downstream speed of boat = $(6x + x)$

$$= 7x = 42 \text{ km/hr}$$

13. **(a):** ATQ -

$$14 \times 6 - 10 \times T = 44$$

$$10T = 40$$

$$T = 4$$

- 14. (e)** Speed of current = $\frac{4}{2} = 2$ kmph
 Speed of boat in still water = 14 kmph
 Required time taken = $\frac{48}{14+2} = 3$ hours
- 15. (c):** Let the speed of boat in still water and the speed of current be $10x$ km/hr and x km/hr respectively
 ATQ
 $\frac{\left(\frac{D}{11x}\right)}{\frac{D-45}{9x}} = \frac{3}{2}$
 $D = 99$ km
- 16. (b):** Speed in upstream = 18 km/hr
 Speed in downstream = 24 km/hr
 Required total distance = $(24 + 18) \times 7 = 294$ km
- 17. (b):** Let the speed of the boat in still water be x km/h
 Given, speed of the stream = 4 km/h
 Now, Time taken by the boat to cover 6 km in upstream = $\frac{6}{x-4}$ h
 Time taken by the boat to cover 6 km in downstream = $\frac{6}{x+4}$ h
 According to the question
 $\frac{6}{x+4} + \frac{6}{x-4} = 2 \Rightarrow 6 \left[\frac{x-4+x+4}{(x+4)(x-4)} \right] = 2$
 $6x = x^2 - 16 \Rightarrow x^2 - 6x - 16 = 0$
 $x^2 + 8x - 2x - 16 = 0 \Rightarrow x(x+8) - 2(x+8) = 0$
 $(x-2)(x+8) = 0 \Rightarrow x = 8$ km/h
Shortcut:
 $\frac{6}{x+4} + \frac{6}{x-4} = 2$
 Now, check by option; $x = 8$
- 18. (d):** Speed of the boat in still water = $\frac{1}{2}$ (speed of boat in downstream + speed of boat in upstream)
 $= \frac{1}{2}(15+9) = \frac{1}{2} \times 24 = 12$ km/h
- 19. (a):** Let the speed of boat in still water be x km/h and speed of the stream be y km/h.
 According to the question

$$\frac{20}{x+y} = 2 \Rightarrow x+y = 10 \text{ km/h} \quad \dots (i)$$

$$\text{Similarly } \frac{20}{x-y} = 5$$

$$x-y = 4 \text{ km/h} \quad \dots (ii)$$

On adding Eq. (i) and (ii) we get

$$2x = 14 \text{ km/h } \therefore x = 7 \text{ km/h}$$

20. (b): Let the rate of the swimming in still water be x km/h

$$\therefore \text{ speed of downstream} = (x+3) \text{ km/h}$$

$$\text{speed of upstream} = (x-3) \text{ km/h}$$

According to the question

$$(x+3)t = 2(x-3) \times t \therefore x+3 = 2x-6$$

$$x = 9 \text{ km/h}$$

21. (a): Speed of boat in downstream = $\frac{20}{1} = 20$ km/h

$$\text{Speed of boat in upstream} = \frac{20}{2} = 10 \text{ km/h}$$

$$\therefore \text{ speed of boat in still water} = \frac{1}{2} \times (20+30)$$

$$= 15 \text{ km/h}$$

22. (b): Let the speed of the stream be x km/h

$$\text{speed of boat in still water be } 4x \text{ km/h}$$

$$\text{speed of downstream} = 4x + x = 5x \text{ km/h}$$

$$\text{speed of upstream} = 4x - x = 3x \text{ km/h}$$

According to the question

$$\frac{30}{3x} + \frac{30}{5x} = 8 \Rightarrow \frac{10}{x} + \frac{6}{x} = 8$$

$$\text{Speed of the current } x = 2 \text{ km/h}$$

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Mixture & Alligation

Mixture: When two or more than two substances are mixed in any ratio to produce a product is known as Mixture.

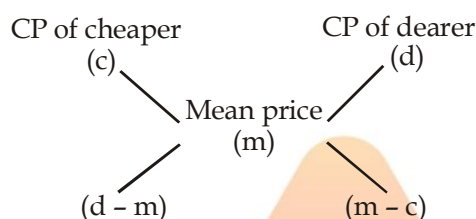
Mean price: The cost price of a unit quantity of the mixture is called the mean price.

Concept 1. Alligation Rule

Let the cost price of a unit of cheaperS article is Rs. c and that of a unit of costly article is d and the average (mean) price of mixture is m , then

$$\frac{\text{Quantity of cheaper article}}{\text{Quantity of costly article}} = \frac{\text{Cost price of a unit of costly article} - \text{Mean price}}{\text{Mean price} - \text{Cost price of a unit of a cheaper article}}$$

The above relation is represented as

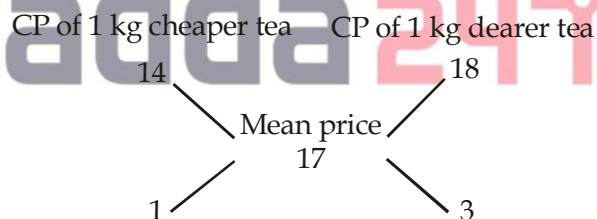


Hence,
$$\frac{\text{Quantity of cheaper}}{\text{Quantity of dearer}} = d - m : m - c = \frac{d - m}{m - c}$$

Alligation rule is also used to find the ratio in which two or more ingredients at their respective prices should be mixed to produce a mixture at a given price.

Example: In what proportion must tea at Rs. 14 per kg be mixed with tea at Rs. 18 per kg, so that the mixture be worth Rs. 17 a kg?

Sol.



$$\frac{\text{Quantity of cheaper}}{\text{Quantity of dearer}} = \frac{18 - 17}{17 - 14} = \frac{1}{3} = 1:3$$

Concept 2. A container has milk and water in the ratio $a:b$, a second container of some capacity as first are has milk and water in the ratio $c:d$. If both the mixture are emptied into a third container, then the ratio of milk to water in third container is given by

$$\left[\frac{a}{a+b} + \frac{c}{c+d} \right] : \left[\frac{b}{a+b} + \frac{d}{c+d} \right]$$

Example: There are two containers of equal capacity. The ratio of milk to water in the first container is $3 : 1$, in the second container is $5 : 2$. If they are mixed up, then the ratio of milk to water in the mixture will be?

Sol. Part of milk in first container = $\frac{3}{3+1} = \frac{3}{4}$

Part of water in first container = $\frac{1}{3+1} = \frac{1}{4}$

Similarly, part of milk in second container = $\frac{5}{5+2} = \frac{5}{7}$

Part of water in second container = $\frac{2}{5+2} = \frac{2}{7}$

∴ Required = $\frac{3}{4} + \frac{5}{7} : \frac{1}{4} + \frac{2}{7} = \frac{41}{28} : \frac{15}{28} = 41 : 15$

Concept 3: Suppose a container contains 'x' units of a liquid from which 'y' units are taken out and replaced by water.

After n operation, quantity of pure liquid = $x \left(1 - \frac{y}{x}\right)^n$ units

Example: A container contains 40 litres of milk. From this container 4 litres of milk was taken out and replaced by water. This process was repeated further two times. How much milk is now contained by the container?

Sol. Amount of milk left after 3 operations = $\left[40 \left(1 - \frac{4}{40}\right)^3\right]$ litres = $\left(40 \times \frac{9}{10} \times \frac{9}{10} \times \frac{9}{10}\right) = 29.16$ litres.

Solved Example

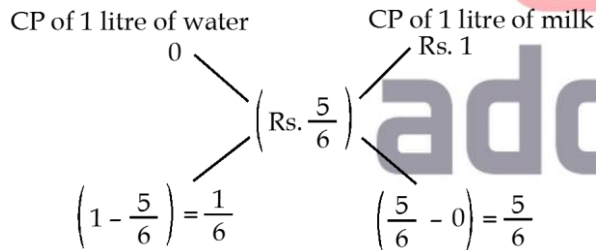
1. In what ratio must water be mixed with milk to gain 20% by selling the mixture at cost price?

Sol. Let CP of milk be Rs. 1 per litre.

Then; SP of 1 litre of mixture = Rs. 1, Gain = 20%.

∴ CP of 1 litre of mixture = Rs. $\left(\frac{100}{120} \times 1\right) = \text{Rs. } \frac{5}{6}$.

By the rule of alligation, we have:



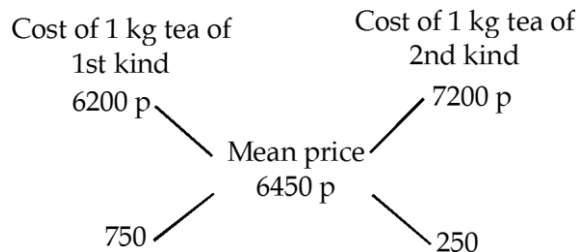
∴ Ratio of water and milk = $\frac{1}{6} : \frac{5}{6} = 1 : 5$.

Shortcut:

Ratio = Profit% : 100 = 20 : 100 = 1 : 5

2. In what ratio must tea at Rs. 62 per kg be mixed with tea at Rs. 72 per kg so that the mixture must be worth Rs. 64.50 per kg?

Sol.



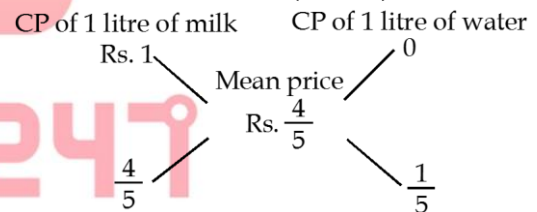
∴ Required ratio = 750 : 250 = 3 : 1.

3. A dishonest milkman professes to sell his milk at cost price but he mixes it with water and thereby gains 25%. The percentage of water in the mixture is:

Sol. Let CP of 1 litre milk be Rs. 1.

Then, SP of 1 litre of mixture = Rs. 1, Gain = 25%.

CP of 1 litre mixture = Rs. $\left(\frac{100}{125} \times 1\right) = \text{Rs. } \frac{4}{5}$.



∴ Ratio of milk to water = $\frac{4}{5} : \frac{1}{5} = 4 : 1$.

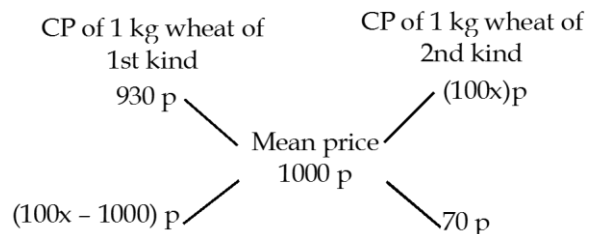
Hence, percentage of water in the mixture

= $\left(\frac{1}{5} \times 100\right)\% = 20\%$.

4. One quality of wheat at Rs. 9.30 per kg is mixed with another quality at a certain rate in the ratio 8:7. If the mixture so formed be worth Rs. 10 per kg, what is the rate per kg of the second quality of wheat?

Sol. Let the rate of the second quality be Rs. x per kg.

By the rule of alligation, we have:



$$\therefore \frac{100x - 1000}{70} = \frac{8}{7} \Rightarrow 700x - 7000 = 560$$

$$700x = 7560 \Rightarrow x = \text{Rs. } 10.80.$$

5. A container contains 100 litres of spirit. From this container 10 litres of spirit was taken out and replaced by water. This process was repeated further two times. How much spirit is now contained by the container?

Sol. Amount of milk left after 3 operations

$$= \left[100 \left(1 - \frac{40}{100} \right)^3 \right] \text{ litres}$$

$$= \left(100 \times \frac{9}{10} \times \frac{9}{10} \times \frac{9}{10} \right) = 72.9 \text{ litres.}$$

Basic Questions

- In a mixture of milk and water of the volume of 60 litre the ratio of milk to water is 7 : 5. How much quantity of water will be added to make mixture of equal ratio?
(a) 8 Litre (b) 10 Litre (c) 15 Litre
(d) 20 Litre (e) None of these
- In a mixture of milk and water of the volume of 30 Litre, the ratio of milk and Water is 8 : 7. How much water should be added in mixture to make ratio 4 : 5?
(a) 6 Litre (b) 4.5 Litre (c) 5 Litre
(d) 5.5 Litre (e) None of these
- In what ratio must oil at Rs. 62 per kg be mixed with oil of Rs. 72 per kg, so that the mixture must be worth Rs. 64.50 per Kg?
(a) 1 : 3 (b) 1 : 2 (c) 3 : 1
(d) 4 : 1 (e) None of these
- A mixture of milk and water measures 60 ltr. It contains 20% water. How many litres of water should be added to it so that water may be 25%?
(a) 6 ltr (b) 4 ltr (c) 8 gallons
(d) 10 ltr (e) None of these
- In what ratio must a grocer mix two varieties of pulses costing Rs. 15 and Rs. 20 per kg respectively so as to get a mixture worth Rs. 16.5 per kg?
(a) 3 : 7 (b) 5 : 7 (c) 7 : 3
(d) 7 : 5 (e) None of these
- A dishonest milkman professes to sell his milk at cost price but he mixes it with water and thereby gains 25%. The percentage of water in the mixture is?
(a) 4% (b) 6% (c) 20%
(d) 25% (e) None of these
- Find the ratio in which rice at Rs. 7.20 a kg be mixed with rice at Rs. 5.70 a kg to produce a mixture worth Rs. 6.30 a kg?
(a) 1 : 3 (b) 2 : 3 (c) 3 : 4
(d) 4 : 5 (e) None of these
- Aditya and Sanjay started a business investing 45000 and 30000 respectively. What will be the ratio between their profit?
(a) 2 : 3 (b) 3 : 2 (c) 4 : 9
(d) Can be determined (e) None of these
- In what ratio must sugar at Rs. 2 per kg be mixed with sugar at Rs. 3.50 per kg so that the mixture be worth Rs. 2.50 per kg?
(a) 2 : 1 (b) 1 : 5 (c) 3 : 1
(d) 2 : 3 (e) None of these
- 600 gm of Sugar solution has 40% sugar in it. How much sugar should be added to make it 50% in the solution?
(a) 60 gm. (b) 90 gm. (c) 120 gm.
(d) 150 gm. (e) None of these

Prelims Questions

Level - 1

- The ratio of milk and water in a mixture of 64 litres is 7:1. How much water must be added to it so that the ratio of milk and water becomes 14:5?
(a) 12 litres (b) 15 litres (c) 8 litres
(d) 16 litres (e) None of these
- A mixture contains milk and water in the ratio 3:1. On adding 4 liters of water, the ratio of milk to water becomes 7:3. The quantity of water in the final mixture is?
(a) 16 liters (b) 14 liters (c) 18 liters
(d) 20 liters (e) 24 liters

3. A container is full of 75 litre milk. If 15 litre content of container is replaced by water and the same process is further repeated two times, then find the quantity of milk left in the final solution?
 (a) 36.4 litre (b) 38.4 litre (c) 40 litre
 (d) 41.4 litre (e) 48.4 litre
4. In a mixture of juice & water, 40 litres water is mixed due to which ratio changes from 3 : 4 to 1 : 4. Find initial quantity of mixture. (in litres)
 (a) 45 (b) 25 (c) 30
 (d) 40 (e) 35
5. A container contains milk and water in ratio of 3:1 and Capacity of Container is 40 lit. If half of the Container is replaced with 15 lit of water then find new quantity of water in container?
 (a) 15 lit (b) 20 lit (c) 18 lit
 (d) 24 lit (e) None of these
6. In a mixture of Milk and water, 25 litres of water is added due to which the ratio of milk and water becomes from 4:5 to 2:5. Find the initial quantity of Mixture.
 (a) 40 (b) 45 (c) 50
 (d) 55 (e) 35
7. A shopkeeper mixes two type of sugar i.e. 45 kg of Rs 42 per kg and 75 kg of Rs 50 per kg. Find at what price he has to sell the mixture to get 10% profit?
 (a) 52.8 Rs/kg (b) 51.7 Rs/kg (c) 50.7 Rs/kg
 (d) 53 Rs/kg (e) None of these
8. What quantity of water is required to be mixed with a mixture having alcohol & water in ratio 4 : 1 such that final mixture contains equal quantity of both? (final mixture quantity is 50 lit)
 (a) 25 lit (b) 20.75 lit (c) 18.75 lit
 (d) 22.75 lit (e) 18 lit
9. From a vessel of 45 litre which is full of milk, 9 litre milk is taken out and completely replaced with water. Again 9 litre mixture is taken out and completely replaced with water. Find the quantity of milk left in the final mixture?
 (a) 32.4 litre (b) 28.8 litre (c) 24 litre
 (d) 33.6 litre (e) None of these
10. A container has 30 litres of alcohol. If 3 liters of alcohol is replaced by 3 liters of water and this operation is repeated two times more, then what will be the quantity of alcohol in the new mixture?
 (a) 24 liters (b) 21 liters (c) 21.87 liters
 (d) 24.3 liters (e) 21.3 liters
11. A vessel contains 120 liters of milk. 30 liters of milk taken out from the vessel and replaced by water and this operation repeated two more times. Find the ratio of milk and water in resulting mixture?
 (a) 71 : 23 (b) None of these (c) 23 : 77
 (d) 27 : 47 (e) 27 : 37
12. 80 l mixture of milk and water contains 25% of water. If 24 l of mixture taken out from mixture, then find what quantity of water should be mixed in remaining mixture to make water 65% of resulting mixture?
 (a) 56 l (b) 44 l (c) 42 l
 (d) 40 l (e) 64 l
13. Ramesh purchased 4kg rice & 5 kg wheat for Rs.180 and Suresh purchased 2kg rice & 15kg wheat for Rs.290. Then, find per kg price of wheat is what percent of per kg price of rice?
 (a) 64% (b) 90% (c) 75%
 (d) 82% (e) 60%
14. A container is full of mixture (40% water) of milk and water. A part of this mixture is replaced by another containing 81% milk and now the percentage of milk was found to be 74%. Find quantity of mixture replaced.
 (a) $\frac{1}{3}$ (b) $\frac{2}{3}$ (c) $\frac{2}{5}$
 (d) $\frac{3}{5}$ (e) None of these
15. A container contains two liquids A and B in the ratio 8 : 5 .When 13 liters of mixture is drawn off and is completely replaced with liquid B, then the ratio of A and B in the container becomes 1 : 1. How many liter of liquid A was in the container initially?
 (a) $128/3$ liter (b) 117 liter (c) $134/3$ liter
 (d) $121/3$ liter (e) 130 liter
16. A vessel contains mixture in which 25% is water and rest is milk. If 40 liters more water added in vessel, then quantity of water becomes 40% of mixture. Find the quantity of milk in the vessel?
 (a) 100 l (b) 140 l (c) 160 l
 (d) 120 l (e) 80 l
17. In first mixture, quantity of milk was 6 lit more than that of water. After adding 40 ltr of second mixture (having ratio of water to milk 3: 5) in the first mixture, ratio of water to milk in the final mixture becomes 9: 13. Find the total quantity of water in the final mixture.
 (a) 27 ltr (b) 31.5 ltr (c) 36 ltr
 (d) 45 ltr (e) None of these
18. In 100 lit mixture of milk and water, milk is 68 lit more than that of water. When 'a' lit of milk is taken out and (a+15) lit of water is added, milk becomes 50% more than that of water. Find value of 'a'?
 (a) 20 (b) 15 (c) 18
 (d) 12 (e) 16

19. In a juice, guava is 85% and rest is sugar. In another juice, pomegranate is 90% while rest is sugar. Both the juices are mixed in the ratio of 3 : 2. Find concentration of sugar in final mixture. (in %)
 (a) 10 (b) 11 (c) 12
 (d) 13 (e) 14
20. Two varieties of wheat is mixed in the ratio of 2:3 by weight. The price of the mixture is Rs.12/kg and the price of the variety having lower weight is Rs 10/kg. Find the price per kg of the other variety.(in Rs)
 (a) 35/3 (b)50/3 (c) 38/3
 (d)47/3 (e)40/3
21. A container is full of milk, $\frac{1}{4}$ th of the milk is taken out and is replaced with water, and this process is repeated 3 times and 297ℓ of milk is finally left in the container. find the capacity of container? (in ℓ)
 (a) 528 (b) 644 (c) 740
 (d) 704 (e) 750
22. A mixture of milk and water is in ratio 5 : 3. If 40 liters of mixture is taken out and 4 liters of pure water is added to the mixture, then percentage of water in the mixture becomes 40%. Find the initial quantity of mixture.
 (a) 148 liters (b) 144 liters (c) 150 liters
 (d) 136 liters (e) 140 liters
23. Two mixtures P & Q of concentration 4 : 5 and 5 : 7 of juice & water poured in the ratio of 3 : 4 in a vessel. If juice in resulting mixture is 144 ml , then find quantity of water in resulting mixture?
 (a) 172 ml (b) 164 ml (c) 200 ml
 (d) 192 ml (e) 240 ml
24. Two vessel A and B of equal capacity contains mixture of milk and water in the ratio 8 : y and 7 : 6 respectively. If total quality of each vessel is 260L and quantity of milk in A $14\frac{2}{7}\%$. More than quantity of milk of milk in B then find y
 (a) 10 (b) 4 (c) 5
 (d) 6 (e) 7
25. A man bought petrol at the cost of Rs. 70/liter and kerosene at Rs.30/liter. He mixed petrol and kerosene in some ratio and sold the mixture at Rs. 60/liter. If he earned a profit of $11\frac{1}{9}\%$, then find the ratio of petrol and kerosene oil in the mixture.
 (a) 4 : 1 (b) 5 : 3 (c) 3 : 2
 (d) 1 : 1 (e) 7 : 3
26. A mixture of milk and water contains 80% milk. x litre of mixture is taken out and replaced with water. Find the value of x if final concentration of milk in mixture is 50% and initial quantity of mixture is 80 ℓ.
 (a) 35ℓ (b) 40ℓ (c) 30 ℓ
 (d) 18ℓ (e) 24 ℓ
27. In a vessel , milk and water are in the ratio of 5 : 2. If 42 liter of mixture is taken out from the vessel and 32 liter of water is added, then new ratio of milk and water becomes 7 : 6. Find initial quantity of mixture in vessel?
 (a) 84 liters (b) 98 liters (c) 126 liters
 (d) 154 liters (e) 140 liters
28. A milkman pays Rs. 12.8 per liter of milk. He added water to it and sells the mixture at Rs. 16 per liter at a profit of 37.5%. Find the ratio of milk to that of water added to the mixture?
 (a) 10: 1 (b) 1: 10 (c) 11: 1
 (d) 5: 1 (e) 10: 3
29. A seller mixed two variety of tea (X & Y) costing Rs. 80 & Rs. 120 respectively. If in mixture, Y is 200% more than that of X and sold this mixture at the Rs. 143, then find the profit percent of seller?
 (a) 30% (b) 25% (c) 35%
 (d) 40% (e) 20%
30. In a mixture of Wine and Rum, quantity of Wine is $66\frac{2}{3}\%$ of quantity of Rum. If in 90 ml mixture, 15 ml more wine was added then, what would be the percentage of wine in the new mixture?
 (a) $34\frac{1}{7}\%$ (b) $35\frac{1}{6}\%$ (c) $17\frac{1}{2}\%$
 (d) $50\frac{4}{7}\%$ (e) $48\frac{4}{7}\%$
31. There are two containers A and B. Container A is empty while container B is full with a mixture of milk and water in the ratio 5 : 3. If 50% of mixture of B is poured in container A then A is $28\frac{4}{7}\%$ filled. Now, If A contains 10 L milk then find the capacity of A.
 (a) 48 lit. (b) 54 lit. (c) 56 lit.
 (d) 36 lit. (e) 62 lit.
32. In a mixture of juice and water, juice is 20% more than water. This is mixed with another mixture having juice & water in ratio 5:6. If these two are mixed in ratio 3:4. Find ratio of juice & water in final mixture.
 (a) 35 : 39 (b) 35 : 38 (c) 1 : 1
 (d) 38: 41 (e) 38 : 39
33. A vessel contains mixture of petrol and diesel contains 75% petrol. When some quantity of kerosene oil is added in the vessel then mixture contains 50% petrol. Find ratio of quantity of kerosene oil to diesel in the final mixture.
 (a)8 : 3 (b)2 : 1 (c)1 : 2
 (d)3 : 8 (e) None of the above.
34. In a vessel, the ratio of alcohol and water is 3:7. If 20 litres of the mixture is taken out and 2 litres of water is filled into it, the new ratio becomes 1:3. Find the initial quantity of the mixture in the vessel?
 (a) 40 litre (b) 20 litre (c) 30 litre
 (d) 50 litre (e) None of these

35. A mixture of milk and water contains 75% milk. If 8 liter of mixture is taken out and 7 liters of milk is added, then ratio of milk to water becomes 7 : 2. Find the quantity of mixture initially.
 (a) 75 L (b) 64 L (c) 68 L
 (d) 56 L (e) 40 L
36. A container has mixture of water and acid in which water is 40% out of total mixture of 50 lit. if 30 lit of the mixture is taken out and 50 lit of another mixture of water and acid is added and in second mixture acid is 40%, then find ratio of water to acid in final mixture.
 (a) 16:19 (b) 8:7 (c) 19:16
 (d) 7:8 (e) 17:19
37. A container contains milk and water in ratio 13 : 7. When 30 lit mixture is taken out of x lit mixture and 2.5 lit of milk is added then quantity of milk becomes $66\frac{2}{3}\%$ of total mixture. Find 'x'.
 (a) 80 lit (b) 70 lit (c) 90 lit
 (d) 100 lit (e) 75 lit
38. A vessel contains 240 liters of petrol. 20 liters of petrol taken out from it and completely replaced by kerosene and then again from the mixture 20 liters of mixture taken out and completely replaced by kerosene. Find the remaining quantity of petrol in the final mixture.
 (a) 166.67 lit (b) 233.33 lit (c) 217.17 lit
 (d) 165.5 lit (e) 201.67 lit
39. Mixture of milk and water has 7 liters of water. When 2 liters of milk and 11 liters of water are added to the mixture then concentration of milk in mixture becomes 80%. Find total quantity of initial mixture.
 (a) 68 liters (b) 85 liters (c) 90 liters
 (d) 77 liters (e) 72 liters
40. Rice of two category i.e. Rs. 150 per kg and Rs. 200 per kg are mixed with a third category in ratio 1:2:2, if mixture of these was sold at profit on 20% for Rs. 252, find cost price of third category rice?
 (a) Rs. 175 (b) Rs. 275 (c) Rs. 250
 (d) Rs. 225 (e) None of these.

Level - 2

1. In an alloy A, Aluminum and Nickel are present in the ratio 4 : 3 respectively and in alloy B, the same element are in the ratio 3 : 5 respectively. If these two alloys be mixed to form a new alloy in which same elements are in the ratio 1 : 1 respectively, then find the ratio of alloy A and alloy B in the new alloy ?
 (a) 6 : 7 (b) 7 : 4 (c) 4 : 7
 (d) 7 : 6 (e) 4 : 3
2. An alloy 'A' made of Copper and Zinc contain 40% copper and another alloy 'B' having same elements contain 30% zinc. A new alloy is made by mixing both alloys which contain 60% copper. Find the ratio of quantity of alloy A and alloy B in the new alloy?
 (a) 1 : 2 (b) 3 : 4 (c) 2 : 1
 (d) 4 : 3 (e) 5 : 3
3. There are two mixture comprising milk and water. Ratio of milk to water in both mixture is 4 : 1. 50% of mixture - B is mixed in mixture - A, then quantity of water in the resulting mixture becomes 20 liters. Then, find ratio of total quantity of mixture - A to total quantity of mixture - B if total quantity of both the mixture is 140 lit.
 (a) 4 : 3 (b) 3 : 4 (c) 5 : 6
 (d) 6 : 5 (e) None of the above.
4. A vessel contains 100% more milk than water. If '45' liters of mixture is taken out from the vessel and completely replaced by water, then the ratio of milk to water in the resulting mixture becomes 19 : 17. Quantity of milk in original mixture is what percent more than the quantity of water in the resulting mixture?
 (a) $49\frac{6}{17}\%$ (b) $41\frac{3}{17}\%$ (c) $33\frac{13}{17}\%$
 (d) $45\frac{4}{17}\%$ (e) None of the above.
5. A tank contains 384 liters mixture of milk & water in the ratio of 15 : 17. If X liters of mixture taken out and (X - 14) liters of milk & (X - 34) liters of water added in remaining mixture so ratio of milk & water becomes equal. Find quantity of milk in original mixture is what percent of total final mixture?
 (a) 40% (b) 35% (c) 45%
 (d) 50% (e) 25%
6. Mixture - A & B contains petrol and kerosene in the ratio of 5 : 4 and 2 : 1 respectively. 20% mixture - A & 50% mixture - B is mixed to form another mixture - C. If quantity of petrol in mixture - C is 90 liters and ratio of petrol to kerosene in mixture - C is 30 : 19, then find initial quantity of mixture - A.
 (a) 100 liters (b) 160 liters (c) 150 liters
 (d) 200 liters (e) 360 liters
7. In first mixture, ratio of milk to water is 7: 9. After adding 24 ltr of second mixture (having ratio of water to milk 3: 5) in the first mixture, the quantity of milk and water becomes equal in the final mixture. Find the total quantity of milk in the final mixture.
 (a) 28 ltr (b) 30 ltr (c) 36 ltr
 (d) 32 ltr (e) 24 ltr

8. Mixture – A & B has milk and water in the ratio 4 : 1 and 17 : 8 respectively. Mixture – A & B are mixed to form another mixture – C. If quantity of milk in mixture – C is 75 liters and ratio of total quantity of mixture – A to that of mixture – B is 2 : 5, then find quantity of water in mixture – A is how much less than that of in mixture – C?
 (a) 36 liters (b) 48 liters (c) 42 liters
 (d) 30 liters (e) 24 liters
9. A vessel contains mixture of tin and copper in the ratio of 2 : 3. Some amount of mixture is taken out and 28 gm copper is added to the remaining mixture so that amount of copper becomes $66\frac{2}{3}\%$ in the new mixture. If $12\frac{1}{2}\%$ of initial mixture is 22.5 gm then, find what amount of tin was taken out from the initial mixture?
 (a) 16gm (b) 14gm (c) 12gm
 (d) 10gm (e) 18gm
10. A vessel contains 288 l mixture of milk and water in the ratio of 11 : 7. Some quantity of mixture is taken out and completely replaced with water, due to which new ratio of milk and water in the vessel becomes 11 : 13. Find the ratio of the amount of water in initial mixture and that of in final mixture?
 (a) 28 : 39 (b) 31 : 39 (c) 24 : 41
 (d) 28 : 43 (e) 29 : 41
11. A container of capacity 80 liters is filled with the mixture of milk and water. If certain quantity of mixture is taken out then 70% of milk and 30% of water is removed out from the mixture and overall 55% percent of the container will be vacant then find the initial quantity of water and milk in the container.
 (a) 30l, 50l (b) 55l, 25l (c) 25l, 55l
 (d) 45l, 35l (e) 35l, 45l
12. A vessel contains mixture of Milk & water from which 40% of mixture from vessel is replaced with mango juice. Resulting quantity of water in vessel is 25% more than milk, while resulting quantity of mango juice in vessel is 50% more than milk. If initial quantity of milk in vessel is 10 liters less than water and X% of resulting mixture taken out, then sum of water & mango juice in vessel becomes 33 liters. Find 'X'?
 (a) 50 (b) 60 (c) 40
 (d) 35 (e) 25
13. Two vessels A and B containing a mixture of milk and water. The ratio of milk and water in the vessel A is 4 : 5 and in vessel B is 5 : 8. If x lit of mixture from vessel A and 39 lit of mixture from vessel B is taken out and mix into another vessel C then ratio of milk to water become 2:3 in vessel C. Find the value of x.
 (a) 16 lit (b) 12.8 lit (c) 14.5 lit
 (d) 17.5 lit (e) 13.5 lit
14. The cost of Type 1 rice is Rs. 15 per kg and Type 2 rice is Rs. 20 per kg. If both Type 1 and Type 2 are mixed in the ratio of 2 : 3, then the price per kg of the mixed variety of rice is?
 (a) Rs. 18 (b) Rs. 18.50 (c) Rs. 19
 (d) Rs. 19.50 (e) None of these
15. A merchant has 1000 kg of sugar, part of which he sells at 8% profit and the rest at 18% profit. If he gains 14% on the whole then the quantity sold at 18% profit is:
 (a) 400 kg (b) 560 kg (c) 600 kg
 (d) 640 kg (e) None of these
16. A vessel of 160 litre is filled with Milk and Water. 70% of Milk and 30% of Water is taken out of the vessel. After this task, it is found that vessel is now filled by 55% quantity of Milk and Water. What is the original quantity of milk and water in the vessel respectively?
 (a) 60, 100 (b) 100, 60 (c) 70, 90
 (d) 90, 70 (e) None of these
17. A tub contains a mixture of two liquid P and Q in the ratio of 4 : 1. When 10 Litre of the mixture is taken out and 10 Litre of Liquid Q is poured in the jar, the ratio becomes 2 : 3. How many litre of liquid P was contained in the jar?
 (a) 10 litre (b) 15 litre (c) 20 litre
 (d) 16 litre (e) None of these
18. A bottle contains 81 litres of pure milk. $\frac{1}{3}$ of the milk is replaced by the same amount of water. Again $\frac{1}{3}$ of the mixture is replaced by that amount of water. The ratio of the milk and water in the new mixture is:
 (a) 1 : 2 (b) 1 : 1 (c) 2 : 1
 (d) 4 : 5 (e) None of these
19. Aditya and Manish continued in a joint business for 36 months. Aditya contribute Rs. 300 for certain time and Manish invested Rs. 500 for remaining time. If out of total profit of Rs. 1020, Aditya gets Rs. 495, then for how long Aditya kept his money?
 (a) 16 months (b) 14 months (c) 8 months
 (d) 22 months (e) None of these
20. A jar contained a mixture of two liquids A and B in the ratio 3 : 2. When 5 litres of the mixture was taken out and 5 litres of liquid B was poured in the jar, this ratio became 2 : 3. The quantity of liquid A contained in the jar initially was:
 (a) 4 litres (b) 8 litres (c) 9 litres
 (d) 32 litres (e) None of these

Mains Questions

1. Vessel-A contains 80 liters mixture of petrol and kerosene oil in the ratio 3 : 1 and vessel-B contains mixture of diesel, petrol and kerosene oil in the ratio 1 : 3 : 5. Mixtures of both vessels are mixed in another vessel-C and quantity of petrol in vessel-C is 10 liters more than the quantity of kerosene oil in vessel-C. Then, find the capacity of vessel-B.
 (a) 140 liters (b) 135 liters (c) 120 liters
 (d) 125 liters (e) 130 liters
2. In Adda247, ratio of revenue generated by CRACKER book to that of by ACE book in a month is 9:11 and price of a CRACKER book is Rs. 10 more than that of a ACE book. Find total revenue generated by CRACKER book in the month of May if 350 books (CRACKER+ACE) were sold in a day. Price of a CRACKER book is 20% less than quantity of the CRACKER book sold in a day (number of books sold of each type every day is same).
 (a) Rs 4,00,000 (b) Rs 4,58,000 (c) Rs 4,22,500
 (d) Rs 5,58,000 (e) Rs 5,25,800
3. There are three vessels A, B and C, Vessel A and B filled with mixture of milk and Water in the ratio of 5 : 4 and 5 : 3 respectively. 25% of mixture from vessel A taken out and mixed in vessel C, which contains 45 l pure milk. If in resulting mixture milk is 250% more than water in vessel C and initial quantity of mixture in vessel B is 20 l less than that of mixture in vessel A, then find the quantity of milk in vessel B?
 (a) 180 liters (b) 120 liters (c) 80 liters
 (d) 100 liters (e) 140 liters
4. Glass 'A' contains 400 ml sprite & glass 'B' contains 220 ml coke. 4X ml sprite taken out from 'A' and mixed in 'B' and then 3X ml mixture from 'B' taken out and poured into a vacant glass 'C'. If ratio of coke to sprite in glass C is 11 : 4, then find remaining quantity of sprite in glass 'B'?
 (a) 240 ml (b) 60 ml (c) 64 ml
 (d) 80 ml (e) 48 ml
5. From container P containing 108 liters of mixture of milk and water, water is 12.5% of milk in container. 36 liters of the mixture is taken out and poured into container Q in which ratio of milk to water is 3 : 1. If difference between total milk and total water in container Q is 60 liters, then find difference between the quantity of initial mixture in container Q and final mixture in P?
 (a) 6 liters (b) 4 liters (c) 8 liters
 (d) 10 liters (e) 12 liters
6. In vessel A mixture, petrol and kerosene oil are in the ratio of 7 : 5 and in vessel B it is in the ratio of 8 : 5. P liter of mixture from vessel A and Q liter of mixture from vessel B are taken out and poured into vessel C. If vessel C contains total 150 liter mixture with 40% kerosene oil, then find value of $\frac{P}{Q}$?
 (a) $\frac{12}{19}$ (b) $\frac{12}{17}$ (c) $\frac{11}{13}$
 (d) $\frac{12}{13}$ (e) $\frac{12}{11}$
7. Ratio of Vodka and Wine in vessel A is 5 : 3 and same mixture in vessel B in the ratio of 3 : 2, 16ℓ of mixture from vessel A taken out and poured in vessel B new ratio of Vodka to wine becomes 29 : 19. If new quantity of mixture in vessel B is equal to initial quantity of mixture in vessel A, then find quantity of Vodka after 16 ℓ of mixture has been taken out from vessel A?
 (a) 50ℓ (b) 48ℓ (c) 54ℓ
 (d) 80ℓ (e) 84ℓ
8. There are two vessels A and B which contains mixture of sulphuric acid and nitrous oxide in the ratio of 7 : 2 and 3 : 4 respectively. Mixture of both vessels are mixed to obtain a mixture of 390 ml, in which quantity of nitrous oxide is 160 ml. Find ratio of quantity of mixture in vessel A quantity of mixture in vessel B?
 (a) 7 : 6 (b) 6 : 7 (c) 5 : 7
 (d) 7 : 9 (e) 4 : 7
9. Two casks of 48 and 42 litres are filled with mixtures of wine and water, the proportions in the two casks being respectively 13 : 7 and 18 : 17. If the contents of the two casks be mixed, and 20 litres of water added to the whole what will be the proportion of wine to water in the resultant mixture?
 (a) 13 : 12 (b) 12 : 13 (c) 21 : 31
 (d) 31 : 21 (e) None of these
10. Three glasses of capacity 2 litres, 5 litres and 9 litres contain mixture of milk and water with milk concentrations 90%, 80% and 70% respectively. The contents of three glasses are emptied into a large vessel. Find the ratio of milk to water in the resultant mixture?
 (a) 121 : 39 (b) 131 : 49 (c) 39 : 121
 (d) 49 : 131 (e) None of these

Previous Year Question

1. X liters of milk is taken out and replaced with water from a container having 240 liters milk. Now, 20% of the mixture is taken out and replaced with water. In final mixture, the difference in quantity of milk & water is 128 liters. Find X.
 (a) 12 (b) 10 (c) 9
 (d) 11 (e) 8

IBPS PO Prelims 2019

2. A container contain 96 litre mixture of milk and water out of which 35% is water. 20 lit of mixture is taken out and 10 litre milk & 16 litre water are added in remaining mixture. Find the difference between quantity of milk and water in the final mixture after replacement.
 (a) 15.4 lit (b) 16.8 lit (c) 18.2 lit
 (d) 21.4 lit (e) 19.8 lit

IBPS Clerk Mains 2019

3. In a mixture of milk and water, the proportion of milk by weight is 60%. If from the 80 gm mixture, 20 gm of mixture is taken out and 6 gm of pure water is added to the mixture then find the ratio of milk and water in the new mixture.
 (a) 5 : 6 (b) 6 : 5 (c) 4 : 3
 (d) 3 : 2 (e) 7 : 6

RRB PO Mains 2019

4. In 64 liter of pure milk, 20 liter of water is mixed and then $\frac{1}{4}$ th of the mixture is taken out. When x liter of water is added again then ratio of water to that of the milk becomes 1:2. Find value of x?
 (a) 10 liter (b) 8 liter (c) 12 liter
 (d) 6 liter (e) 9 liter

RRB Clerk Prelims 2019

5. Glass 'A' contains 400 ml sprite & glass 'B' contains 220 ml coke. 4X ml sprite taken out from 'A' and mixed in 'B' and then 3X ml mixture from 'B' taken out and poured into a vacant glass 'C'. If ratio of coke to sprite in glass C is 11 : 4, then find remaining quantity of sprite in glass 'B'?
 (a) 240 ml (b) 60 ml (c) 64 ml
 (d) 80 ml (e) 48 ml

RRB Clerk Mains 2019

6. In 100 lit mixture of milk and water, milk is 68 lit more than that of water. When 'a' lit of milk is taken out and (a+15) lit of water is added, milk becomes 50% more than that of water. Find value of 'a'?
 (a) 20 (b) 15 (c) 18
 (d) 12 (e) 16

RRB Clerk Mains 2019

7. A tank contains 384 liters mixture of milk & water in the ratio of 15 : 17. If X liters of mixture taken out and (X - 14) liters of milk & (X - 34) liters of water added in remaining mixture so ratio of milk & water becomes equal. Find quantity of milk in original mixture is what percent of total final mixture?
 (a) 40% (b) 35% (c) 45%
 (d) 50% (e) 25%

RBI Grade B Phase I 2019

8. A vessel contain mixture of milk and water in the ratio of 6 : 1 respectively. If 21 liters mixture taken out and replaced with 77 liters of milk, then the resultant mixture becomes twice of the initial mixture. Find the quantity of the initial mixture?
 (a) 56 liters (b) 42 liters (c) 84 liters
 (d) 35 liters (e) 91 liters

SBI PO Prelims 2020

9. A container contains mixture of milk & water in ratio 5 : 3 respectively. If 8 lit milk is added in it then ratio of milk to water becomes 11 : 5. Find difference between initial quantity of milk & that of water.
 (a) 5 lit (b) 38 lit (c) 18 lit
 (d) 30 lit (e) 10 lit

SBI Clerk Prelims 2020

10. In a mixture of milk and water, the proportion of milk by weight is 60%. If from the 80 gm mixture, 20 gm of mixture is taken out and 6 gm of pure water is added to the mixture then find the ratio of milk and water in the new mixture.
 (a) 5 : 6 (b) 6 : 5 (c) 4 : 3
 (d) 3 : 2 (e) 7 : 6

IBPS PO Prelims 2020

11. A container contains a mixture of two liquids P and Q in the ratio 5 : 3. If 16 liter of the mixture is taken out and replaced with liquid Q, then the new ratio of liquid P to liquid Q becomes 1: 1. Find the initial quantity of mixture in the container.
 (a) 80 L (b) 60 L (c) 70 L
 (d) 48 L (e) 96 L

IBPS Clerk Prelims 2020

12. A vessel contains mixture of milk and water in the ratio of 7:1 respectively. 24 liters mixture is removed from the vessel and if the quantity of remaining milk in the vessel is 56 liters, then find quantity of water in the vessel initially.
 (a) 11 liters (b) 15 liters (c) 12 liters
 (d) 9 liters (e) 8 liters

IBPS RRB PO Prelims 2020

13. A vessel contains mixture of milk and water in the ratio of 3 : 1 respectively. If 20 liters mixture taken out from the vessel and now the difference between milk and water in the remaining mixture is 70 liters, then find initial mixture in vessel (in liters)?
 (a) 240 (b) 160
 (c) 120 (d) 80 (e) 180

RRB Clerk Prelims 2020

14. In 48 liter of water, 40 liter of juice is mixed and then 50% of the mixture is taken out and then 'a' liter of juice is added again then ratio of water to that of juice becomes 4:5. Find value of 'a'?
 (a) 10 liter (b) 8 liter (c) 12 liter
 (d) 6 liter (e) 9 liter

RBI Assistant Prelims 2020

15. A container contains a mixture of milk and water in which water is 24%. 50% of the mixture is taken out in which water is 78 litre less than the milk. Find the remaining quantity of milk in that container?
 (a) 171 lit (b) 152 lit (c) 133 lit
 (d) 108 lit (e) 114 lit

SBI PO Prelims 2019

16. A mixture has milk and water in the ratio 4: 1. When 50% of the mixture is taken out and replaced by 24 liters of water then the ratio of milk to water in the mixture becomes 1: 1. Find initial quantity of mixture.
 (a) 80 liters (b) 45 liters (c) 70 liters
 (d) 60 liters (e) 75 liters

SBI Clerk Prelims 2019

17. A vessel contains milk and water in the ratio 3 : 1. When 80l mixture is taken out and completely replaced by milk, then milk becomes 700% of the water in the vessel. Find original quantity of the vessel.
 (a) 240 lit (b) 280 lit (c) 320 lit
 (d) 200 lit (e) 160 lit

SBI Clerk Mains 2019

18. A shopkeeper bought 15 kg of rice at the rate of Rs. 29 per kg and 25 kg of rice at the rate of Rs. 20 per kg. He sold the mixture of both types of rice at the rate of Rs. 27 per kg. His profit in this transaction is:
 (a) Rs. 125 (b) Rs. 150 (c) Rs. 140
 (d) Rs. 145 (e) None of these

19. In 40 L mixture of milk and water, the ratio of milk to water is 7 : 1. In order to make the ratio of milk and water 3 : 1, the quantity of water (in litres) that should be added to the mixture will be:
 (a) 6 (b) $6\frac{1}{2}$ (c) $6\frac{2}{3}$
 (d) $6\frac{3}{4}$ (e) None of these

20. A mixture of 30 L contain milk and water in the ratio of 7 : 3. How much water should be added to it so that the ratio of milk and water becomes 3 : 7?
 (a) 40 L (b) 49 L (c) 56 L
 (d) 63 L (e) None of these

21. Two vessels A and B contain milk and water mixed in the ratio 8 : 5 and 5 : 2, respectively. The ratio in which these two mixtures be mixed to get a new mixture containing $69\frac{3}{13}\%$ milk is
 (a) 3 : 5 (b) 5 : 2 (c) 5 : 7
 (d) 2 : 7 (e) None of these

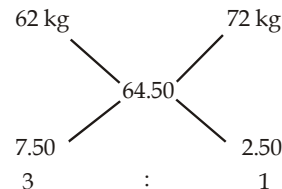
Solutions

Basic Questions

1. (b): In the mixture quantity of milk are $\frac{7}{12} \times 60 = 35$ L
 In mixture quantity of water are $\frac{5}{12} \times 60 = 25$ litre
 Quantity of water is added by = $35 - 25 = 10$ L.

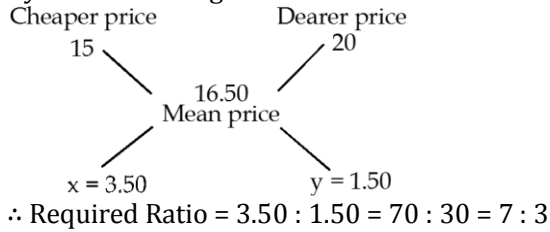
2. (a): Quantity of milk & water be $\left(\frac{30}{15} \times 8\right), \left(\frac{30}{15} \times 7\right)$
 Milk = 16 Litre, Water = 14 Litre
 Let x litre water be added
 $\frac{16}{14+x} = \frac{4}{5} \Rightarrow 56 + 4x = 80 \Rightarrow x = 6$

3. (c): By mixture Alligation method:



4. (b): Quantity of water in a mixture of 60 litre is
 $= \frac{20}{100} \times 60 = 12$ litre
 quantity of milk = $60 \text{ lt.} - 12 \text{ lt.} = 48 \text{ lt.}$
 In new mixture Water = 25%, Milk = 75%
 Let total quantity of new mixture be x litre
 $\Rightarrow x = 64$
 So, quantity of water = $64 - 48 = 16$ litre
 So, 16 ltr. water must be added

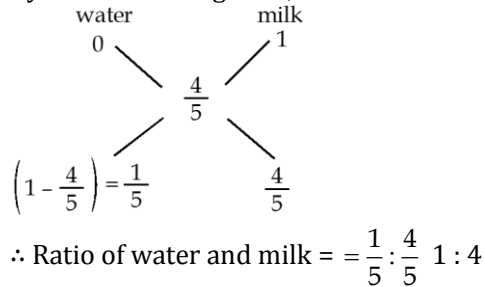
5. (c): By the rule of alligation:



6. (c): Let CP of milk be 1 per litre.
Then SP of 1 litre of mixture = 1 Rs.
Gain obtained = 25%

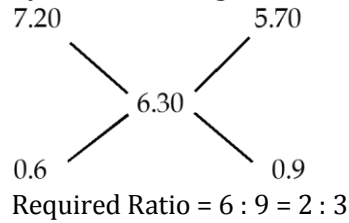
$$\text{CP of 1 litre of mixture} = \frac{100}{125} \times 1 = \frac{4}{5}$$

By the rule of alligation, we have



$$\text{Required percentage} = \frac{1}{5} \times 100\% = 20\%$$

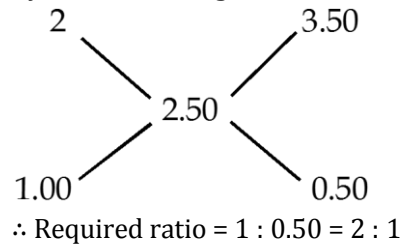
7. (b): By the rule of alligation



8. (b): The required ratio will be same as the ratio of amount of their investment.

$$\therefore \text{Required Ratio} = 45000 : 30000 = 3 : 2$$

9. (a): By the rule of alligation



10. (c): Quantity of sugar in solution = 240 gram

Let quantity added = x gram

$$\therefore \frac{240 + x}{360} = \frac{1}{1} \Rightarrow x = 120 \text{ grams}$$

Prelims Solutions

Level - 1

1. (a): If x litres of water is added to the mixture, the ratio of milk and water will be 14:5

$$\frac{14}{5} = \frac{\frac{7}{8} \times 64}{\frac{1}{8} \times 64 + x}$$

$$\frac{14}{5} = \frac{56}{x + 8}$$

$$14x + 112 = 280$$

$$14x = 168 \Rightarrow x = 12 \text{ litres}$$

2. (c): Let the quantity of milk and water in the mixture be 3x and x respectively.

Then ATQ,

$$\frac{3x}{x+4} = \frac{7}{3}$$

$$9x = 7x + 28$$

$$2x = 28 \Rightarrow x = 14$$

Water in the final mixture = 14 + 4 = 18 litres

3. (b): The container is full of 75 litre milk

$$\text{Required quantity of milk} = 75 \left(1 - \frac{15}{75}\right)^3$$

$$= 75 \left(1 - \frac{1}{5}\right)^3 = 38.4 \text{ litres}$$

4. (e): let initial quantity of juice be 3x litres & water be 4x litres.

$$\text{ATQ, } \frac{3x}{4x+40} = \frac{1}{4}$$

$$12x = 4x + 40 \Rightarrow x = 5$$

Initial quantity of mixture = 3x + 4x = 35 litres

5. (b): Quantity of water remained in Container

$$= 20 \times \frac{1}{4} = 5 \text{ lit}$$

New quantity of water = 5 + 15 = 20 lit

6. (b): Let initial quantity of milk and water be 4x lit & 5x lit respectively.

A.T.Q,

$$\frac{4x}{5x+25} = \frac{2}{5}$$

$$20x = 10x + 50$$

$$x = 5$$

Initial quantity of mixture = 9x = 45 lit.

7. (b): Cost price of mixture per kg = $\frac{45 \times 42 + 75 \times 50}{45 + 75}$

$$= \frac{1890 + 3750}{120} = \text{Rs. } 47$$

Required selling price = 47 × 1.1 = Rs. 51.7

8. (c): let initial quantity of alcohol & water be $4x$ & x lit respectively
 Water added to the mixture be k lit
 $\frac{4x}{x+k} = \frac{1}{1}$
 $3x = k$
 Final mixture contain equal quantity of both alcohol & water i.e. 25 lit
 $x + k = 25$
 $k + \frac{k}{3} = 25$
 $k = \frac{75}{4} = 18.75$ lit

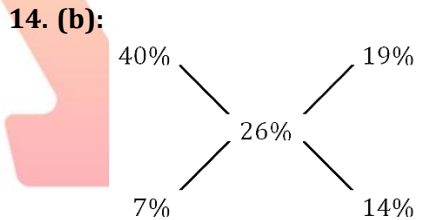
9. (b): Here, the vessel is full of 45 litre milk
 9 litre milk is replaced by 9 litre water and this process is repeated one more time
 Required quantity = $45(1 - \frac{9}{45})^2$
 $= 45(1 - \frac{1}{5})^2$
 $= 45(\frac{4}{5})^2$
 $= \frac{45 \times 16}{25}$
 $= 28.8$ litre

10. (c): Let the initial quantity of alcohol be 'x' ltr and the 'y' ltr of alcohol replaced by water each time.
 Required quantity of alcohol left in the mixture
 $= x \left(\frac{x-y}{x}\right)^n$
 $= 30 \left(\frac{30-3}{30}\right)^3$
 $= 30 \times \frac{9}{10} \times \frac{9}{10} \times \frac{9}{10} = 21.87$ litres

11. (e): Given, total milk = 120 liter
 Let 'x'% of mixture taken out
 So, x% of 120 = 30
 $x = 25\%$
After first operation -
 Milk in vessel = 90 liter
 Water in vessel = 30 liter
After second operation -
 Milk remain in vessel = $90 - 90 \times \frac{25}{100}$
 $= 67.5$ liters
 Water remain in vessel = $30 - 30 \times \frac{25}{100} + 30$
 $= 52.5$ liters
After third operation -
 Milk remain in vessel = $67.5 - 67.5 \times \frac{25}{100}$
 $= 50.625$ liters
 Water remain in vessel
 $= 52.5 - 52.5 \times \frac{25}{100} + 30 = 69.375$ liters
 Required ratio = $\frac{50.625}{69.375}$
 $= 27 : 37$

12. (e): Ratio of milk and water in mixture
 $= 80 \times \frac{3}{4} : 80 \times \frac{1}{4} = 3 : 1$
 Remaining water and milk in mixture —
 Milk = $80 \times \frac{3}{4} - 24 \times \frac{3}{4}$
 $= 60 - 18 = 42$ liter
 Water = $80 \times \frac{1}{4} - 24 \times \frac{1}{4}$
 $= 20 - 6 = 14$ liter
 Let x liter of water added
 $\frac{42}{14+x} = \frac{7}{13}$
 $98 + 7x = 546$
 $7x = 448$
 $x = 64$ liter

13. (a): Let per kg price of rice & wheat be Rs.x & Rs.y respectively.
 ATQ,
 $4x + 5y = 180$... (i)
 And, $2x + 15y = 290$.. (ii)
 On solving (i) & (ii), we get:
 $x = 25, y = 16$
 So, required % = $\frac{16}{25} \times 100 = 64\%$



1:2
 Part of mixture replaced is $\frac{2}{3}$

15. (a):

	A	:	B	
Initially	8	:	5	} 3
	8×1	:	8×1	
Finally	8	:	8	

3 units = 13 litres
 16 units = $\frac{13}{3} \times 16$ litres
 So, initially total quantity of liquid A = $\frac{8}{13} \times \frac{13}{3} \times 16$
 $= \frac{128}{3}$ litres
Or
 Let quantity of liquid A & liquid B in the container initially be $8x$ & $5x$ liters respectively.
 ATQ,
 $\frac{(8x - 13 \times \frac{8}{13})}{5x + 13 - 13 \times \frac{5}{13}} = \frac{1}{1}$
 $x = \frac{16}{3}$ liters
 So, required quantity = $\frac{16}{3} \times 8 = \frac{128}{3}$ liters

- 16. (d):** Let total mixture in vessel be Q liters.
 Initial quantity of water in vessel = 0.25Q
 And, quantity of milk in vessel = 0.75Q
 ATQ -
 $\frac{0.25Q+40}{0.75Q} = \frac{40}{60}$
 $15Q + 2400 = 30Q$
 $15Q = 2400$
 $Q = 160$
 Quantity of milk in vessel = $160 \times \frac{75}{100} = 120$ l
- 17. (c):** Let quantity of water in first mixture be x liters
 Then quantity of milk in the first mixture = (x+6) lit
 Quantity of water added = 15 ltr
 And quantity of milk added = 25 lit
 ATQ
 $\frac{x+15}{x+6+25} = \frac{9}{13}$
 $\Rightarrow x=21$
 Total quantity of water in final mixture = 36 ltrs.
- 18. (b):** Let quantity of milk and water be x lit and y lit respectively.
 Then
 $x + y = 100$ (i)
 And
 $x - y = 68$ (ii)
 From (i) and (ii)
 $x = 84$ & $y = 16$
 ATQ
 $\frac{84-a}{16+a+15} = \frac{3}{2}$
 $\Rightarrow 5a = 75$
 $\Rightarrow a = 15$ lit
- 19. (d):** Juice I 17 : 3
 Juice II 9 : 1 or 18 : 2 (making total quantity of both juices same)
 Both the juices are mixed in the ratio of 3:2
- | | | | | | | |
|----------|----|---|-------|-------|-------------|-------|
| | | | Guava | Sugar | Pomegranate | |
| Juice I | 17 | 3 | 51 | 9 | | |
| Juice II | 18 | 2 | | 4 | 36 | |
| | | | 51 | 13 | 36 | = 100 |
- 20. (e):** Let the price of other variety be Rs 'x' per kg
 Then Atq
 $\frac{10 \times 2 + x \times 3}{5} = 12$
 $x = \text{Rs. } \frac{40}{3}$
- 21. (d):** Let the capacity of container be x liters.
 Atq,
 $x \times \frac{3}{4} \times \frac{3}{4} \times \frac{3}{4} = 297$
 $x = \frac{297 \times 64}{27}$
 $= 704$ lit.

- 22. (d):** Let quantity of milk and water in the initial mixture be '5x liters' & '3x liters' respectively.
 ATQ,
 $\frac{5x-40 \times \frac{5}{8}}{3x-40 \times \frac{3}{8} + 4} = \frac{3}{2}$
 $\frac{5x-25}{3x-11} = \frac{3}{2}$
 $10x - 50 = 9x - 33$
 $x = 17$
 Required quantity = $5x + 3x = 8 \times 17 = 136$ liters
- 23. (d):** Let total mixture taken out from P & Q be 3y & 4y respectively
 ATQ -
 $\frac{4}{9} \times 3y + \frac{5}{12} \times 4y = 144$
 $y = 48$ ml
 Water in resulting mixture = $\frac{5}{9} \times 144 + \frac{7}{12} \times 192$
 $= 192$ ml
- 24. (c):** Milk in B = $\frac{260}{13} \times 7 = 140$ L
 Milk in A = $\frac{8}{7} \times 140$ L
 $= 160$ L
 So,
 $\frac{160}{260-160} = \frac{8}{y}$
 $20y = 100$
 $y = 5$
- 25. (c):** Cost price of mixture of petrol and kerosene
 $= 60 \times \frac{900}{1000} = \text{Rs. } 54$
 ATQ,
- | | |
|--------|----------|
| Petrol | Kerosene |
| 70 | 30 |
| 54 | |
| 24 | 16 |
- So, required ratio = 24 : 16
 $= 3 : 2$
- 26. (c):** According to question
 $\frac{4}{5} \times 80 - \frac{4}{5}x = \frac{1}{5} \times 80 - \frac{1}{5}x + x$
 $64 - \frac{4}{5}x = 16 - \frac{1}{5}x + x$
 $48 = \frac{4}{5}x - \frac{1}{5}x + x$
 $48 = \frac{3x}{5} + x$
 $x = 30$ ℓ
Or
 $\frac{4}{5} \times 80 - \frac{4}{5}x = 40$ (because final concentration is 50%)
 $x = 30$ ℓ

27. (e): Let total mixture in vessel be x liters

$$\begin{aligned} \text{Atq,} \\ \frac{\frac{5x}{7} - 42 \times \frac{5}{7}}{\frac{2x}{7} - 42 \times \frac{2}{7} + 32} &= \frac{7}{6} \\ \frac{5x - 210}{2x + 140} &= \frac{7}{6} \\ 30x - 1260 &= 14x + 980 \\ 16x &= 2240 \\ x &= 140 \text{ liter} \end{aligned}$$

28. (a): S.P. = Rs 16

Profit = 37.5%
 $\therefore \text{CP} = \frac{16 \times 100}{137.5} = \text{Rs } \frac{128}{11}$

Water 0		Milk 12.8
$\frac{128}{11}$		
$\frac{64}{55}$:	$\frac{128}{11}$
1		10

Milk : Water = 10 : 1

29. (a): Let cost of mixture be Rs. 'A'

ATQ -
 $\frac{(120 - A)}{(A - 80)} = \frac{1}{3}$
 $360 - 3A = A - 80$
 $4A = 440$
 $A = 110 \text{ Rs.}$
 Required profit % = $\frac{143 - 110}{110} \times 100$
 $= \frac{33}{110} \times 100$
 $= 30\%$

30. (e): Let quantity of rum = 3x

So \rightarrow Quantity of wine = $3x \times \frac{2}{3} = 2x$
 In 90 ml mixture \rightarrow quantity of wine $\rightarrow \frac{90 \times 2}{5} = 36$
 Total wine in new mixture after 15 ml more wine is added $\Rightarrow 36 + 15 = 51$ gram
 Total new mixture = $90 + 15 = 105$ ml
 Required % $\Rightarrow \frac{51}{105} \times 100 = 48\frac{4}{7}\%$

31. (c): Container A is filled = $28\frac{4}{7}\% = \frac{200}{7}\%$

$= \frac{2}{7}$ th part of A
 Let total capacity of container A = x liter
 Milk in poured container A = 10 liter
 Total mixture poured in container A = $\frac{10}{5} \times 8 = 16$ liter
 ATQ
 $\Rightarrow \frac{2}{7}x = 16$
 $x = 56$ liter

32. (e): in mixture I juice : water = $\frac{120}{100} \times 100 : 100$

$= 6 : 5$
 Mixtures are mixed in ratio 3 : 4
 In final mixture,
 $\frac{\text{juice}}{\text{water}} = \frac{6 \times 3 + 5 \times 4}{5 \times 3 + 6 \times 4} = 38 : 39$

33. (b): Let quantity of petrol in the vessel be 30x liters

So, quantity of diesel in the vessel = $30x \times \frac{25}{75}$
 $= 10x$ liters
 Now, quantity of kerosene in the vessel
 $= (30x \times \frac{100}{50}) - (30x + 10x)$
 $= 20x$ liters
 Required ratio = $\frac{20x}{10x}$
 $= 2 : 1$

34. (c): Let initial quantity of the mixture in the vessel be x litre

In 20 litre mixture,
 Quantity of alcohol = $\frac{3}{10} \times 20 = 6$ litre
 Quantity of water = $\frac{7}{10} \times 20 = 14$ litre

ATQ, $\frac{\frac{3x}{10} - 6}{\frac{7x}{10} - 14 + 2} = \frac{1}{3}$
 $\frac{3x - 60}{7x - 120} = \frac{1}{3}$
 $9x - 180 = 7x - 120$
 $x = 30$ litre

35. (b): Let total quantity of mixture initially = 100x

So quantity of milk initially = 75x
 So quantity of water initially = 25x
 8 liter of mixture is taken out
 So, $\frac{8 \times 75}{100} = 6$ liter of milk is taken out
 $8 - 6 = 2$ liter of water is taken out
 Now,
 ATQ,
 $\frac{75x - 6 + 7}{25x - 2} = \frac{7}{2}$
 $x = \frac{16}{25}$
 So initial quantity of mixture = $\frac{16}{25} \times 100 = 64$ L

36. (c): quantity of water and acid in initial mixture

$= 50 \times \frac{40}{100}, 50 \times \frac{60}{100} = 20$ lit and 30 lit respectively.
 Quantity of acid left after 30 lit of mixture taken out = $30 - 30 \times \frac{3}{5} = 12$ lit.
 Quantity of water left after 30 lit of mixture taken out = $20 - 30 \times \frac{2}{5} = 8$ lit.
 Required ratio
 $= (8 + 50 \times \frac{60}{100}) : (12 + 50 \times \frac{40}{100}) = 19 : 16$

37. (a): Atq

$$66\frac{2}{3}\% \rightarrow \frac{2}{3}$$

$$\frac{(x-30)\frac{13}{20}+2.5}{(x-30)\frac{7}{20}} = \frac{2}{1}$$

$$\Rightarrow \frac{13}{20}x - 19.5 + 2.5 = \frac{14}{20}x - 21$$

$$\frac{x}{20} = 21 - 17$$

$$x = 20 \times 4 \Rightarrow x = 80 \text{ lit}$$

38. (e): Fraction of petrol taken out from the initial quantity = $\frac{20}{240} = \frac{1}{12}$
 So, remaining quantity of petrol in the final mixture = $240 \times \frac{11}{12} \times \frac{11}{12} = 201.66 \text{ lit}$

39. (d): Let quantity of milk in initial mixture be x liters

ATQ,

$$\frac{x+2}{7+11} = \frac{4}{1}$$

$$x+2 = 72$$

$$x = 70$$

So, required quantity = 7 + 70
 = 77 liters

40. (c): let cost of third category rice is x Rs./kg

ATQ

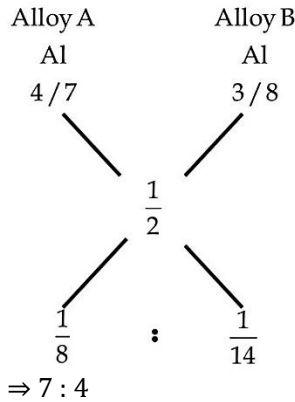
$$\frac{150 \times 1 + 200 \times 2 + x \times 2}{2+2+1} = \frac{252}{120} \times 100$$

$$550 + 2x = 1050$$

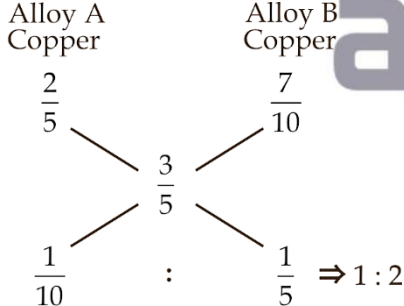
$$x = 250 \text{ Rs/kg}$$

Level - 2

1. (b):



2. (a):



3. (b): Let total quantity of mixture - A and B be '5x liters' and '5y liters' respectively

ATQ

$$5x + 5y = 140$$

$$x + y = 28 \quad \dots (i)$$

Now,

$$5x \times \frac{1}{5} + \frac{50}{100} \times 5y \times \frac{1}{5} = 20$$

$$x + \frac{y}{2} = 20$$

$$2x + y = 40 \quad \dots (ii)$$

So solving (i) and (ii), we get :

$$x = 12, y = 16$$

So, required ratio = $\frac{5x}{5y} = \frac{12}{16} = \frac{3}{4} = 3 : 4$

4. (b): Let quantity of water in original mixture = x liters

So, quantity of milk in original mixture = 2x liters

ATQ,

$$\frac{2x - 45 \times \frac{2}{3}}{x - 45 \times \frac{1}{3} + 45} = \frac{19}{17}$$

$$\Rightarrow \frac{2x - 30}{x + 30} = \frac{19}{17}$$

$$34x - 510 = 19x + 570$$

$$x = 72$$

Hence, quantity of milk in the original mixture = 2x
 = 144 litres

And quantity of water in the resulting mixture =
 $x - 45 \times \frac{1}{3} + 45$
 = 102 liters

Required % = $\frac{144 - 102}{102} \times 100$
 = $\frac{700}{17}\%$
 = $41\frac{3}{17}\%$

5. (c): Total milk in mixture = $384 \times \frac{15}{32} = 180$ liters

Total water in mixture = $384 \times \frac{17}{32} = 204$ liters

ATQ -

$$\frac{180 - X \times \frac{15}{32} + (X - 14)}{204 - X \times \frac{17}{32} + (X - 34)} = \frac{1}{1}$$

$$180 - X \times \frac{15}{32} + (X - 14) = 204 - X \times \frac{17}{32} + (X - 34)$$

$$\frac{X}{16} = (24 - 20)$$

$$X = 64 \text{ liters}$$

Total final mixture

$$= 180 - 64 \times \frac{15}{32} + (64 - 14) + 204 - 64 \times \frac{17}{32} + (64 - 34)$$

$$= 200 + 200 = 400 \text{ liters}$$

Required percentage = $\frac{180}{400} \times 100$
 = 45%

6. (e): Let initial quantity of petrol & kerosene in mixture - A be '5x' & '4x' liters respectively and let initial quantity of petrol & kerosene in mixture - B be '2y' & 'y' liters respectively.

Atq,

$$\frac{20}{100} \times 5x + \frac{50}{100} \times 2y = 90$$

$$x + y = 90 \quad \dots\dots(i)$$

And,

$$\frac{\frac{20}{100} \times 5x + \frac{50}{100} \times 2y}{\frac{20}{100} \times 4x + \frac{50}{100} \times y} = \frac{30}{19}$$

$$\Rightarrow \frac{x+y}{0.8x+0.5y} = \frac{30}{19} \quad \dots(ii)$$

So solving (i) & (ii), we get:

$$\frac{90}{0.8x+0.5y} = \frac{30}{19}$$

$$\Rightarrow 0.8x + 0.5y = 57 \quad \dots(iii)$$

So solving (i) & (iii), we get:

$$x = 40, y = 50$$

$$\begin{aligned} \text{Required quantity} &= 5x + 4x \\ &= 9x = 360 \text{ liters} \end{aligned}$$

7. (c): Let quantity of milk and water in first mixture be 7x and 9x ltr respectively

So addition of 24 liters of second mixture in first mixture:

Quantity of water added = 9 ltr

And quantity of milk added = 15 lit

ATQ

$$\frac{7x+15}{9x+9} = \frac{1}{1} \Rightarrow x=3$$

Hence volume of milk in first mixture = 7 × 3 = 21 ltrs.

Total volume of milk in final mixture = 21 + 15 = 36 ltrs.

8. (e): Let total quantity of mixture - A be 50x liters.

So, total quantity of mixture - B

$$= 50x \times \frac{5}{2} = 125x \text{ liters}$$

ATQ,

$$50x \times \frac{4}{5} + 125x \times \frac{17}{25} = 75$$

$$40x + 85x = 75$$

$$125x = 75 \Rightarrow x = 0.6$$

Required difference

$$\begin{aligned} &= \left(50x \times \frac{1}{5} + 125x \times \frac{8}{25} \right) - 50x \times \frac{1}{5} \\ &= 40x = 24 \text{ liters} \end{aligned}$$

9. (a): Total amount of initial mixture

$$= 22.5 \times 8 = 180 \text{ gm}$$

Let total y gm of mixture taken

ATQ—

$$\frac{180 \times \frac{2}{5} - \frac{2y}{5}}{180 \times \frac{3}{5} - \frac{3y}{5} + 28} = \frac{1}{2}$$

$$\frac{72 - \frac{2y}{5}}{108 - \frac{3y}{5} + 28} = \frac{1}{2}$$

$$\frac{360 - 2y}{680 - 3y} = \frac{1}{2}$$

$$2(360 - 2y) = 680 - 3y$$

$$4y - 3y = 720 - 680$$

$$y = 40 \text{ gm}$$

$$\text{tin taken out} = 40 \times \frac{2}{5} = 16 \text{ gm}$$

10. (a): Total milk in vessel initially = $288 \times \frac{11}{18} = 176 \text{ l}$

$$\text{Total water in vessel initially} = 288 \times \frac{7}{18} = 112 \text{ l}$$

Let x l of mixture is taken out and replaced with water

ATQ -

$$\frac{176 - x \times \frac{11}{18}}{112 - x \times \frac{7}{18} + x} = \frac{11}{13}$$

$$\frac{288 - x}{2016 - 7x + 18x} = \frac{1}{13}$$

$$3744 - 13x = 2016 + 11x$$

$$24x = 1728 \Rightarrow x = 72 \text{ l}$$

Total water in final mixture

$$= 112 - 72 \times \frac{7}{18} + 72 = 156 \text{ l}$$

$$\text{Required ratio} = 112 : 156 = 28 : 39$$

11. (a):

Milk	Water
70	30
55	
25	15
5	3

$$\text{Initial quantity of water} = \frac{3}{8} \times 80 = 30 \text{ litre.}$$

$$\text{Initial quantity of milk} = \frac{5}{8} \times 80 = 50 \text{ litre.}$$

12. (a): Given, when 40% mixture replaced from vessel, ratio of milk, water and mango juice in resulting mixture = 4 : 5 : 6

So, initial ratio of milk and water in vessel also same, milk : water = 4 : 5

ATQ -

$$\text{Water} - \text{milk} = 10 \text{ liters}$$

$$\text{Initial Water} = 50 \text{ liters}$$

$$\text{So, Initial milk} = 40 \text{ liters}$$

$$\text{Total initial quantity} = 50 + 40 = 90 \text{ liters}$$

Quantity of milk in resulting mixture

$$= 40 \times \frac{60}{100} = 24 \text{ liters}$$

Quantity of water in resulting mixture

$$= 50 \times \frac{60}{100} = 30 \text{ liters}$$

Quantity of mango juice in resulting mixture

$$= 90 \times \frac{40}{100} = 36 \text{ liters}$$

After removing X% of resulting mix, remaining quantity = $\frac{33}{5+6} \times 15$

$$\text{So, } x = 50$$

13. (e): quantity of milk in vessel C

$$\frac{x}{9} \times 4 + \frac{39}{13} \times 5 = \frac{4x}{9} + 15$$

And, quantity of water in vessel C

$$\frac{x}{9} \times 5 + \frac{39}{13} \times 8 = \frac{5x}{9} + 24$$

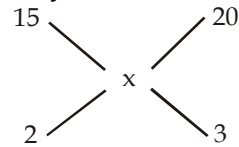
ATQ

$$\Rightarrow \frac{\frac{4x}{9} + 15}{\frac{5x}{9} + 24} = \frac{2}{3} \Rightarrow \frac{4x + 135}{5x + 216} = \frac{2}{3}$$

$$x = 13.5 \text{ lit}$$

14. (a): Let the price per kg of the mixture = x

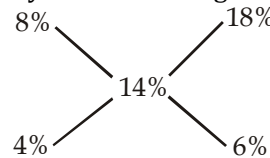
∴ By the rule of Alligation



$$\therefore \frac{x-15}{20-x} = \frac{3}{2} \Rightarrow 2x - 30 = 60 - 3x$$

$$5x = 90 \Rightarrow x = 18$$

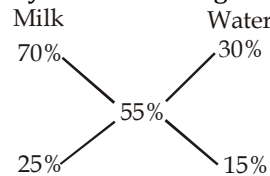
15. (c): By the rule of alligation



$$\therefore \text{ratio} = 4 : 6 = 2 : 3$$

$$\text{required quantity} = \frac{3}{5} \times 1000 = 600 \text{ kg}$$

16. (b): By the rule of alligation



$$\text{ratio} = 25 : 15 = 5 : 3$$

$$\therefore \text{Quantity of milk} = \frac{5}{8} \times 160 = 100 \text{ ltr.}$$

$$\text{and, Quantity of water} = \frac{3}{8} \times 160 = 60 \text{ ltr.}$$

17. (d): Let initially the amount of liquid P in the tub = 4x
initially the amount of liquid Q in the tub = x

$$\therefore \frac{4x - \frac{4}{5} \times 10}{x - \frac{1}{5} \times 10 + 10} = \frac{2}{3} \Rightarrow \frac{4x - 8}{x - 2 + 10} = \frac{2}{3}$$

$$12x - 24 = 2x + 16 \Rightarrow 10x = 40 \Rightarrow x = 4$$

$$\therefore \text{Quantity of liquid P} = 4 \times 4 = 16 \text{ litre}$$

18. (d): Quantity of milk in new mixture-

$$= x \left(1 - \frac{y}{x}\right)^x = 27 \left(1 - \frac{9}{27}\right)^2 = 27 \times \frac{2}{3} \times \frac{2}{3} = 12 \text{ litre.}$$

Quantity of water in new mixture

$$= 27 - 12 = 15 \text{ litre}$$

$$\text{Required Ratio} = 12 : 15 = 4 : 5$$

19. (d): Share in profit

Let Aditya invested his money for x month then Manish will invest (36 - x).

$$\therefore \frac{300 \times x}{500(36-x)} = \frac{33}{35} \Rightarrow \frac{x}{36-x} = \frac{11}{7} \Rightarrow x = 22$$

20. (c): Let Initial quantity of A and B = 3x and 2x

$$\therefore \frac{3x - \frac{3}{5} \times 5}{2x - \frac{2}{5} \times 5 + 5} = \frac{2}{3} \Rightarrow \frac{x}{36-x} = \frac{11}{7} \Rightarrow x = 22$$

$$= 9x - 9 = 4x + 6 \Rightarrow 5x = 15 \Rightarrow x = 3$$

$$12x - 4 = 2x + 16 \Rightarrow 10x = 40 \Rightarrow x = 4$$

$$\therefore \text{quantity of A Initially} = 3 \times 3 = 9 \text{ litres.}$$

Mains Solutions

1. (b): Let the quantity of diesel, petrol & kerosene oil in vessel - B be 'y', '3y' & '5y' liters respectively.

$$\text{Quantity of petrol in vessel - A} = 80 \times \frac{3}{4} = 60 \text{ liters}$$

$$\text{Quantity of Kerosene oil in vessel - A} = 80 \times \frac{1}{4} = 20 \text{ liters}$$

ATQ,

$$(60 + 3y) - (20 + 5y) = 10$$

$$40 - 2y = 10$$

$$y = 15 \text{ liters}$$

$$\text{Required capacity} = (y + 3y + 5y) \text{ liters}$$

$$= 9y \text{ liters}$$

$$= 135 \text{ liters}$$

2. (d): let no. of CRACKER book sold in a day = 5a

$$\text{Price of a CRACKER book} = 5a \times \frac{80}{100} = \text{Rs. } 4a$$

$$\text{Price of a ACE book} = \text{Rs. } (4a - 10)$$

$$\text{Quantity of ACE book sold in a day} = (350 - 5a)$$

ATQ

$$\frac{4a \times 5a}{(4a-10)(350-5a)} = \frac{9}{11}$$

On solving

$$8a^2 - 261a + 630 = 0 \Rightarrow a = 30, \frac{21}{8}$$

As 5a is quantity of book so a can't be in fraction so a = 30

$$\text{Required revenue} = 4a \times 5a \times 31$$

$$\Rightarrow 4 \times 30 \times 5 \times 30 \times 31 = \text{Rs. } 5,58,000$$

3. (d): Let total mixture in vessel A = 9x liters
And, total mixture in vessel B = 8y liters

ATQ—

$$\frac{9x \times \frac{25}{100} \times \frac{5}{9} + 45}{9x \times \frac{25}{100} \times \frac{4}{9}} = \frac{7}{2}$$

$$\frac{1.25x + 45}{x} = \frac{7}{2}$$

$$2.5x + 90 = 7x \Rightarrow 4.5x = 90$$

$$x = \frac{90}{4.5} \Rightarrow x = 20$$

Initial quantity of mixture in vessel B
= 20 × 9 = 180 liters

Quantity of milk in vessel B
= 180 × $\frac{5}{8}$ = 112.5 liters

4. (c): Given, sprite taken out from glass 'A' = 4x ml
Total mixture in glass 'B' = (220 + 4x) ml

$$\text{Ratio of coke to sprite in glass 'B'} = \frac{220}{4x} = \frac{55}{x}$$

Now mixture taken out from glass 'B' and poured in glass 'C' = 3x ml

Given, ratio of coke to sprite in glass 'C' = 11 : 4

$$\frac{3x}{55 + x} \times 55 : \frac{3x}{55 + x} \times x = 11 : 4$$

$$\frac{55}{x} = \frac{11}{4} \Rightarrow x = 20 \text{ ml}$$

$$\text{Required quantity} = 4 \times x - \frac{3x}{55 + x} \times x$$

$$= 4 \times 20 - \frac{3 \times 20}{55 + 20} \times 20$$

$$= 80 - \frac{60}{75} \times 20 = 80 - 16 = 64 \text{ ml}$$

5. (c): Let initially milk and water in containers Q is '3a' liters and 'a' liters respectively

ATQ -

$$3a + \frac{8}{9} \times 36 - a - \frac{1}{9} \times 36 = 60$$

$$3a + 32 - a - 4 = 60 \Rightarrow a = 16 \text{ liters}$$

Initial quantity in container Q = 16 (3 + 1)
= 64 liters

$$\text{Required difference} = (108 - 36) - 64 = 8 \text{ liters}$$

6. (d): For vessel A -

$$\text{Petrol taken out} = \frac{7P}{12} \text{ liters}$$

$$\text{Kerosene oil taken out} = \frac{5P}{12} \text{ liters}$$

For vessel B-

$$\text{Kerosene oil taken out} = \frac{5Q}{13} \text{ liters}$$

In vessel C-

Kerosene oil =

$$\frac{5P}{12} + \frac{5Q}{13} = \frac{150 \times 40}{100}$$

$$\frac{65P + 60Q}{156} = 60$$

$$13P + 12Q = 1872 \text{ ---(I)}$$

Petrol in vessel C

$$\frac{7P}{12} + \frac{8Q}{13} = \frac{150 \times 60}{100}$$

$$\frac{91P + 96Q}{156} = 90$$

$$91P + 96Q = 14040 \text{ ---(II)}$$

From (I) and (II) _____

$$Q = 78$$

$$P = 72$$

$$\frac{P}{Q} = \frac{72}{78} = \frac{12}{13}$$

7. (a): Let ratio of Vodka and wine in vessel A be 5x and 3x

and ratio of Vodka and wine in vessel B be 3y and 2y

ATQ—

$$\frac{3y + 16 \times \frac{5}{8}}{2y + 16 \times \frac{3}{8}} = \frac{29}{19}$$

$$\frac{3y + 10}{2y + 6} = \frac{29}{19}$$

$$58y - 57y = 190 - 174$$

$$y = 16$$

New quantity of mixture in vessel B

$$= (16 \times 3 + 10) + (16 \times 2 + 6)$$

$$= 96 \text{ l} = \text{initial quantity of mixture in vessel A}$$

Quantity of Vodka remaining in vessel A

$$= 96 \times \frac{5}{8} - \frac{16 \times 5}{8} = 60 - 10 = 50 \text{ l}$$

8. (b): Let total mixture of sulphuric acid and nitrous oxide in vessel A and B be P ml and Q ml respectively

ATQ,

$$P + Q = 390 \text{ ---(i)}$$

$$\frac{2P}{9} + \frac{4Q}{7} = 160$$

$$14P + 36Q = 10080 \text{ ---(ii)}$$

From 14 × (i) - (ii)

$$Q = 210 \text{ ml}$$

$$P = 390 - 210 = 180 \text{ ml}$$

$$\text{Required ratio} = \frac{180}{210} = 6 : 7$$

9. (b): Water quantity in first case = $\frac{7}{20} \times 48$ litre

$$\text{water quantity in second case} = \frac{17}{35} \times 42 \text{ litre}$$

Total water quantity in 90 litre of mixture

$$= \frac{7 \times 48}{20} + \frac{17 \times 42}{35} = \frac{186}{5} \text{ litre}$$

After adding of 20 litre of water the quantity will

$$\text{be} = \frac{186}{5} + 20 = \frac{286}{5}$$

quantity of wine in 110 litre of mixture

$$= 110 - \frac{286}{5} = \frac{264}{5}$$

$$\therefore \text{required ratio} = \frac{264}{5} : \frac{286}{5} = 12 : 13$$

10. (a): The quantity of milk in the (2 + 5 + 9 = 16) ltr. of

$$\text{mixture} = \frac{90}{100} \times 2 + \frac{80}{100} \times 5 + \frac{70}{100} \times 9$$

$$= 1.8 + 4 + 6.3 = 12.1$$

$$\text{Water quantity} = 16.0 - 12.1 = 3.9$$

$$\therefore \text{Required Ratio} = \frac{121}{39} = 121 : 39$$

Previous Year Question

1. **(b):** When X liter milk is taken out
 Quantity of milk left = $(240 - X)$ lit
 Quantity of water = X lit
 When 20% of mixture taken out
 Remaining quantity of milk = $\frac{80}{100} \times (240 - X)$
 = $(192 - 0.8X)$ lit
 Remaining quantity of water
 = $\frac{80}{100} \times X + \frac{20}{100} \times 240 = (0.8X + 48)$ lit
 ATQ, $(192 - 0.8X) - (0.8X + 48) = 128$
 $16 = 1.6X \Rightarrow X = 10$
2. **(b):** milk remained after 20 lit mixture is taken out
 = $(96 - 20) \times \frac{65}{100} = 49.4$ lit
 Water remained after 20 lit mixture is taken out
 = $(96 - 20) \times \frac{35}{100} = 26.6$ lit
 Required difference = $(49.4 + 10) - (26.6 + 16)$
 = 16.8 litre
3. **(b):** Ratio of Milk and water in mixture = 60 : 40
 = 3 : 2
 Quantity of Milk left in mixture after 20 gm of mixture is taken out = $60 \times \frac{3}{5} = 36$ gm.
 Quantity of water left = $60 \times \frac{2}{5} = 24$ gm
 \therefore Required ratio = $\frac{36}{24+6} = 6 : 5$
4. **(e):** Ratio of milk to that of water in the initial mixture = 16:5
 $\frac{1}{4}$ th of the mixture = 21 liter
 $\frac{64 - 21 \times \frac{16}{21}}{20 - 21 \times \frac{5}{21} + x} = \frac{2}{1}$
 $x = 9$ liter
5. **(c):** Given, sprite taken out from glass 'A' = 4X ml
 Total mixture in glass 'B' = $(220 + 4X)$ ml
 Ratio of coke to sprite in glass 'B' = $\frac{220}{4X} = \frac{55}{X}$
 Now mixture taken out from glass 'B' and poured in glass 'C' = 3X ml
 Given, ratio of coke to sprite in glass 'C' = 11 : 4
 $\frac{3X}{55 + X} \times 55 : \frac{3X}{55 + X} \times X = 11 : 4$
 $\frac{55}{X} = \frac{11}{4} \Rightarrow X = 20$ ml
 Required quantity = $4 \times X - \frac{3X}{55 + X} \times X$
 = $4 \times 20 - \frac{3 \times 20}{55 + 20} \times 20$
 = $80 - \frac{60}{75} \times 20 = 80 - 16 = 64$ ml

6. **(b):** Let quantity of milk and water be x lit and y lit respectively.
 Then
 $x + y = 100$ (i)
 And
 $x - y = 68$ (ii)
 From (i) and (ii)
 $x = 84$ & $y = 16$
 ATQ
 $\frac{84 - a}{16 + a + 15} = \frac{3}{2} \Rightarrow 5a = 75 \Rightarrow a = 15$ lit
7. **(c):** Total milk in mixture = $384 \times \frac{15}{32} = 180$ liters
 Total water in mixture = $384 \times \frac{17}{32} = 204$ liters
 ATQ -
 $\frac{180 - X \times \frac{15}{32} + (X - 14)}{204 - X \times \frac{17}{32} + (X - 34)} = \frac{1}{1}$
 $180 - X \times \frac{15}{32} + (X - 14) = 204 - X \times \frac{17}{32} + (X - 34)$
 $\frac{X}{16} = (24 - 20) \Rightarrow x = 64$ liters
 Total final mixture = $180 - 64 \times \frac{15}{32} + (64 - 14) + 204 - 64 \times \frac{17}{32} + (64 - 34)$
 = $200 + 200 = 400$ liters
 Required percentage = $\frac{180}{400} \times 100 = 45\%$
8. **(a):** Let total initial mixture = 7x
 ATQ -
 $(6x - 21 \times \frac{6}{7} + 77) + (x - 21 \times \frac{1}{7}) = 14x$
 $7x = 56 \Rightarrow x = 8$
 So, quantity of the initial mixture = $7x = 56$ liters
9. **(e):** let initial quantity of milk & water be 5x & 3x lit respectively
 ATQ, $\frac{5x + 8}{3x} = \frac{11}{5}$
 $25x + 40 = 33x \Rightarrow x = 5$
 required difference = $5x - 3x = 2x = 10$ lit
10. **(b):** Ratio of Milk and water in mixture = 60 : 40 = 3 : 2
 Quantity of Milk left in mixture after 20 gm of mixture is taken out = $60 \times \frac{3}{5} = 36$ gm.
 Quantity of water left = $60 \times \frac{2}{5} = 24$ gm
 \therefore Required ratio = $\frac{36}{24+6} = 6 : 5$
11. **(a):** Let initial quantity of liquid P and Q in container be 5x & 3x respectively
 So,
 $\frac{5x - \frac{5}{8} \times 16}{8x} = \frac{1}{2}$
 $5x - 10 = 4x \Rightarrow x = 10$
 Initial quantity of mixture = $(5 + 3) \times 10 = 80$ liter

12. (a): ATQ,

Let quantity of milk and water in the vessel initially be $7x$ liters & x liters respectively.

ATQ,

$$\left(7x - 24 \times \frac{7x}{8x}\right) = 56$$

$$x = 11$$

13. (b): Let total initial mixture in vessel = $4x$

So, milk in vessel = $3x$

And water in vessel = x

ATQ -

$$\left(3x - 20 \times \frac{3x}{4x}\right) - \left(x - 20 \times \frac{x}{4x}\right) = 70$$

$$(3x - 15) - (x - 5) = 70$$

$$2x = 80 \Rightarrow x = 40$$

So, initial mixture in vessel

$$= 4x = 4 \times 40 = 160 \text{ liters}$$

14. (a): Ratio of water to that of juice in the initial mixture = 6:5

50% of the mixture = 44 liter

ATQ,

$$\frac{48 - 44 \times \frac{6}{11}}{40 - 44 \times \frac{5}{11} + a} = \frac{4}{5}$$

$$a = 10 \text{ liter}$$

15. (e): Let the quantity of mixture be $100x$ lit

Quantity of milk = $76x$ lit

And quantity of water = $24x$ lit

Quantity of water taken = $12x$ lit

Quantity of milk taken = $38x$ lit

ATQ

$$26x = 78 \Rightarrow x = 3 \text{ lit}$$

required quantity of milk = 114 lit

16. (a): Let initial quantity of milk and water in the mixture be '40x liters' and '10x liters' respectively.

ATQ,

$$\frac{(40x \times \frac{1}{2})}{10x \times \frac{1}{2} + 24} = \frac{1}{1}$$

$$\frac{20x}{5x + 24} = \frac{1}{1}$$

$$20x = 5x + 24$$

$$15x = 24 \Rightarrow x = 1.6$$

So, required quantity = $40x + 10x$

$$= 50x = 80 \text{ liters}$$

17. (e): Let initial quantity of milk and water in the vessel be $30x$ lit and $10x$ lit respectively.

$$\text{Quantity of milk taken out from the vessel} = 80 \times \frac{3}{4}$$

$$= 60 \text{ lit}$$

Quantity of water taken out from the vessel =

$$80 \times \frac{1}{4} = 20 \text{ lit}$$

ATQ,

$$\frac{(30x - 60) + 80}{10x - 20} = \frac{700}{100}$$

$$\Rightarrow x = 4$$

Hence, required original quantity of the vessel

$$= 30x + 10x = 160 \text{ lit}$$

18. (d): Cost price of $(15 + 25)$ kg of rice

$$= 15 \times 29 + 25 \times 20$$

$$= 435 + 500 = \text{Rs. } 935$$

Selling price of 40 kg of mixture = 27×40

$$= \text{Rs. } 1080$$

$$\text{Gain} = 1080 - 935 = \text{Rs. } 145$$

19. (c): Quantity of milk = $\frac{7}{8} \times 40 = 35 \text{ L}$

Quantity of water = 5 L

$$\frac{35}{5 + x} = \frac{3}{1} \Rightarrow 35 = 15 + 3x$$

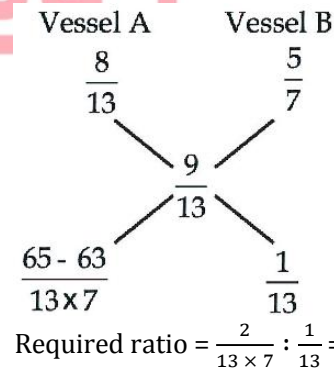
$$3x = 20, x = \frac{20}{3} = 6\frac{2}{3} \text{ L}$$

20. (a): Quantity of milk = $\frac{7}{10} \times 30 = 21 \text{ L}$


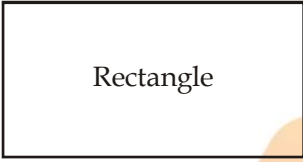
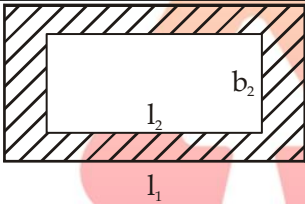
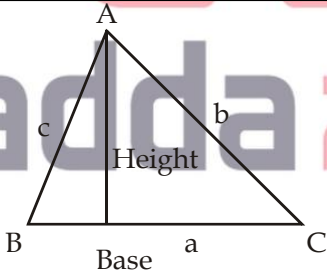
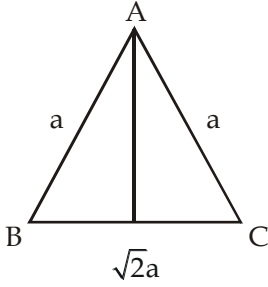
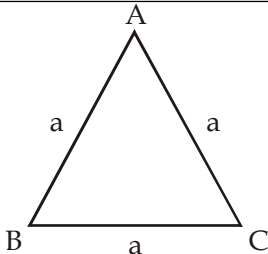
Quantity of water = 9 L

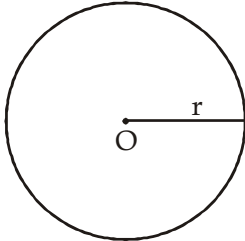
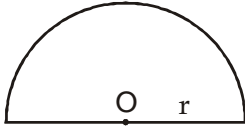
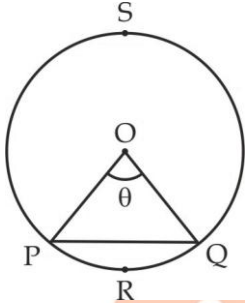
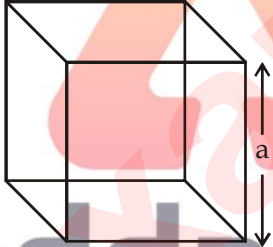
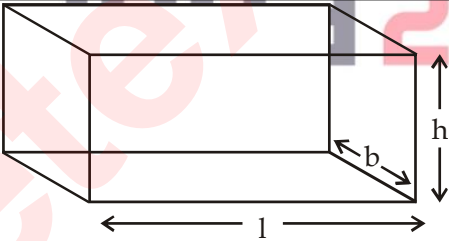
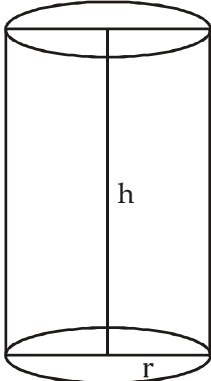
$$\frac{21}{9 + x} = \frac{3}{7} \Rightarrow 147 = 27 + 3x \Rightarrow 3x = 120, x = 40$$

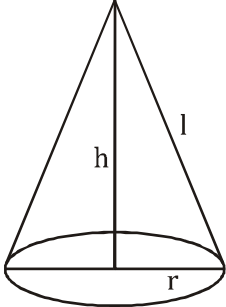
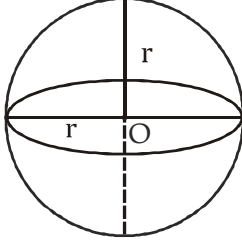
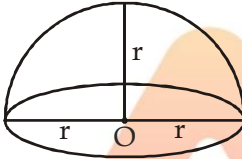
21. (d):



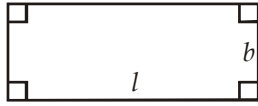
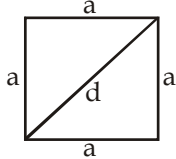
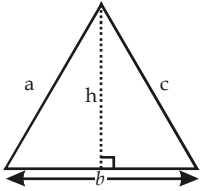
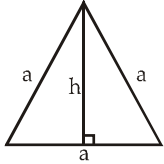
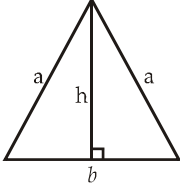
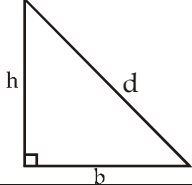
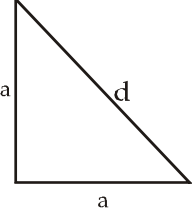
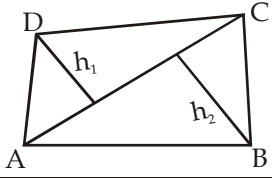
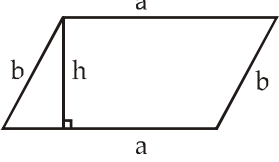
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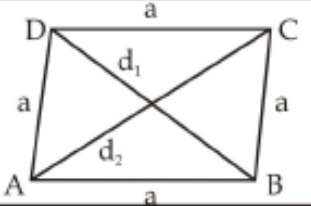
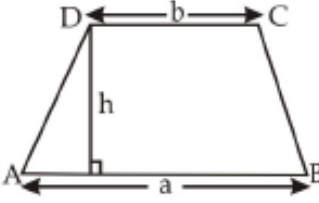
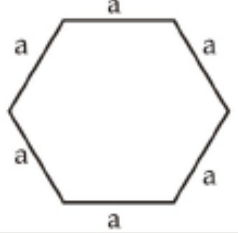
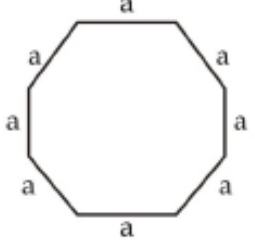
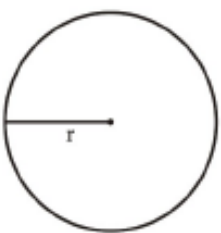

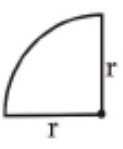
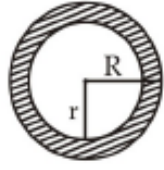
S. No.	Name	Figure	Formula
1.	Square	 <p>Square Side(S)</p>	<ul style="list-style-type: none"> • Area = side \times side = $(s)^2$ • $S = \sqrt{\text{Area}}$ • Perimeter = 4 (Side) • Diagonal = (side) $\times \sqrt{2}$
2.	Rectangle	 <p>Rectangle length (l) breadth (b)</p>	<ul style="list-style-type: none"> • Area = $l \times b$ • Perimeter = $2(l + b)$ • Diagonal = $\sqrt{l^2 + b^2}$
		 <p>l_1 l_2 b_1 b_2</p>	<ul style="list-style-type: none"> • Area of track = $l_1 b_1 - l_2 b_2$
3.	Triangle	 <p>A c Height b Base a B C</p>	<ul style="list-style-type: none"> • Area = $\frac{1}{2} \times \text{base} \times \text{height}$ • Area = $\sqrt{s(s-a)(s-b)(s-c)}$ <p>Where, $s = \text{semi-perimeter} = \frac{a+b+c}{2}$</p>
	Area and perimeter of Right angled Isosceles Triangle	 <p>A a a $\sqrt{2}a$ B C</p>	<ul style="list-style-type: none"> • Area = $\frac{1}{2} a^2$ • Perimeter = $(2a + \sqrt{2}a)$ • Height = $\frac{a}{\sqrt{2}}$
	Area of equilateral Triangle	 <p>A a a a B C</p>	<ul style="list-style-type: none"> • Area = $\frac{\sqrt{3}}{4} \times (\text{side})^2 = \frac{\sqrt{3}}{4} a^2$ • Altitude = $\frac{\sqrt{3}}{2} \times \text{side} = \frac{\sqrt{3}}{2} a$ • Perimeter = $3 \times \text{side} = 3a$

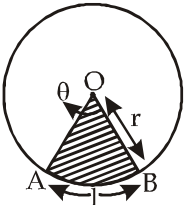
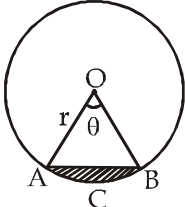
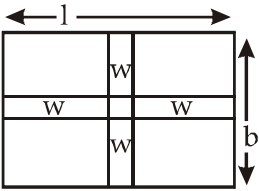
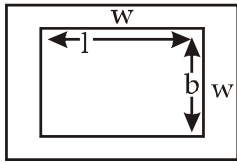
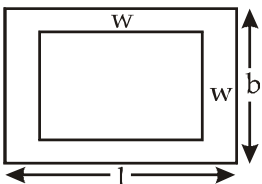
S. No.	Name	Figure	Formula
4.	Circle		<ul style="list-style-type: none"> Circumference = $2\pi r = \pi D$ Area = $\frac{\pi}{4} D^2$
5.	Semi circle		<ul style="list-style-type: none"> Area of semi-circle = $\frac{1}{2} \pi r^2$ Perimeter of semi-circle = $\pi r + 2r = \pi r + D$
6.	Area of Sector		<ul style="list-style-type: none"> If θ be the angle at the centre of a circle of radius r Length of the arc PQ = $2\pi r \times \frac{\theta}{360^\circ}$ Area of sector OPRQ = $\pi r^2 \times \frac{\theta}{360^\circ}$
7.	Cube		<ul style="list-style-type: none"> edge of cube = length = breadth = height = a Volume of a cube = $(edge)^3 = a^3$ Total surface Area = $6 \times (edge)^2 = 6a^2$ Diagonal of a cube = $\sqrt{3} \times edge = \sqrt{3}a$
6.	Cuboid		<ul style="list-style-type: none"> $V = l \times b \times h$ Surface area = $2(lb + bh + hl)$ Diagonal = $\sqrt{l^2 + b^2 + h^2}$
8.	Right Circular Cylinder		<ul style="list-style-type: none"> Volume = $\pi r^2 h$ Curved Surface Area = $2\pi r h$ Total surface Area = $2\pi r h + 2\pi r^2 = 2\pi r(r + h)$

S. No.	Name	Figure	Formula
9.	Right Circular Cone		<ul style="list-style-type: none"> • Volume = $\frac{1}{3} \pi r^2 h$ • Curved Surface Area = $\pi r l$ • Total surface Area = $\pi r l + \pi r^2$ = $\pi r(l + r)$
10.	Sphere		<ul style="list-style-type: none"> • Volume = $\frac{4}{3} \pi r^3$ • Surface Area = $4\pi r^2$
11.	Hemisphere		<ul style="list-style-type: none"> • Volume = $\frac{2}{3} \pi r^3$ • Curved Surface Area = $2\pi r^2$ • Total surface Area = $2\pi r^2 + \pi r^2 = 3\pi r^2$

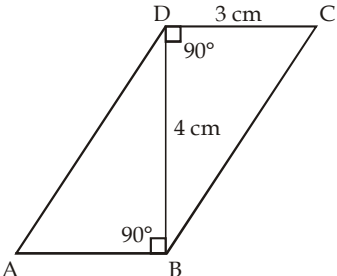
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S. No.	Name	Figure	Nomenclature	Area	Perimeter
1.	Rectangle		l → length b → breadth	$l \times b = lb$	$2l + 2b = 2(l + b)$
2.	Square		a → side d → diagonal $d = a\sqrt{2}$	(i) $a \times a = a^2$ (ii) $\frac{d^2}{2}$	$a + a + a + a = 4a$
3.	Triangle (Scalene)		a, b and c are three sides of triangle and s is the semiperimeter, where $s = \frac{(a + b + c)}{2}$ b is the base and h is the altitude of triangle	(i) $\frac{1}{2} \times b \times h$ (ii) $\sqrt{s(s-a)(s-b)(s-c)}$ (Hero's formula)	$a + b + c = 2s$
4.	Equilateral triangle		a → sides h → height or altitude $h = \frac{\sqrt{3}}{2} a$	(i) $\frac{1}{2} \times a \times h$ (ii) $\frac{\sqrt{3}}{4} a^2$	$3a$
5.	Isosceles triangle		a → equal sides b → base $h = \frac{\sqrt{4a^2 - b^2}}{2}$ h → height or altitude	(i) $\frac{1}{2} \times b \times h$ (ii) $\frac{1}{4} \times b \times \sqrt{4a^2 - b^2}$	$2a + b$
6.	Right angled triangle		b → base h → altitude/height d → hypotenuse $d = \sqrt{b^2 + h^2}$	$\frac{1}{2} \times b \times h$	$b + h + d$
7.	Isosceles right angled triangle		a → equal sides d → hypotenuse $d = a\sqrt{2}$	$\frac{1}{2} a^2$	$2a + d$
8.	Quadrilateral		AC is the diagonal and h_1, h_2 are the Altitudes on AC from the vertices D and B respectively	$\frac{1}{2} \times AC \times (h_1 + h_2)$	$AB + BC + CD + AD$
9.	Parallelogram		a and b are sides adjacent to each other. h → distance between the parallel sides	$a \times h$	$2(a + b)$

10.	Rhombus		<p>a → each equal side of Rhombus d_1 and d_2 are the diagonals d_1 → BD d_2 → AC</p>	$\frac{1}{2} \times d_1 \times d_2$	4a
11.	Trapezium		<p>a and b are parallel sides to each other and h is the perpendicular distance between parallel sides</p>	$\left(\frac{a+b}{2}\right) \times h$	AB+BC+CD+AD
12.	Regular hexagon		a → each of the equal side	$\frac{3\sqrt{3}}{2} a^2$	6a
13.	Regular Octagon		a → each of equal side	$2a^2(1+\sqrt{2})$	8a
14.	Circle		<p>r → radius of the circle $\pi = \frac{22}{7} = 3.1416$ (approx)</p>	πr^2	$2\pi r$ (called as circumference)
15.	Semicircle		r → radius of the circle	$\frac{1}{2} \pi r^2$	$\pi r + 2r$
16.	Quadrant		r → radius	$\frac{1}{4} \pi r^2$	$\frac{1}{2} \pi r + 2r$
17.	Ring of circular path (shaded region)		<p>R → outer radius r → inner radius</p>	$\pi(R^2 - r^2)$	<p>(outer) → $2\pi R$ (inner) → $2\pi r$</p>

18.	Sector of a circle		<p>O → centre of the circle r → radius l → length of the arc θ → angle of the sector $l = 2\pi r \left(\frac{\theta}{360^\circ} \right)$</p>	<p>(i) $\pi r^2 \left(\frac{\theta}{360^\circ} \right)$ (ii) $\frac{1}{2} r \times l$</p>	$l + 2r$
19.	Segment of a circle		<p>θ → angle of the sector r → radius AB → chord ACB → arc of the circle</p>	<p>Area of segment ACB (Minor segment) $= r^2 \left(\frac{\pi\theta}{360^\circ} - \frac{\sin\theta}{2} \right)$</p>	$\left[\frac{\theta}{360^\circ} \times 2\pi r + 2r \sin \left(\frac{\theta}{2} \right) \right]$
20.	Pathways running across the middle of a rectangle		<p>l → length b → breadth w → width of the path (road)</p>	$(l + b - w)w$	$2(l + b) - 4w$ $+ 4w$ $= 2[l + b]$
21.	Outer pathways		<p>l → length b → breadth w → widthness of the path</p>	$(l + b + 2w) 2w$	(inner) → $2(l + b)$ (outer) → $2(l + b + 4w)$
22.	Inner path		<p>l → length b → breadth w → widthness of the path</p>	$(l + b - 2w) 2w$	(outer) → $2(l + b)$ (inner) → $2(l + b - 4w)$

Basic Questions

- A rectangular plot is 180 m^2 in area. If its length is 18m then, its perimeter is?
 (a) 28 m (b) 56 m (c) 360 m
 (d) 60 (e) None of these
- The side of a square exceeds the side of the another square by 4 cm and the sum of the areas of the two squares is 400 cm^2 . The dimensions of the square are?
 (a) 8 cm and 12 cm (b) 6 cm and 10 cm
 (c) 12 cm and 16 cm (d) 10 cm and 18 cm
 (e) None of these
- The area of the floor of a rectangular hall of length 40 m is 960 m^2 . Carpets of size $6 \text{ m} \times 4 \text{ m}$ are available. Then, how many carpets are required to cover the hall?
 (a) 20 (b) 30 (c) 40
 (d) 45 (e) None of these
- A lawn is in the shape of rectangle of length 60 m and width 40 m. Inside the lawn there is a footpath of uniform width 1 m bordering the lawn. The area of the path is
 (a) 194 m^2 (b) 196 m^2 (c) 198 m^2
 (d) 200 m^2 (e) None of these
- ABCD is a parallelogram as shown in figure, then its area is?

 (a) 12 cm^2 (b) 14 cm^2 (c) 15 cm^2
 (d) 660 cm^2 (e) None of these

6. What is the area of a triangle whose sides are 9 cm, 12 cm and 15 cm ?
 (a) 45 cm^2 (b) 54 cm^2 (c) 56 cm^2
 (d) 64 cm^2 (e) None of these
7. What is the perimeter of an equilateral triangle whose area is $4\sqrt{3} \text{ cm}^2$?
 (a) 4 cm (b) 3 cm (c) 12 cm
 (d) 7 cm (e) None of these
8. The circumference of a circle whose area is 24.64 m^2 is
 (a) 17.2 m (b) 17.4 m (c) 17.6 m
 (d) 18.0 m (e) None of these
9. If the radius of a circle is decreased by 20%, then the percentage decrease in its area is?
 (a) 26% (b) 32% (c) 36%
 (d) 53% (e) None of these
10. If the perimeter of a semi-circular protractor is 36 cm, then its diameter is?
 (a) 6 cm (b) 7 cm (c) 7.5 cm
 (d) 14 cm (e) None of these
11. The ratio of the area of the incircle and circumcircle of a square are?
 (a) 1 : 1 (b) 2 : 1 (c) 1 : 2
 (d) 3 : 1 (e) None of these
12. The diagonal of a square field measures 50 m. The area of square field is?
 (a) 1250 m^2 (b) 1200 m^2 (c) 1205 m^2
 (d) 1025 m^2 (e) None of these
13. The circumference of a circle is 176 m. Then, its area is
 (a) 2464 m^2 (b) 2164 cm^2 (c) 2346 cm^2
 (d) 2246 cm^2 (e) None of these
14. In a circle of radius 42 cm, an arc subtends an angle of 72° at the centre. The length of the arc is?
 (a) 52.8 cm (b) 53.8 cm (c) 72.8 cm
 (d) 79.8 cm (e) None of these
15. An isosceles right angle triangle has area 200 cm^2 . Then length of its hypotenuse is
 (a) $15\sqrt{2} \text{ cm}$ (b) $\frac{10}{\sqrt{2}} \text{ cm}$ (c) $10\sqrt{2} \text{ cm}$
 (d) $20\sqrt{2} \text{ cm}$ (e) None of these

Prelims Questions

Level - 1

1. If side of a square is equal to height of equilateral triangle, then find ratio of area of equilateral triangle to area of square?
 (a) $\sqrt{2} : 5$ (b) 3 : 5 (c) $\sqrt{3} : 2$
 (d) $1 : \sqrt{3}$ (e) Data insufficient.
2. A circle is inscribed in an equilateral triangle whose height is $3\sqrt{3} \text{ cm}$. Then, find the ratio of area of equilateral triangle to area of circle inscribed in an equilateral triangle.
 (a) $3\sqrt{3} : 4$ (b) $4 : 3\sqrt{3}$ (c) $5\sqrt{2} : 7\sqrt{3}$
 (d) Cannot be determined.
 (e) None of the above.
3. Ratio of volume of conical tent to total surface area of hemispherical bowl is 8 : 1. Radius of bowl and tent is equal and slant height of tent is 75cm. If radius of conical tent is equal to side of a cube, then find curved surface area of cube.
 (a) 1576 cm^2 (b) 1764 cm^2 (c) 1852 cm^2
 (d) 1690 cm^2 (e) 1512 cm^2
4. Length of a rectangle is how much percent more than its breadth if area of rectangular plot is 480 sq. m. and when each side has been 5 m longer, the area would have been increased by 245 sq. m.?
 (a) 50% (b) 20% (c) 10%
 (d) 80% (e) 40%
5. Ravi cuts a square field of maximum possible area from his circular field. Find the area of the remaining circular field if the cost of grass cutting of the square field at Rs 4 per m^2 is Rs 882?
 (a) 120 m^2 (b) 126 m^2 (c) 121 m^2
 (d) 116 m^2 (e) 109 m^2
6. Area of rectangle having length and breadth in the ratio of 4: 3 is 432 cm^2 . A square whose side is equal to diagonal of rectangle then find ratio of numerical value of perimeter to the area of square?
 (a) 7: 55 (b) 4: 35 (c) None of these
 (d) 1:8 (e) 2:15

7. The diagonal of a square is $4\sqrt{2}$ units. The diagonal of another square whose area is double that of the first square is. (in units)
 (a) $4\sqrt{2}$ (b) $6\sqrt{2}$ (c) 8
 (d) $8\sqrt{2}$ (e) 10
8. The radius of a cylinder & a sphere is same, and ratio of height and radius of cylinder is 2 : 1. If the volume of sphere is $288 \pi \text{ cm}^3$ then find the volume of cylinder? (in cm^3)
 (a) 438π (b) 426π (c) 420π
 (d) 432π (e) 444π
9. Diameter of a cylinder is $\frac{2}{3}$ rd of sum of its radius & height, while ratio of curved surface area to volume of cylinder is 1 : 7. If radius and height of a cone is same as that of cylinder, then find slant height of cone?
 (a) $21\sqrt{5}$ cm (b) $10\sqrt{5}$ cm (c) $7\sqrt{5}$ cm
 (d) $14\sqrt{5}$ cm (e) $16\sqrt{5}$ cm
10. The ratio of curved surface area to total surface area of a cylinder is 7:9. Find diameter of cylinder, if volume of cylinder is 88 cm^3 .
 (a) 14 cm (b) 2 cm (c) 9 cm
 (d) 7 cm (e) 4 cm
11. The surface area of sphere and total surface area of hemisphere is in ratio 3:1. What is the volume of sphere if sum of squares of radius of sphere and hemisphere is 13 cm^2 . (in cm^3)
 (a) 72π (b) 108π (c) 32π
 (d) 36π (e) 18π
12. A right circular cone and a right cylinder have a circle of the same radius as their base and their heights are equal to the radius itself. If a hemisphere has the same radius, then their volumes are in the proportion of
 (a) 2:3:1 (b) 1:3:2 (c) 1:2:3
 (d) 1:3:1 (e) 1:1:3
13. The ratio of the length and the breadth of a rectangle is 15:8 and the area of the rectangle is 1080 sq.cm . what is the perimeter of the rectangle?
 (a) 138 cm (b) 120 cm (c) 150 cm
 (d) 148 cm (e) 130 cm
14. If ratio of area of a circle to the area of an equilateral triangle is $16\pi:\sqrt{3}$, then what is the ratio of radius of the circle to the length of the side of equilateral triangle?
 (a) 2: 3 (b) 2: 1 (c) 1: 2
 (d) 3: 2 (e) 4:3
15. Length of a rectangular land is twice the radius of a circle of circumference 132 cm. The land area got increased by 144 sq.cm , when a square land is attached along the breadth of the rectangle. Find area of rectangle in sq.cm .
 (a) 1008 (b) 257 (c) 504
 (d) 756 (e) 1512
16. A steel sphere of radius 6 cm is drawn into a wire of diameter 16 cm. find the length of the wire. (in cm)
 (a) 3.5 (b) 6 (c) 4.5
 (d) 2.5 (e) 5.5
17. Difference between circumference of a circular vessel (candy maker) and its diameter is 60 cm. If 40 cm^2 is waste material and 16 square boxes required to pack remaining quantity of candy, then find side of each square box?
 (a) 4 cm (b) 8 cm (c) 10 cm
 (d) 5 cm (e) 6 cm
18. Two right angle triangles are combined to form a rectangle of length 4 cm. one triangle is isosceles. Find the diagonal length of rectangle.
 (a) Cannot be determined
 (b) $16\sqrt{2}$ cm (c) $4\sqrt{2}$ cm
 (d) 4 cm (e) $2\sqrt{2}$ cm
19. Perimeter of a rectangle is equal to the perimeter of a square whose side is twice of that of the breadth of the rectangle. What is the ratio of length of side of square to the length of rectangle?
 (a) 4 : 9 (b) 6 : 5 (c) 7 : 9
 (d) 14 : 9 (e) 2 : 3
20. Ratio between two perpendicular side of right angle triangle is 8:15, and it's hypotenuse is 102 m. Find area of right angle triangle?
 (a) 2460 m^2 (b) 2240 m^2 (c) 1680 m^2
 (d) 2160 m^2 (e) None of these.
21. Cost of paving a circular field at $\text{Rs.}10/\text{cm}^2$ is $\text{Rs.}3465$. If side of square field is equal to diameter of circular field, then find perimeter of square field.
 (a) 72 cm (b) 96 cm (c) 120 cm
 (d) 84 cm (e) 108 cm
22. The perimeter of a triangle is equal to perimeter of a rectangle. Length of rectangle is 75% of side of a square and ratio of length to breadth of rectangle is 3 : 2. If difference between perimeter of square and that of rectangle is 36 cm, then find perimeter of triangle?
 (a) 60 cm (b) 48 cm (c) 72 cm
 (d) 80 cm (e) 96 cm

23. If volume of cylindrical vessel is 3696 cm^3 and ratio of height and radius of cylindrical vessel is 3 : 7, then find total surface area of cylindrical vessel.
 (a) 1590 cm^2 (b) 1270 cm^2 (c) 1450 cm^2
 (d) 1760 cm^2 (e) None of the above.
24. A solid spherical ball of radius 21 cm is melted to form 'n' solid hemispherical bowl. If radius of each hemispherical bowl is half of radius of spherical ball, then find total surface area of all hemispherical bowls.
 (a) 15846 cm^2 (b) 16632 cm^2 (c) 16028 cm^2
 (d) 16272 cm^2 (e) 16748 cm^2
25. Area of rectangle whose breadth is 25% less than its length is 432 cm^2 . A square is drawn whose side is equal to diagonal of rectangle then find ratio of perimeter of square to that of rectangle?
 (a) 9:7 (b) 48:35 (c) None of these
 (d) 12:7 (e) 3:2
26. Perimeter of square is two times of perimeter of a rectangle and length of rectangle is 6 cm more than that of breadth. If side of square is 75% more than length of rectangle then, find area of square?
 (a) 1764 cm^2 (b) 1798 cm^2 (c) 1864 cm^2
 (d) 1824 cm^2 (e) 1724 cm^2
27. Curved surface area of a cone whose radius is 42 cm is 7656 cm^2 . If height of cone is half of perimeter of a square, then find the area of square?
 (a) 400 cm^2 (b) 441 cm^2 (c) 1600 cm^2
 (d) 900 cm^2 (e) None of these
28. A toy is formed such that cone is mounted on a hemispherical base. Radius of cone and hemispherical base is equal and ratio of radius to height of cone is 7 : 10. If total height of the toy is 34cm, then find volume of the toy.
 (a) 9856 cm^3 (b) 10048 cm^3 (c) 9936 cm^3
 (d) 9882 cm^3 (e) 9996 cm^3
29. Area and perimeter of a rectangle is 432 cm^2 and 84 cm respectively. If the rectangle is inscribed in a circle of maximum possible area, then find the circumference of the circle.
 (a) $72\frac{4}{7} \text{ cm}$ (b) $68\frac{3}{7} \text{ cm}$ (c) $56\frac{5}{7} \text{ cm}$
 (d) $94\frac{2}{7} \text{ cm}$ (e) $84\frac{3}{7} \text{ cm}$
30. Length of rectangle is 20% more than its width. Find the diagonal of rectangle if area of rectangle is 4320 cm^2 .
 (a) $15\sqrt{17} \text{ cm}$ (b) $12\sqrt{61} \text{ cm}$ (c) $14\sqrt{21} \text{ cm}$
 (d) $10\sqrt{21} \text{ cm}$ (e) $10\sqrt{3} \text{ cm}$
31. A cylinder of radius 13 cm and height 56 cm is to be melted to cast 'n' hemispherical bowls of outer diameter 16 cm and inner diameter 14 cm. Find the value of 'n'?
 (a) 56 (b) 72 (c) 65
 (d) 84 (e) 91
32. The ratio of the radius and height of a cylinder is 7: 12. If its volume is 6237 cm^3 then find difference between its total surface area and curved surface area?
 (a) 700 cm^2 (b) 686 cm^2 (c) 679 cm^2
 (d) 672 cm^2 (e) 693 cm^2
33. Length of first park is 24 m and ratio between area to perimeter of this park is 36 : 7. Breadth of second park is 14 m and ratio between area to perimeter of this park is 63 : 16. If total cost of fencing first park is Rs. 2100, then find the cost of fencing second park?
 (a) 1200 Rs. (b) 1500 Rs. (c) 1000 Rs.
 (d) 1800 Rs. (e) 1600 Rs.
34. A solid spherical ball of lead 3 cm in radius is melted and recast into three spherical balls. If the radius of two of these balls are 1.5 cm and 2.5 cm respectively then find the diameter of the third ball?
 (a) 4 cm (b) 2 cm (c) 5 cm
 (d) 6 cm (e) 8 cm
35. A sphere is melted and re-casted into solid cylinder and its radius are same. Find total surface area of sphere is what percentage of the total surface area of cylinder.
 (a) $88\frac{4}{7}\%$ (b) $81\frac{3}{7}\%$ (c) $83\frac{4}{7}\%$
 (d) $85\frac{5}{7}\%$ (e) None of these
36. Side of a square is 50% more than length of rectangle and ratio of length to breadth of rectangle is 2 : 1. If radius of circle is 40% more than breadth of rectangle and area of square is 3600 cm^2 , then find difference in area of rectangle and area of circle.
 (a) 1528 cm^2 (b) 1344 cm^2 (c) 1456 cm^2
 (d) 1732 cm^2 (e) 1664 cm^2
37. The perimeter of 4 squares is 24 cm, 32 cm, 40 cm, 48 cm respectively. What will be the area of the square having perimeter equal to sum of edges of 4 squares? (in sq.cm.)
 (a) 64 (b) 81 (c) 100
 (d) 121 (e) 144

- 38.** Two squares are drawn on a same base but of different edge length. If difference of their area is 36 sq.cm. find the edge length of larger square if difference of their edge length is 3 cm.
 (a) 5.5 cm (b) 7.5 cm (c) 6.5 cm
 (d) 4.5 cm (e) 6 cm
- 39.** The perimeter of a square is double than the perimeter of a rectangle. The area of the rectangle is 36 sq.cm. what is the area of square?
 (a) 72 sq.cm (b) 56 sq.cm (c) 64 sq.cm
 (d) can't be determined (e) 108 sq.cm
- 40.** The ratio of areas of two squares is 289 : 169. Find the ratio of their diagonals.
 (a) 19 : 15 (b) 15 : 13 (c) 17 : 15
 (d) 17 : 13 (e) 13 : 11
- 41.** The parallel sides of a trapezium are 4 cm & 10 cm respectively while non-parallel sides are equal to side of square of area 25 sq.cm. find area of trapezium. (in sq.cm.)
 (a) 50 (b) 42 (c) 56
 (d) 28 (e) 14
- 42.** If the length and breadth of a rectangle is increased by 20% and 10% respectively, then find the percentage increase in the area of the rectangle?
 (a) 36 % (b) 32% (c) 28%
 (d) 40% (e) 34%
- 43.** The ratio of area of square to that of rectangle of length 10 cm is 4 : 5. If breadth of rectangle is same as side of square. Find length of diagonal of square.
 (a) $9\sqrt{2}$ cm (b) $10\sqrt{2}$ cm (c) $6\sqrt{2}$ cm
 (d) $4\sqrt{2}$ cm (e) $8\sqrt{2}$ cm
- 44.** If the circumference of circle is 88 cm and ratio of radius of circle to side of square is 1 : 2 then what will be the ratio of area of circle to area of square.
 (a) 14 : 11 (b) 11 : 14 (c) 13 : 14
 (d) 11 : 16 (e) 16 : 13
- 45.** An equilateral triangle of side 6 cm has area equal to area of a trapezium having parallel sides as 5 cm & 7 cm. find height between parallel sides of trapezium.
 (a) $\frac{3\sqrt{3}}{2}$ cm (b) $\frac{7\sqrt{3}}{2}$ cm (c) $\frac{4\sqrt{3}}{2}$ cm
 (d) $\frac{\sqrt{3}}{2}$ cm (e) $\frac{3\sqrt{3}}{4}$ cm
- 46.** Length of rectangle A is 1.25 times of its width and area of rectangle A is 1280 cm². If width of rectangle A is equal to side of equilateral triangle, then find the perimeter of triangle.
 (a) 72m (b) 66m (c) 84m
 (d) 96m (e) 60m
- 47.** Area of base of a cylinder is 132cm² and height is half of square of radius of it's base. Find volume of the cylinders?
 (a) 2772 cm³ (b) 3113 cm³ (c) 2376 cm³
 (d) 924 cm³ (e) 1452 cm³
- 48.** The ratio of the volume to surface area of the sphere is 8 : 3. What is the total surface area of the hemisphere, given that the radius of sphere and hemisphere is same? (in unit²)
 (a) 128π (b) 192π (c) 64π
 (d) 256π (e) 48π
- 49.** A circle of radius 27 meter is converted into a semicircle. Find radius of semi-circle formed?
 (a) 22 meters (b) 11 meters (c) 36 meters
 (d) 45 meters (e) 33 meters
- 50.** What is the total surface area of cylinder of radius 25 cm and height of 0.8m?
 (a) 1.54 m² (b) 1.77 m² (c) 1.65 m²
 (d) 1.80 m² (e) 1.25 m²

Level - 2

- 1.** A large sphere of radius 'R' cm was converted into 64 small spheres of radius 'r' cm and then one small sphere is converted into 16 smaller cones of radius of 'a' cm. If height of cone is two times of its radius, then find R:a:r.
 (a) 6:1:2 (b) 4:2:1 (c) 8:1:2
 (d) 4:1:2 (e) 16:1:4
- 2.** Find no. of same type of smaller spherical balls that can be formed from another hemisphere if radius of each such smaller spherical ball is $\frac{1}{16}$ th of that hemisphere?
 (a) 4096 (b) 2560 (c) 2048
 (d) 5096 (e) 2296

3. The diagonal of rectangle which length 12 cm and breadth 5 cm are equal to hypotenuse of a right - angle isosceles triangle. Find the area of rectangle is how much more than (in cm sq.) that of area of right - angle isosceles triangle?
 (a) 16.75 (b) 17.25 (c) 17.75
 (d) 17.50 (e) 18.25
4. A spherical ball is melted to form 63 identical cylindrical vessels. If radius of each cylindrical vessel is $33\frac{1}{3}\%$ of radius of spherical ball and height of each cylindrical vessel is 3cm less than radius of each cylindrical vessel, then find radius of spherical ball.
 (a) 21cm (b) 14cm (c) 35cm
 (d) 49cm (e) 42cm
5. Breadth of a rectangular park is 12m and ratio of area of rectangular park to perimeter of rectangular park is 42 : 11. If radius of circular park is equal to length of rectangular park and cost of fencing circular park is Rs.20/m, then find total cost of fencing circular park.
 (a) Rs.2250 (b) Rs.2760 (c) Rs.2800
 (d) Rs.2640 (e) Rs.2540

Direction (6 - 7):The area of rectangular based tank, of which longer side is 150% more than smaller side is 1440 m² and the tank contains 10800 m³ water.

6. Total surface area of tank, if tank is opened from upper side.
 (a) 2700 m² (b) 2400 m² (c) 3600 m²
 (d) 4900 m² (e) 2100 m²
7. If radius of a conical tank is $\frac{7}{8}$ th of smaller side of rectangular based tank and height is two times of height of rectangular based tank, then find capacity of water contained by conical tank?
 (a) 6730 m³ (b) 6530 m³ (c) 6930 m³
 (d) 6960 m³ (e) 6990 m³
8. A rectangular sheet of area 300 cm². The ratio between length and breadth of the rectangular sheet is 4 : 3. If the rectangular sheet is cut in that way to make a square sheet of maximum area, then find the area of the square sheet.
 (a) 400 cm² (b) 196 cm² (c) 75 cm²
 (d) 169 cm² (e) 225 cm²

9. The sum of area of a circle & area of a rectangle is equal to 2136 sq. cm. The diameter of the circle is 42 cm. What is the difference between the circumference of the circle & the perimeter of the rectangle, if the breadth of the rectangle is 30 cm?
 (a) 42 cm (b) 22 cm (c) 30 cm
 (d) 11 cm (e) 18 cm
10. A solid is in the form of a cylinder with hemispherical ends. If the height of the solid is 26cm and diameter of cylindrical part is 14cm, then find the cost of covering the solid with metal sheet (Cost of metal sheet is Rs.15/cm²).
 (a) Rs.16570 (b) Rs.15440 (c) Rs.17160
 (d) Rs.12420 (e) Rs.14370
11. Radius of smaller circular park is 60 m and area of bigger circular park is $36\frac{1}{9}\%$ more than area of smaller circular park. If side of a square park is half of the radius of bigger circular park and cost of fencing the square park is 16 per m, then find the total cost of fencing the square park?
 (a) 2200 Rs. (b) 2240 Rs. (c) 2280 Rs.
 (d) 2260 Rs. (e) None of these
12. The radius and height of a right circular cone are 12 cm and 15 cm respectively. The cone is cut by a plane parallel to its base so as to divide it into two parts. The volume of the frustum (the lower part) of the cone is 320π cm³. Find the radius of the upper circular of the frustum.
 (a) $2\sqrt[3]{30}$ cm (b) $3\sqrt[3]{15}$ cm (c) $4\sqrt[3]{15}$ cm
 (d) $2\sqrt[3]{18}$ cm (e) None of these
13. The ratio of the curved surface area of the cylinder and the curved surface area of cone is 8: P. If slant height of the cone is 15 cm, and the total volume of the structure made by joining the same cone and cylinder such that the base of both cone and cylinder completely coincide is 1944π cm³. then find the value of P, if the radius of each of cone and cylinder is 9 cm.
 (a) $\frac{5}{2}$ (b) 4 (c) $\frac{9}{2}$
 (d) 3 (e) $\frac{3}{2}$
14. The perimeter of a triangle is equal to perimeter of a rectangle. Length of rectangle is 75% of side of a square and ratio of length to breadth of rectangle is 3 : 2. If difference between perimeter of square and that of rectangle is 36 cm, then find perimeter of triangle?
 (a) 60 cm (b) 48 cm (c) 72 cm
 (d) 80 cm (e) 96 cm

15. Breadth of a rectangle is increased by 5 cm to form a square of area 676 cm^2 . Find the total surface area of a cylindrical toy whose radius is equal to the breadth of rectangle and height is equal to the length of a rectangle.
 (a) 6424 cm^2 (b) 6412 cm^2 (c) 6408 cm^2
 (d) 6400 cm^2 (e) 6204 cm^2
16. If total cost of fencing a circular plot is Rs. 2816, then what will be cost of fencing a square plot, which has side of 6.4 meters more than radius of given circular plot having area of 98.56 m^2 . (consider per meter cost of fencing of circular plot & of square plot same)
 (a) 3860 Rs. (b) 3820 Rs. (c) 3840 Rs.
 (d) 3800 Rs. (e) 3880 Rs.
17. The radius of a semicircle is equal to the radius of a sphere whose surface area is 616 cm^2 and height of a cylinder is 150% more than radius of semicircle and ratio of height to radius of cylinder is 5 : 1. Then find radius of cylinder? (in cm)
 (a) 14 (b) 7.5 (c) 3
 (d) 3.5 (e) 5.5
18. A cylindrical mould of iron of radius 6 cm is used to make 2 conical shape ice-creams of radius 2 cm each. If height of ice-cream is 60% of height of mould then find volume of the mould if height of mould is 5 times the radius of ice-cream.
 (a) $340 \pi \text{ cm}^3$ (b) $352 \pi \text{ cm}^3$ (c) $342 \pi \text{ cm}^3$
 (d) $344 \pi \text{ cm}^3$ (e) $356 \pi \text{ cm}^3$
19. Radius of two circles are in the ratio of 1 : 3. Sum of circumference of both circles is 176 cm, which is equal to perimeter of a rectangle. If ratio between length to breadth of rectangle is 8 : 3, then what is the difference between radius of bigger circle and length of rectangle?
 (a) 60 cm (b) 65 cm (c) 62 cm
 (d) 43 cm (e) 59 cm
20. Ratio of difference between area of a rectangle obtained in two cases, first when length of a rectangle is decreased by 4 cm and second when breadth of the original rectangle is increased by 4 cm to the area of rectangle is 4 : 9. Find ratio of numerical value perimeter to area of rectangle.
 (a) 2 : 7 (b) 2 : 5 (c) 2 : 11
 (d) 2 : 9 (e) None of these
21. A solid sphere iron ball having radius of 12 cm melted and re-casted into a hollow cylindrical vessel of uniform thickness. If external radius of the base of cylindrical vessel is 10 cm and its height is 64 cm, then find the uniform thickness of the cylindrical vessel?
 (a) 2 cm (b) 1 cm (c) 2.5 cm
 (d) 2.25 cm (e) None of these
22. Total surface area of a cylinder mounted with a hemispherical bowl on one end is 2552 cm^2 . If height of cylinder is 8 cm then find the volume of the solid body? (cm^3)
 (a) $10443 \frac{1}{3}$ (b) $10677 \frac{1}{3}$ (c) $10547 \frac{1}{3}$
 (d) $10977 \frac{1}{3}$ (e) $10787 \frac{1}{3}$
23. The surface area of a sphere is 423.5 cm^2 less than total surface area of a hemisphere. If ratio between radius of hemisphere and sphere is 3 : 2, then find the radius of hemisphere?
 (a) 5.5 cm (b) 5 cm (c) 4 cm
 (d) 7 cm (e) 10.5 cm
24. The ratio of the volume of the cylinder to that of a cone having same heights is 27 : 36. If the sum of the radii of cylinder and cone is 45 cm, then what is the area of rectangle whose sides are equal to the radii of cylinder and cone?
 (a) 450 cm^2 (b) 360 cm^2 (c) 480 cm^2
 (d) 540 cm^2 (e) 420 cm^2
25. The total surface area of a cylinder is $368\pi \text{ cm}^2$ and sum of radius and height of cylinder is 23cm. Find the volume of cone whose total surface area is $200\pi \text{ cm}^2$. (radius of cylinder and cone is equal)
 (a) $512\pi \text{ cm}^3$ (b) $640\pi \text{ cm}^3$ (c) $320\pi \text{ cm}^3$
 (d) $290\pi \text{ cm}^3$ (e) $400\pi \text{ cm}^3$

Mains Questions

1. A solid right circular cylinder has radius r and height $5r$. A solid right circular cone is carved out from one end of the base of cylinder. If base radius of cone is r and height is $2\sqrt{2}r$ then, find the ratio between total surface area of cone to the total surface area of remaining part of cylinder.
 (a) 3 : 5 (b) 4 : 7 (c) 2 : 7
 (d) 3 : 4 (e) 1 : 3

Directions (2-3): A hemispherical bowl is filled with hot water. The contents of the bowl are transferred into a cylindrical vessel whose radius is 50% more than its height.

2. If diameter of the bowl is the same as that of the cylindrical vessel, then the volume of the hot water in the cylindrical vessel is
 - (a) 60% of the cylindrical vessel
 - (b) 80% of the cylindrical vessel
 - (c) 100% of the cylindrical vessel
 - (d) 50% of the cylindrical vessel
 - (e) none of these
3. This hemispherical bowl is joined at one end of the cylindrical vessel and the solid obtained by combining these figure is filled completely with water. If a drain pipe is connected to it then pipe will empty 539 cm^3 of water in one minute. If radius of the solid is 21 cm, then in what time whole water will be emptied from the solid. Given that diameter of cylinder and hemisphere are same.
 - (a) 72 min
 - (b) 60 min
 - (c) 90 min
 - (d) 75 min
 - (e) None of these
4. Four horses are tethered for grazing at four corners of a square plot of side 14 m so that the adjacent horses can just reach one another. There is a small circular pond of area 20m^2 at the centre. Find the ungrazed area.
 - (a) 36m^2
 - (b) 25m^2
 - (c) 18m^2
 - (d) 22m^2
 - (e) None of these
5. Sum of Area of circle and a rectangle is equal to 622 sq cm . The diameter of the circle is 14 cm, then what is the sum of circumference of the circle and the perimeter of the rectangle if the length of rectangle is 26 cm?
 - (a) 142cm
 - (b) 132cm
 - (c) 152cm
 - (d) 140cm
 - (e) 134cm
6. There is a solid cone of radius R. A circular hole of radius r is drilled from the centre of its circular base to its top, along its axis. Find the fraction of the volume of the cone left, if $R : r = 7 : 4$.
 - (a) $\frac{208}{343}$
 - (b) $\frac{135}{343}$
 - (c) $\frac{235}{343}$
 - (d) $\frac{108}{343}$
 - (e) None of these

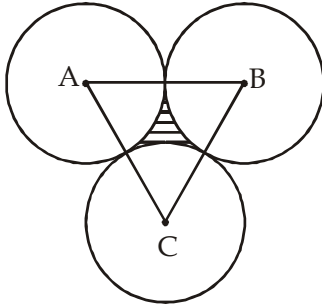
Directions (7-8): There are 500 rooms in a multi-floored hotel. However, due to a change in rule, the hotel has to decrease the number of floors by 5. However, the management is able to put 5 more rooms in each floor. Over all, the number of rooms in the hotel decreases by 10%.

7. What is the number of floors and the number of rooms/floor in the hotel originally had?
 - (a) 10 floors 50 rooms
 - (b) 20 floors 20 rooms
 - (c) 20 floors 25 rooms
 - (d) 50 floors 10 rooms
 - (e) 60 floors, 45 rooms
8. If previously before modification the hotel has 20 floors and 25 rooms in each floor now hotel has to increase the total no. of rooms to 600, then what is the additional number of rooms the hotel must put in each floor?
 - (a) 20
 - (b) 15
 - (c) 10
 - (d) 25
 - (e) None of these

Directions (9-10): According to a plan, a team of woodcutters decided to harvest 216 cm^3 of wheat in several days. In the first three days, the team fulfilled the daily assignment, and then it harvested 8 m^3 of wheat over and above the plan every day. Therefore, a day before the planned date, they had already harvested 232 m^3 of wheat.

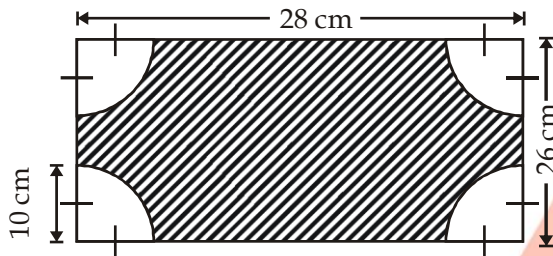
9. How many cubic metres of wheat a day did the team have to cut according to the plan?
 - (a) 24
 - (b) 28
 - (c) 26
 - (d) Can't be determined
 - (e) None of these
10. To harvest 216 m^3 of wheat 2 days before the planned date, how many cubic metres of wheat must be harvested by team over and the above the plan every day after first three days?
 - (a) 8 m^3
 - (b) 12 m^3
 - (c) 10 m^3
 - (d) 16 m^3
 - (e) None of these
11. The dimensions of a field are 20 m by 9 m. A pit 10 m long, 4.5 m wide and 3 m deep is dug in one corner of the field and the earth removed has been evenly spread over the remaining area of the field. What will be the rise in the height of field as a result of this operation?
 - (a) 1.5 m
 - (b) 2 m
 - (c) 3 m
 - (d) 4 m
 - (e) 1m
12. If the curved surface area of a cone is thrice that of another cone and slant height of the second cone is thrice that of the first, find the ratio of the area of their base.
 - (a) 81 : 1
 - (b) 9 : 1
 - (c) 3 : 1
 - (d) 27 : 1
 - (e) 11 : 1

13. Find the area of the shaded region if the radius of each of the circles is 1 cm.



- (a) $2 - \frac{\pi}{3}$ (b) $\sqrt{3} - \pi$ (c) $\sqrt{3} - \frac{\pi}{2}$
 (d) $\sqrt{3} - \frac{\pi}{4}$ (e) None of these

14. Find the perimeter and area of the shaded portion of the adjoining diagram:



- (a) 90.8 cm, 414 cm² (b) 181.6 cm, 423.7 cm²
 (c) 90.8 cm, 827.4 cm² (d) 181.6 cm, 827.4 cm²
 (e) None of these

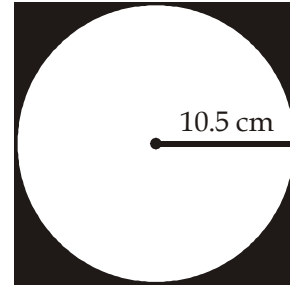
15. A cylindrical container whose diameter is 12 cm and height is 15 cm, is filled with ice cream. The whole ice-cream is distributed to 10 children in equal cones having hemispherical tops. If the height of the conical portion is twice the diameter of its base, find the diameter of the ice-cream cone?

- (a) 6 cm (b) 12 cm (c) 3 cm
 (d) 18 cm (e) 15 cm

16. A rectangular tin sheet is 22 m long and 8 m broad. It is rolled along its length to form a cylinder by making the opposite edges just to touch each other. The volume of the cylinder (in m³) is:

- (a) 385 (b) 204 (c) 280 p
 (d) 308 (e) None of these

17. What is the area of the shaded portion if each side of the square measures 21 cm?

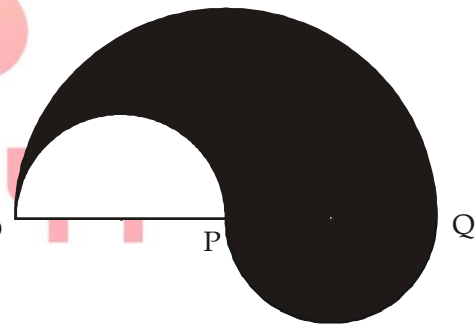


- (a) 86.5 cm² (b) 102 cm² (c) 94.5 cm²
 (d) 81.5 cm² (e) None of these

18. An oblong piece of ground measures 19 meters 2.5 dm by 12 metres 5 dm. From the centre of each side a path 2 meters wide goes across to the centre of the opposite side. Find the cost of paving these paths at the rate of Rs. 12.32. per sq meter.

- (a) Rs. 7430.68 (b) Rs. 713.04 (c) Rs. 753.26
 (d) Rs. 733.04 (e) None of these

19. In the given figure, OP = PQ = 14 cm and semicircles are drawn on OP, PQ and OQ as diameters. Then, the perimeter of the shaded area is:



- (a) 88 cm (b) 176 cm (c) 264 cm
 (d) 352 cm (e) None of these

20. The circumference of a circular field is 440 m. A circular path of 10 metre width runs around the outside of the field. Find the cost of gravelling the path at the rate of 70 paise per square metre?

- (a) Rs. 2200 (b) Rs. 3300 (c) Rs. 264
 (d) Can't be determined
 (e) None of these

Previous Year Question

1. The length & breadth of a rectangle is in ratio 4 : 7. If perimeter is 88 cm. find area of rectangle.
 (a) 414 cm² (b) 336 cm² (c) 448cm²
 (d) 524 cm² (e) 396 cm²

IBPS PO Prelims 2019

2. The radius of a circle is 14 cm. what is area of another circle having radius 1.5 times of the actual circle?
 (a) 1296 cm² (b) 1386 cm² (c) 1352 cm²
 (d) 1485 cm² (e) 1276 cm²

IBPS PO Prelims 2019

3. A rectangular path of width 3m is surrounding the garden whose length is 3m more than its width. If cost of painting the path at rate of 0.5Rs/m² is Rs 273 then find the area of garden
 (a) 1525m² (b) 1804 m² (c) 1776 m²
 (d) 1906 m² (e) 1664 m²

IBPS Clerk Prelims 2019

4. The length & breadth of a rectangle is in ratio 4 : 7. If perimeter is 88 cm. find area of rectangle.
 (a) 414 cm² (b) 336 cm² (c) 448cm²
 (d) 524 cm² (e) 396 cm²

IBPS PO Prelims 2019

5. The radius of a circle is 14 cm. what is area of another circle having radius 1.5 times of the actual circle?
 (a) 1296 cm² (b) 1386 cm² (c) 1352 cm²
 (d) 1485 cm² (e) 1276 cm²

IBPS PO Prelims 2019

6. A rectangular path of width 3m is surrounding the garden whose length is 3m more than its width. If cost of painting the path at rate of 0.5Rs/m² is Rs 273 then find the area of garden
 (a) 1525m² (b) 1804 m² (c) 1776 m²
 (d) 1906 m² (e) 1664 m²

IBPS Clerk Prelims 2019

7. The area of a square is 1767 m² (approx.) and length of rectangle is one-third of side of that square. If breadth of rectangle is 4m less than length of rectangle, then find difference between area of square and area of rectangle.
 (a) 1609 m² (b) 1627 m² (c) 1664 m²
 (d) 1729 m² (e) 1709 m²

IBPS Clerk Mains 2019

8. Area of Ist circle and circumference of IInd circle is 1386 cm² and 176 cm respectively. There is a square whose side is $35\frac{5}{7}\%$ of twice of sum of the radius of both the circles. Find the perimeter of the square (in cm)?
 (a) 132 (b) 136 (c) 140
 (d) 116 (e) 124

IBPS RRB PO Prelims 2019

9. A Square and an equilateral triangle have the same area. If the perimeter of the square is 88 cm, then find the area of the equilateral triangle is?
 (a) 441 cm² (b) 400 cm² (c) 484 cm²
 (d) 324 cm² (e) 576 cm²

RRB PO Mains 2019

10. If circumference of first circle is 132 cm and circumference of second circle is 110 cm then find the difference between area of both the circle?
 (a) 423.5 cm² (b) 412.5 cm² (c) 420 cm²
 (d) 422.4 cm² (e) 419.8 cm²

RRB Clerk Prelims 2019

11. Diameter of a cylinder is $\frac{2}{3}$ rd of sum of its radius & height, while ratio of curved surface area to volume of cylinder is 1 : 7. If radius and height of a cone is same as that of cylinder, then find slant height of cone?
 (a) $21\sqrt{5}$ cm (b) $10\sqrt{5}$ cm (c) $7\sqrt{5}$ cm
 (d) $14\sqrt{5}$ cm (e) $16\sqrt{5}$ cm

RRB Clerk Mains 2019

12. Ravi cuts a square field of maximum possible area from his circular field. Find the area of the remaining circular field if the cost of grass cutting of the square field at Rs 4 per m² is Rs 882?
 (a) 120 m² (b) 126 m² (c) 121 m²
 (d) 116 m² (e) 109 m²

RRB Clerk Mains 2019

13. Area of rectangle having length and breadth in the ratio of 4: 3 is 432 cm². A square whose side is equal to diagonal of rectangle then find ratio of numerical value of perimeter to the area of square?
 (a) 7: 55 (b) 4: 35 (c) None of these
 (d) 1:8 (e) 2:15

RRB Clerk Mains 2019

14. Length of a rectangular land is twice the radius of a circle of circumference 132 cm. The land area got increased by 144 sq.cm, when a square land is attached along the breadth of the rectangle. Find area of rectangle in sq.cm.

- (a) 1008 (b) 257 (c) 504
(d) 756 (e) 1512

RBI Grade B Phase I 2019

15. If length of a rectangle increases by 40% while keeping breadth constant then area of rectangle increased by 24 m² and perimeter of original rectangle is 32 m. find breadth of rectangle.

- (a) 8.4 m (b) 10 m (c) 6 m
(d) 14 m (e) 8 m

SBI Clerk Prelims 2020

16. A sphere is melted and molded into solid cylinder. If radius of both solids is equal, then find the ratio of total surface area of sphere to the total surface area of cylinder

- (a) 2 : 3 (b) 4 : 3 (c) 3 : 7
(d) 6 : 7 (e) 7 : 6

IBPS PO Prelims 2020

17. The sum of the length of a rectangle and the side of a square is 72 meters. If the perimeter of the rectangle is 84 meters and the breadth of the rectangle is 18 meters, then find the measurement of the side of the square (in meters).

- (a) 48 (b) 36 (c) 54
(d) 60 (e) 30

IBPS Clerk Prelims 2020

18. Length of rectangle 'A' is 125% of its breadth and area of rectangle 'A' is 1280 cm². If width of rectangle 'A' is half of the side of a square, then find perimeter of square.

- (a) 72m (b) 64m (c) 84m
(d) 96m (e) 60m

IBPS RRB PO Prelims 2020

19. Perimeter of a rectangle is 2 cm more than circumference of a circle and area of circle is 616 cm². If breath of rectangle is equal to radius of circle, then find length of rectangle (in cm)?

- (a) 35 (b) 33 (c) 31
(d) 21 (e) 27

RRB Clerk Prelims 2020

20. Area of a rectangle is 180cm² and difference between length and breadth of rectangle is 3cm. If breadth of rectangle is equal to the side of a square, then find perimeter of square?

- (a) 44 cm (b) 52 cm (c) 48 cm
(d) 64 cm (e) 40 cm

RBI Assistant Prelims 2020

21. The perimeter of a triangle is equal to perimeter of a rectangle. Length of rectangle is 75% of side of a square and ratio of length to breadth of rectangle is 3 : 2. If difference between perimeter of square and that of rectangle is 36 cm, then find perimeter of triangle?

- (a) 60 cm (b) 48 cm (c) 72 cm
(d) 80 cm (e) 96 cm

SBI PO Prelims 2019

22. If perimeter of the base of a cylinder is 66 cm. Then find volume of cylinder if height of cylinder is 0.04 m

- (a) 1111 cm³ (b) 1386 cm³ (c) 2046 cm³
(d) 1186 cm³ (e) 2002 cm³

SBI PO Prelims 2019

23. Ratio of base and perpendicular side of a right-angled triangle is 3:4 and its base is equal to the side of a square having area 81 cm². Find the perimeter of the triangle?

- (a) 30 cm (b) 36 cm (c) 33 cm
(d) 42 cm (e) 40 cm

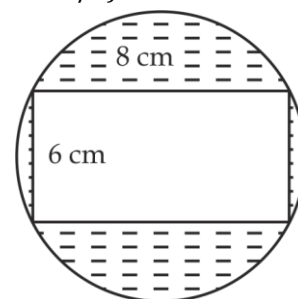
SBI Clerk Prelims 2019

24. Perimeter of a right angled triangle is 60m and length of hypotenuse of right angled triangle is 25m. If base of the right angled triangle is the smallest side, then find length of smallest side.

- (a) 10m (b) 18m (c) 21m
(d) 25m (e) 15m

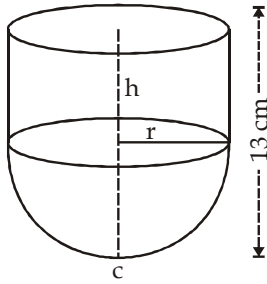
SBI Clerk Mains 2019

25. In the adjacent figure, find the area of the shaded region. (Use = 22/7)

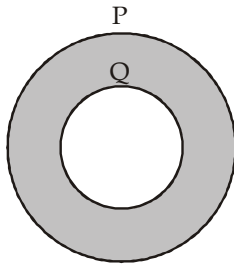


- (a) 15.28 cm² (b) 61.14 cm² (c) 30.57 cm²
(d) 40.76 cm² (e) None of these

26. A vessel is in the form of a hollow cylinder mounted on a hemispherical bowl. The diameter of the sphere is 14 cm and the total height of the vessel is 13 cm. Find the capacity of the vessel? (Take $\pi = 22/7$)

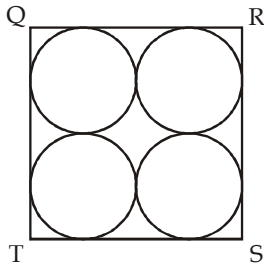


- (a) 321.33 cm^3 (b) 1642.67 cm^3 (c) 1232 cm^3
 (d) 1632.33 cm^3 (e) None of these
27. In the given figure, circle P has diameter 2 m and circle Q has diameter 1 m. Find the area of the shaded region?



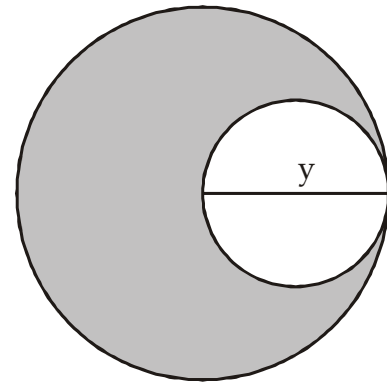
- (a) $\frac{3}{4}\pi$ (b) $\frac{3}{7}\pi$ (c) $\frac{3}{5}\pi$
 (d) 4π (e) None of these

28. In the given figure, QRST is a square. If the area of each circle is 2π , then find the area of square QRST?



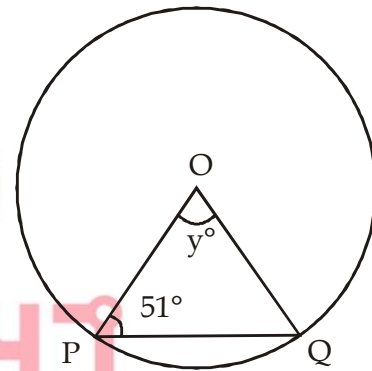
- (a) $\sqrt{4}\pi^2$ (b) $\sqrt{4}\pi$ (c) 32
 (d) 16 (e) None of these

29. In given figure, y is both the radius of the larger circle and the diameter of the smaller circle. Find the area of shaded region?



- (a) $\frac{3}{7}\pi y^2$ (b) $\frac{3}{4}\pi y^2$ (c) $\frac{1}{4}\pi y^2$
 (d) $\frac{1}{3}\pi y^2$ (e) None of these

30. In the given figure, if O is the centre of the circle, then find the value of y?



- (a) 78° (b) 77° (c) 76°
 (d) 75° (e) None of these

31. The length of a rectangular plot is thrice of its breadth. If the area of the rectangular plot is 7803 sq m, what is the breadth of the rectangular plot?

- (a) 51 m (b) 153 m (c) 104 m
 (d) 88 m (e) None of these

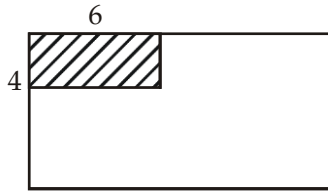
Solutions

Basic Questions

1. (b): Breadth = $\frac{\text{Area}}{\text{Length}} = \frac{180}{18} = 10$ m
 \therefore Perimeter = $2(\text{length} + \text{breadth}) = 2(18 + 10) = 56$ m

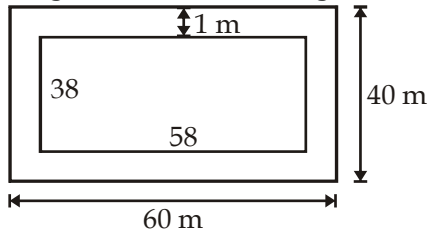
2. (c): Let side of square = x cm
 Side of another square = $(x + 4)$ cm
 $\therefore x^2 + (x + 4)^2 = 400$
 $x^2 + x^2 + 16 + 8x = 400$
 $2x^2 + 8x - 384 = 0$ P $x^2 + 4x - 192 = 0$
 $x^2 + 16x - 12x - 192 = 0$
 $x(x + 16) - 12(x + 16) = 0$
 $(x - 12)(x + 16) = 0$
 $\therefore x = 12$ (-16 not possible)
 \therefore side of one square = 12 cm
 side of another square = 16 cm

3. (c): Given,



Area of the floor = 960 m^2
 Area of one carpet = $6 \times 4 = 24 \text{ m}^2$
 \therefore No. of carpet required = $\frac{\text{Area of floor}}{\text{Area of one carpet}}$
 $= \frac{960}{24} = 40$

4. (b): Length of the outer rectangle = 60 m



Breadth of the outer rectangle = 40 m
 \therefore Area = $60 \times 40 = 2400 \text{ m}^2$.
 Width of path = 1 m
 Length of the inner rectangle = $60 \text{ m} - (1 + 1) \text{ m} = 58 \text{ m}$
 Breadth of the inner rectangle = $40 - 2 = 38 \text{ m}$
 \therefore Area = $58 \times 38 = 2204 \text{ m}^2$
 Area of path
 $= [\text{Area of outer rectangle}] - [\text{Area of inner rectangle}]$
 $= 2400 - 2204 = 196 \text{ m}^2$

5. (a): Area of parallelogram,
 $ABCD = (\text{Area of } \triangle ABD + \text{Area of } \triangle BDC)$
 $= 2 (\text{Area of } \triangle ABD)$
 $= 2 \times \frac{1}{2} \times 3 \times 4 = 12 \text{ cm}^2$

6. (b): Here, $s = \frac{9 + 12 + 15}{2} = 18$ cm
 $\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}$
 $= \sqrt{18(18-9)(18-12)(18-15)}$
 $= \sqrt{18 \times 9 \times 6 \times 3}$
 $= 54 \text{ cm}^2$

7. (c): By formula
 $\text{Area} = \frac{\sqrt{3}}{4} \times (\text{side})^2 \Rightarrow \frac{\sqrt{3}}{4} \times (\text{side})^2 = 4\sqrt{3}$
 $(\text{side})^2 = 16 \Rightarrow \text{side} = 4$ cm
 \therefore perimeter = $3 \times \text{side} = 3 \times 4 = 12$ cm

8. (c): Let, the radius of the circle = r m
 $\therefore \pi r^2 = 24.64$
 $\frac{22}{7} \times r^2 = 24.64 \Rightarrow r^2 = \frac{7 \times 24.64}{22}$
 $r = \frac{\sqrt{7 \times 24.64}}{22} = 2.8$

Thus, circumference = $2\pi r$
 $= 2 \times \frac{22}{7} \times 2.8 = 17.6$ m

9. (c): Let initial radius of circle = r
 Now new radius = 80% of $r = r \times \frac{80}{100} = \frac{4r}{5}$
 initial area = πr^2
 New area = $\pi \left(\frac{4r}{5}\right)^2 = \frac{16}{25} \pi r^2$
 Decrease in Area = $\left(\pi r^2 - \frac{16}{25} \pi r^2\right) = \frac{9}{25} \pi r^2$
 \therefore percentage decrease = $\frac{\frac{9}{25} \pi r^2}{\pi r^2} \times 100$
 $= \frac{9}{25} \times 100 = 9 \times 4 = 36\%$

Shortcut:

$\% = x + y + \frac{xy}{100}$
 $= -20 - 20 + \frac{(-20)(-20)}{100}$
 $= -40 + 4 = -36\%$ (-ve sign show % decrease)

10. (d): Let the radius of the protractor = r cm
 perimeter = $(\pi r + 2r) = (\pi + 2)r = 36$
 $\therefore \frac{36}{7} r = 36 \Rightarrow r = 7$ cm
 \therefore diameter of the protractor = $2 \times 7 = 14$ cm

- 11. (c):** Let side of square = x
 Diagonal = $\sqrt{2}x$
 Radius of incircle $\frac{x}{2}$
 Radius of circumcircle = $\frac{\sqrt{2}x}{2} = \frac{x}{\sqrt{2}}$
 Required Ratio = $\left(\frac{\pi x^2}{4} : \frac{\pi x^2}{2}\right) = 2 : 4 = 1 : 2$

- 12. (a):** Given diagonal of square = 50 m
 $\sqrt{2} \times \text{side} = 50 \Rightarrow \text{side} = \frac{50}{\sqrt{2}}$
 Area = $\text{side}^2 = \left(\frac{50}{\sqrt{2}}\right)^2 = \frac{2500}{2} = 1250 \text{ m}^2$

- 13. (a):** Given, circumference ($2\pi r$) = 176
 $r = \frac{176}{2 \times 22} \times 7 \Rightarrow r = \frac{8 \times 7}{2} \Rightarrow r = 28 \text{ m}$
 Area = $\pi r^2 = \frac{22}{7} \times 28 \times 28 = 2464 \text{ m}^2$

- 14. (a):** Length of the arc = $2\pi r \times \frac{\theta}{360}$
 $= 2\pi \times 42 \times \frac{72}{360} = 2 \times \frac{22}{7} \times 42 \times \frac{72}{360} = 52.8 \text{ cm}$

- 15. (d):** Area of isosceles triangle with side (a) = $\frac{1}{2}a^2$
 $\therefore 200 = \frac{1}{2}a^2 \Rightarrow a^2 = 400 \Rightarrow a = 20 \text{ cm}$
 $\therefore \text{Hypotenuse} = \sqrt{a^2 + a^2} = \sqrt{2}.a$
 $= \sqrt{2} \times 20 = 20\sqrt{2} \text{ cm}$

Prelims Solutions

Level - 1

- 1. (d):** Let side of square be 'x' & side of equilateral triangle be 'y'.

ATQ,

$$x = \frac{\sqrt{3}}{2} \times y \text{ [given]}$$

$$y = \frac{2x}{\sqrt{3}}$$

$$\text{Required ratio} = \frac{\frac{\sqrt{3}}{4}y^2}{x^2} = \frac{\sqrt{3}}{4} \times \left(\frac{2x}{\sqrt{3}}\right)^2 \times \frac{1}{x^2}$$

$$= \frac{\sqrt{3}}{4} \times \frac{4x^2}{3} \times \frac{1}{x^2}$$

$$= 1 : \sqrt{3}$$

- 2. (e):** ATQ,

Let side of an equilateral triangle be 'a' cm.

$$\frac{\sqrt{3}}{2} a = 3\sqrt{3}$$

$$a = 6 \text{ cm}$$

$$\text{Area of equilateral triangle} = \frac{\sqrt{3}}{4} (6)^2 = \frac{\sqrt{3}}{4} \times 36 =$$

$$9\sqrt{3} \text{ cm}^2$$

Radius of circle inscribed in an equilateral

$$\text{triangle} = 3\sqrt{3} \times \frac{1}{3} = \sqrt{3} \text{ cm}$$

$$\text{Area of inscribed circle} = \pi(\sqrt{3})^2 = 3\pi \text{ cm}^2$$

$$\text{Required ratio} = \frac{9\sqrt{3}}{3\pi} = \frac{21\sqrt{3}}{22}$$

- 3. (b):** Let radius & height of conical tent be 'r cm' & 'h cm' respectively.

So, radius of hemispherical bowl = r cm.

ATQ,

$$\frac{\frac{1}{3}\pi r^2 h}{3\pi r^2} = \frac{8}{1}$$

$$\Rightarrow \frac{h}{3 \times 3} = \frac{8}{1}$$

$$h = 72 \text{ cm}$$

Now,

$$\text{Radius of conical tent} = \sqrt{75^2 - 72^2}$$

$$= \sqrt{441} = 21 \text{ cm}$$

$$\text{Required area} = 4 \times (21)^2$$

$$= 1764 \text{ cm}^2$$

- 4. (b):** Let, the length of plot be 'l' mtr and breadth be 'b' mtr.

$$\text{Then, } lb = 480 \dots\dots\dots(i)$$

$$\text{And } (l + 5)(b + 5) = 725 \dots\dots\dots(ii)$$

Solving (i) and (ii)

$$l + b = 44 \dots\dots\dots(iii)$$

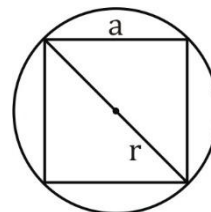
Solving (i) and (iii)

$$l = 24 \text{ (Since, } l > b)$$

$$b = 20$$

$$\text{Required percentage} = \frac{4}{20} \times 100 = 20\%$$

- 5. (b):** Let side of square be a cm and radius of circle be r cm.



$$\text{Area of the square field} = 220.5 \text{ m}^2$$

$$\text{Diagonal of the square field} = 21 \text{ m}$$

$$\text{Radius of the circular field} = \frac{\text{Diagonal of the square field}}{2} = 10.5 \text{ m}$$

$$\text{Area of the circular field} = 346.5 \text{ m}^2$$

$$\text{Area of the remaining circular field} = 126 \text{ m}^2$$

6. (e): Let length of the rectangle be $4x$ cm
 Then breadth of that rectangle = $3x$ cm
 ATQ
 $4x \times 3x = 432$
 $\Rightarrow x = 6$
 Length = 24 cm and breadth = 18 cm
 Diagonal = $\sqrt{(576 + 324)} = 30$ cm
 Required ratio = $\frac{120}{90} = 2:15$
7. (c): Given diagonal of first square = $4\sqrt{2}$ units
 Then side of first square = 4 units
 Area of first square = 16 sq. units
 ATQ, area of second square = 32 sq. units
 So diagonal of second square = 8 units
8. (d): Volume of sphere = $\frac{4}{3}\pi R^3$ ($R \rightarrow$ Radius)
 Volume of cylinder = $\pi r^2 h$ ($r \rightarrow$ radius of cylinder, $h \rightarrow$ height of cylinder)
 $R = r$ (given)
 ATQ,
 $\frac{4}{3}\pi R^3 = 288\pi \Rightarrow R^3 = 216 \Rightarrow R = 6 \text{ cm} = r$
 Radius of cylinder = $r = 6$ cm
 Height of cylinder = $h = 12$ cm
 Volume of cylinder = $\pi r^2 h$
 $= 432\pi \text{ cm}^3$
9. (d): Let radius of cylinder = r cm
 And, let height of cylinder = h cm
 ATQ -
 $2r = \frac{2}{3}(r + h)$
 $3r = r + h$
 $h = 2r$
 Curved surface area of cylinder = $2\pi r h$
 And, volume of cylinder = $\pi r^2 h$
 $\frac{2\pi r h}{\pi r^2 h} = \frac{1}{7}$
 $r = 14$ cm
 $h = 28$ cm
 So, $l = \sqrt{r^2 + h^2}$
 $l = \sqrt{14^2 + 28^2}$
 $l = \sqrt{196 + 784}$
 $l = \sqrt{980}$
 $l = \sqrt{7 \times 7 \times 2 \times 2 \times 5}$
 $l = 14\sqrt{5}$ cm

10. (e): ATQ, $\frac{2\pi r h}{2\pi r(r+h)} = \frac{7}{9}$
 $\frac{h}{r+h} = \frac{7}{9}$
 $\Rightarrow \frac{r}{h} = \frac{2}{7}$

Let $r = 2x$ cm and $h = 7x$ cm
 Volume = $\pi r^2 h = 88$
 On solving, $r = 2$ cm & $h = 7$ cm
 Diameter = $2r = 4$ cm

11. (d): ATQ, radius of sphere is R cm and of hemisphere is r cm
 $\frac{4\pi R^2}{3\pi r^2} = \frac{3}{1}$
 $\frac{R^2}{r^2} = \frac{9}{4} \Rightarrow \frac{R}{r} = \frac{3}{2}$
 Given $R^2 + r^2 = 13$
 If $R = 3x$ cm and $r = 2x$ cm
 Then $9x^2 + 4x^2 = 13$
 So, $x = 1$
 $R = 3$ cm and $r = 2$ cm
 Required volume (of sphere) = $\frac{4}{3}\pi R^3 = \frac{4}{3}\pi(3)^3 = 36\pi \text{ cm}^3$

12. (b): Let the radius and height of the cone and cylinder be ' r ' unit
 And the radius of hemi-sphere be also ' r ' unit
 required volume proportion = $\left(\frac{1}{3} \times \frac{22}{7} \times r^2 \times r\right) : \left(\frac{22}{7} \times r^2 \times r\right) : \left(\frac{2}{3} \times \frac{22}{7} \times r^3\right)$
 $= 1:3:2$

13. (a): Let the length and breadth of rectangle be $15y$ cm and $8y$ cm respectively
 Area of rectangle = 1080 sq cm (given)
 $(15y)(8y) = 1080$
 $120y^2 = 1080$
 $y^2 = \frac{1080}{120} = 9$
 $y = 3$
 Perimeter of rectangle = $2(15 \times 3 + 8 \times 3) = 138$ cm

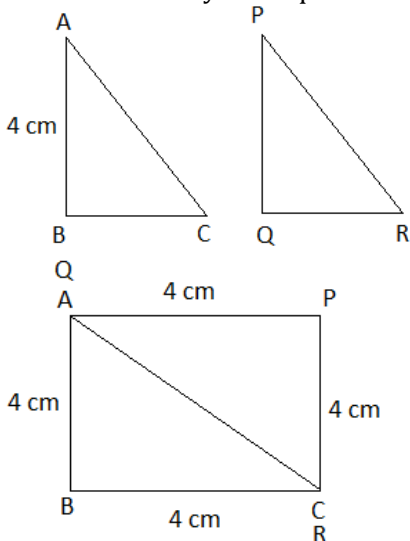
14. (b): Let the radius of the circle and length of the side of equilateral triangle be ' r ' and ' a ' respectively.
 ATQ,
 $\frac{(\pi r)^2}{4(a)^2} = \frac{16\pi}{\sqrt{3}}$
 $\frac{(r)^2}{(a)^2} = \frac{4}{1}$
 $\frac{r}{a} = \frac{2}{1} = 2:1$

15. (c): let radius be r cm
 $132 = 2 \times \frac{22}{7} r \Rightarrow r = 21 \text{ cm} \Rightarrow l = 42 \text{ cm}$
 Let length, breadth of rectangle be l, b cm respectively
 Square is attached along breadth of rectangle,
 edge of square = b cm
 Increase in area = area of square
 $b^2 = 144 \Rightarrow b = 12 \text{ cm}$
 Area of rectangle = $lb = 42 \times 12 = 504 \text{ cm}^2$

16. (c): Atq,
 let the length of the wire be x cm
 $\frac{4}{3} \pi (6)^3 = \pi(8)^2 \times x$
 $\Rightarrow x = \frac{216 \times 4}{3 \times 64}$
 $= 4.5 \text{ cm}$

17. (e): Let radius of circular vessel = r cm
 ATQ -
 $2\pi r - 2r = 60$
 $\frac{15r}{7} = 30$
 $r = 14 \text{ cm}$
 Total volume of circular vessel = $\pi r^2 = \frac{22}{7} \times 14 \times 14$
 $= 616 \text{ cm}^2$
 Total useful material = $616 - 40 = 576 \text{ cm}^2$
 Volume of one square box = $\frac{576}{16} = 36 \text{ cm}^2$
 So, side of one square box = $a^2 = 36$
 $a = 6 \text{ cm}$

18. (c): let two triangles be ΔABC & ΔPQR
 If length of rectangle is 4 cm then a side of any triangle is 4 cm which means other triangle should have side 4 cm .
 Since one triangle is isosceles, possible case is both triangles are isosceles and rectangle so formed will actually be a square.



Diagonal = $\sqrt{4^2 + 4^2} = 4\sqrt{2} \text{ cm}$

19. (e): Let breadth of rectangle be ' x meters' and length of rectangle be ' y meters'
 So, side of square = $2x$ meters
 ATQ,
 $4 \times (2x) = 2(x + y)$
 $8x = 2x + 2y$
 $6x = 2y$
 $3x = y$
 Now, required ratio = $\frac{2x}{3x} = 2 : 3$

20. (d): let two perpendicular side of right-angle triangle are $8a$ and $15a$ meter
 ATQ
 $\sqrt{(8a)^2 + (15a)^2} = 102$
 $\sqrt{64a^2 + 225a^2} = 102$
 $17a = 102$
 $a = 6$
 Area of triangle = $\frac{1}{2} \times 6 \times 8 \times 6 \times 15 = 2160 \text{ m}^2$

21. (d): Let radius of circular field be ' r cm'
 ATQ,
 Area of circular field = $\frac{3465}{10}$
 $\Rightarrow \pi r^2 = 346.5$
 $r^2 = \frac{3465}{10} \times \frac{7}{22} \Rightarrow r = \frac{21}{2}$
 $r = 10.5 \text{ cm}$
 Hence, side of square field = $2r$
 $= 2 \times 10.5 = 21 \text{ cm}$

So, required perimeter = $4 \times 21 = 84 \text{ cm}$

22. (a): Let side of square be ' $4x$ ' cm
 So, length of rectangle = $4x \times \frac{3}{4} = 3x \text{ cm}$
 And, breadth of rectangle = $2x \text{ cm}$
 ATQ -
 $4 \times 4x - 2(3x + 2x) = 36$
 $6x = 36$
 $x = 6 \text{ cm}$
 Perimeter of triangle = perimeter of rectangle = $2(18 + 12) = 60 \text{ cm}$

23. (d): Let radius and height of cylindrical vessel be ' $7r$ ' and ' $3r$ ' respectively.
 Atq,
 $\frac{22}{7} \times 7r \times 7r \times 3r = 3696$
 $\Rightarrow r^3 = \frac{3696 \times 7}{22 \times 7 \times 7 \times 3}$
 $r^3 = 8$
 $r = 2$
 So, required area = $2 \times \frac{22}{7} \times 14(14 + 6)$
 $= 1760 \text{ cm}^2$

24. (b): ATQ,

Volume of spherical ball = $n \times$ volume of hemispherical bowl

$$\frac{4}{3} \times \frac{22}{7} \times 21 \times 21 \times 21 = n \times \frac{2}{3} \times \frac{22}{7} \times \frac{21}{2} \times \frac{21}{2} \times \frac{21}{2}$$

$$\Rightarrow n = 16$$

$$\text{Required area} = 16 \times 3 \times \frac{22}{7} \times \frac{21}{2} \times \frac{21}{2}$$

$$= 16632 \text{ cm}^2$$

25. (c): Let length of the rectangle be $4x$ cm

Then breadth of that rectangle = $3x$ cm

ATQ

$$4x \times 3x = 432$$

$$\Rightarrow x = 6$$

Length of rectangle = 24 cm and breadth of rectangle = 18 cm

$$\text{Diagonal} = \sqrt{(576 + 324)} = 30 \text{ cm}$$

$$\text{Required ratio} = \frac{120}{84} = 10:7$$

26. (a): Let breadth of rectangle be ' x ' cm

So, length of rectangle will be ' $(x + 6)$ ' cm

And side of square will be $\frac{(7x+42)}{4}$ cm

ATQ -

$$4(2x + 6) = (7x + 42)$$

$$x = 18 \text{ cm}$$

$$\text{Length} = 24 \text{ cm}$$

$$\text{So, side of square} = 24 \times \frac{7}{4} = 42 \text{ cm}$$

$$\text{Area of square} = 42 \times 42 = 1764 \text{ cm}^2$$

27. (a): Curved surface of cone = $\frac{22}{7} \times r \times l = 7656 \text{ cm}^2$

Where ' r ' is radius and ' l ' is slant height of cone

$$l = \frac{7656}{\frac{22}{7} \times \frac{7}{42}} = 58 \text{ cm}$$

$$\text{Height of cone} = \sqrt{58^2 - 42^2} = \sqrt{1600} = 40 \text{ cm}$$

$$\text{Perimeter of square} = 40 \times 2 = 80 \text{ cm}$$

$$\text{Side of square} = \frac{80}{4} = 20 \text{ cm}$$

$$\text{Area of square} = 20^2 = 400 \text{ cm}^2$$

28. (a): Let radius & height of the cone be ' $7r$ ' & ' $10r$ ' respectively.

So, radius of hemispherical base = $7r$

ATQ,

$$10r + 7r = 34$$

$$17r = 34$$

$$r = 2 \text{ cm}$$

$$\text{Required volume} = \frac{1}{3} \pi (7r)^2 \times (10r) + \frac{2}{3} \pi (7r)^3$$

$$= \frac{1}{3} \pi (7r)^2 [10r + 14r]$$

$$= \frac{1}{3} \pi 49 r^2 \times 24r$$

$$= \frac{1}{3} \times \frac{22}{7} \times 49 \times 2 \times 2 \times 24 \times 2$$

$$= 9856 \text{ cm}^3$$

29. (d): Let length and breadth of a rectangle be ' l cm' and ' b cm' respectively.

ATQ,

$$l \times b = 432 \text{ (i)}$$

$$\text{And, } 2(l + b) = 84$$

$$l + b = 42$$

$$l = 42 - b \text{ (ii)}$$

On solving (i) & (ii), we get:

$$b = 18 \text{ [}\because \text{ length is always greater than breadth]} \\ \& l = 24$$

Now, circumscribing circle of maximum possible area can only be drawn when diameter of the circle is equal to diagonal of the rectangle.

$$\text{So, radius of the circle} = \frac{1}{2} \times (\sqrt{l^2 + b^2})$$

$$= \frac{1}{2} \times \sqrt{900}$$

$$= 15 \text{ cm}$$

$$\text{So, circumference of the circle} = 2 \times \frac{22}{7} \times 15$$

$$= \frac{660}{7} \text{ cm}$$

$$= 94 \frac{2}{7} \text{ cm}$$

30. (b): Let width of the rectangle be $5x$ cm then its

length = $6x$ cm

$$6x \times 5x = 4320$$

$$30x^2 = 4320$$

$$x = 12$$

$$\text{Length of diagonal} = \sqrt{(6 \times 12)^2 + (5 \times 12)^2} = 12\sqrt{61} \text{ cm}$$

31. (d): Volume of cylinder = $\pi r^2 h$ (r - radius of cylinder, h - height of cylinder)

$$= \pi \times (13)^2 \times 56$$

$$= \pi \times 169 \times 56 \text{ cm}^3$$

Volume of hemispherical bowl = $\frac{2}{3} \pi [a^3 - b^3]$ (a - outer radius, b - inner radius)

$$= \frac{2}{3} \pi \left[\left(\frac{16}{2} \right)^3 - \left(\frac{14}{2} \right)^3 \right]$$

$$= \frac{2}{3} \pi \times 169 \text{ cm}^3$$

ATQ,

$$\pi \times 169 \times 56 = n \times \frac{2}{3} \pi \times 169$$

$$n = 84$$

32. (e): Let radius and height of the cylinder be $7x$ and $12x$ cm respectively.

ATQ

$$\frac{22}{7} \times 7x \times 7x \times 12x = 6237$$

$$x = \sqrt[3]{\frac{27}{8}} = \frac{3}{2} = 1.5$$

$$\text{Required difference} = 2\pi r^2 = 693 \text{ cm}^2$$

33. (e): Area = $l \times b$

$$\text{Perimeter} = 2(l + b)$$

$$\frac{24 \times b}{48 + 2b} = \frac{36}{7}$$

$$b = 18 \text{ m}$$

$$\text{Perimeter of first park} = 2(24 + 18) = 84 \text{ m}$$

$$\text{Cost of fencing per meter} = \frac{2100}{84} = 25 \text{ Rs.}$$

$$\text{Also, } \frac{14 \times l}{28 + 2l} = \frac{63}{16}$$

$$l = 18 \text{ m}$$

$$\text{Total cost of fencing second park} = 2(18 + 14)$$

$$\times 25 = 1600 \text{ Rs.}$$

34. (a): Let the radius of third ball be x cm.

ATQ,

$$\Rightarrow \frac{4}{3}\pi(3)^3 = \frac{4}{3}\pi(1.5)^3 + \frac{4}{3}\pi(2.5)^3 + \frac{4}{3}\pi(x)^3$$

$$\Rightarrow (3)^3 = (1.5^3 + 2.5^3 + x^3)$$

$$\Rightarrow 27 = 3.375 + 15.625 + x^3$$

$$\Rightarrow x^3 = 8$$

$$\Rightarrow x = 2 \text{ cm}$$

\therefore the diameter of the third ball = 4 cm

35. (d): Let radius of sphere and cylinder be r cm and height of the cylinder be h cm.

$$\text{So, volume of sphere} = \frac{4}{3}\pi r^3$$

$$\text{Volume of cylinder} = \text{Volume of sphere}$$

$$\frac{4}{3}\pi r^3 = \pi r^2 h$$

$$h = \frac{4}{3}r$$

$$\text{TSA of sphere} = 4\pi r^2$$

$$\text{TSA of cylinder} = 2\pi r(r + h)$$

$$= 2\pi r\left(r + \frac{4}{3}r\right)$$

$$= \frac{14}{3}\pi r^2$$

$$\text{Required ratio} = \frac{4\pi r^2}{\frac{14}{3}\pi r^2} \times 100 = 85\frac{5}{7}\%$$

36. (e): Let side of square be 'a cm'.

$$\text{So, area of square} = a^2$$

$$3600 = a^2$$

$$a = 60 \text{ cm}$$

$$\text{Now, length of rectangle} = 60 \times \frac{100}{150} = 40 \text{ cm}$$

$$\text{and breadth of rectangle} = 40 \times \frac{1}{2} = 20 \text{ cm}$$

$$\text{Hence, radius of circle} = 20 \times \frac{140}{100} = 28 \text{ cm}$$

$$\text{Required difference} = \left(\frac{22}{7} \times 28 \times 28\right) -$$

$$(40 \times 20)$$

$$= 2464 - 800 = 1664 \text{ cm}^2$$

37. (b): let side of 4 squares be a, b, c & d cm respectively

$$a = \frac{24}{4} = 6 \text{ cm}$$

$$b = \frac{32}{4} = 8 \text{ cm}$$

$$c = \frac{40}{4} = 10 \text{ cm}$$

$$d = \frac{48}{4} = 12 \text{ cm}$$

$$\text{Perimeter of new square} = a + b + c + d = 6 +$$

$$8 + 10 + 12 = 36 \text{ cm}$$

$$4(\text{side}) = 36$$

$$\text{side} = 9 \text{ cm}$$

$$\text{Required area} = \text{side}^2 = 9^2 = 81 \text{ cm}^2$$

38. (b): let side of larger & smaller square be a & b cm respectively.

$$a - b = 3$$

$$a^2 - b^2 = 36$$

$$(a - b)(a + b) = 36$$

$$(a + b) = 12$$

$$\text{Side of larger square} = a = \frac{12+3}{2} = 7.5 \text{ cm}$$

39. (d): Let side of square be a and length and breadth of rectangle be l and b respectively

$$4a = 2[2(l+b)]$$

$$4a = 4(l+b)$$

$$a = l+b$$

$$\text{it is given that } l \times b = 36$$

But, we can't determine value of $l+b$

Hence, area of square cannot be determined.

40. (d): let side of squares be 'a' & 'b' units respectively.

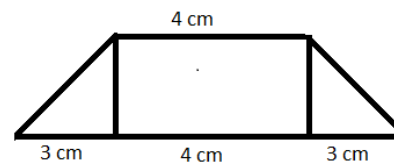
$$\frac{a^2}{b^2} = \frac{289}{169}$$

$$\frac{a}{b} = \frac{17}{13}$$

$$\text{Required ratio} = \frac{\sqrt{2}a}{\sqrt{2}b} = 17 : 13$$

41. (d): side of square = $\sqrt{25} = 5$ cm

Since non-parallel sides are equal,



$$\text{Height of trapezium} = \sqrt{5^2 - 3^2} = 4 \text{ cm}$$

$$\text{Area of trapezium} = \frac{1}{2}(\text{base1} + \text{base2}) \times \text{height}$$

$$\frac{1}{2} \times (4 + 10) \times 4 = 28 \text{ cm}^2$$

42. (b): Let the length(l) and breadth(b) of the rectangle be $20x$ and $10y$ respectively.
 Area of the rectangle = $l \times b = 20x \times 10y = 200xy$
 When length and breadth of the rectangle is increased by 20% and 10% respectively, then new length and new breadth of rectangle will be $24x$ and $11y$ respectively
 new area of rectangle = $24x \times 11y = 264xy$
 % increase in area of the rectangle = $\frac{264xy - 200xy}{200xy} \times 100$
 = 32%

43. (e): let side of square be x cm
 $\frac{x^2}{10x} = \frac{4}{5}$
 $x = 8$ cm
 Diagonal of square = $\sqrt{2}x = 8\sqrt{2}$ cm

44. (b): A.T.Q,
 $2 \times \frac{22}{7} \times r = 88$
 $\therefore r = 14$ cm
 So, side of square = 28 cm
 Required ratio = $\frac{22}{7} \times 14 \times 14 : 28 \times 28$
 = 11 : 14

45. (a): let height between parallel sides be h cm
 ATQ, $\frac{\sqrt{3}}{4}(6)^2 = \frac{1}{2} \times (5 + 7) \times h$
 $h = \frac{3\sqrt{3}}{2}$ cm

46. (d): Let width of rectangle A be '4x meters'
 So, length of rectangle A = $4x \times 1.25 = 5x$ meters
 ATQ,
 $4x \times 5x = 1280$

$20x^2 = 1280$
 $x^2 = 64$
 $x = 8$
 Hence, side of equilateral triangle = $4x = 32$ m
 Required perimeter = $3 \times 32 = 96$ meters

47. (a): let radius of cylinder is 'r' cm
 ATQ
 $\pi r^2 = 132$
 $r^2 = \frac{132}{\pi} \times 7$
 $r^2 = 42$
 Height of Cylinder = $\frac{42}{2} = 21$ cm
 Volume of Cylinder = $\pi r^2 h$
 = $132 \times 21 = 2772$ cm³

48. (b): Let the radius of the sphere be R unit.
 ATQ
 $\Rightarrow \frac{\frac{4}{3}\pi R^3}{4\pi R^2} = \frac{8}{3}$
 $\Rightarrow R = 8$ unit
 Total surface area of the hemisphere = $3\pi R^2$
 = $3 \times \pi \times 64 = 192\pi$ unit²

49. (e): Let radius of semicircle = R
 Atq,
 $2 \times \pi \times 27 = \pi R + 2R$
 $2\pi \times 27 = R(\frac{22}{7} + 2)$
 $R = \frac{2 \times 22 \times 27 \times 7}{7 \times 36}$
 $R = 33$ meter

50. (c): total surface area of cylinder = $2\pi r(r + h)$
 = $2 \times \frac{22}{7} \times 25 \times 105$
 = 1.65 m²

Level - 2

1. (c): Volume of large sphere = $\frac{4}{3}\pi R^3$ cm³
 Volume of small sphere = $\frac{4}{3}\pi r^3$ cm³
 ATQ
 $\frac{4}{3}\pi R^3 = 64 \times \frac{4}{3}\pi r^3$
 $\frac{R}{r} = \frac{4}{1}$
 Let R and r be 4d and d respectively
 Height of cone = 2a cm
 Volume of one cone = $\frac{1}{3}\pi a^2 \times 2a = \frac{2}{3}\pi a^3$
 ATQ
 $\frac{4}{3}\pi r^3 = 16 \times \frac{2}{3}\pi a^3$

$\frac{4}{3}\pi d^3 = 16 \times \frac{2}{3}\pi a^3$
 $a = \frac{d}{2}$
 Required ratio = $4d : \frac{d}{2} : d$
 $\Rightarrow 8:1:2$

2. (c): let radius of hemisphere (R) = 16r cm
 then radius of each such smaller spherical ball = $\frac{1}{16} \times 16r = r$ cm
 no. of balls formed = $\frac{\frac{2}{3}\pi R^3}{\frac{4}{3}\pi r^3} = \frac{\frac{2}{3}\pi \times 16r \times 16r \times 16r}{\frac{4}{3}\pi r \times r \times r} =$
 2048 balls

3. (c): We know that, in rectangle
 $(\text{Diagonal})^2 = \text{Length}^2 + \text{Breath}^2$
 $(\text{Diagonal})^2 = (12)^2 + (5)^2$
 $(\text{Diagonal})^2 = 144 + 25$
 $(\text{Diagonal}) = 13 \text{ cm} = \text{hypotenuse of a right - angle isosceles triangle}$
 Let side of right - angle isosceles triangle = a cm
 Then, hypotenuse of right-angle triangle will be = $\sqrt{2}a \text{ cm}$
 ATQ
 $\sqrt{2}a = 13$
 $a = \frac{13}{\sqrt{2}} \text{ cm}$
 Area of right - angle isosceles triangle = $\frac{1}{2} \times \frac{13}{\sqrt{2}} \times \frac{13}{\sqrt{2}}$
 $= 42.25 \text{ cm sq.}$
 Area of rectangle = $12 \times 5 = 60 \text{ cm sq.}$
 Required difference = $60 - 42.25 = 17.75 \text{ cm sq.}$

4. (a): Let radius & height of each cylindrical vessel be 'r cm' & 'h cm' respectively.
 So, radius of spherical ball = 3r cm
 ATQ,
 $r - h = 3$
 $r = 3 + h$... (i)
 And,
 Volume of spherical ball = 63 × volume of cylindrical vessel
 $\frac{4}{3}\pi(3r)^3 = 63 \times \pi \times r^2 \times h$
 $\Rightarrow 4r = 7h$... (ii)
 On solving (i) & (ii), we get:
 $h = 4, r = 7$
 So, required radius = 3r
 $= 21 \text{ cm}$

5. (d): Let length of rectangular park be l meters.
 ATQ,
 $\frac{1 \times 12}{2(1+12)} = \frac{42}{11}$
 $\Rightarrow \frac{1}{1+12} = \frac{7}{11}$
 $11l = 7l + 84$
 $4l = 84$
 $l = 21 \text{ m}$
 So, radius of circular park = 21m
 Required cost = $2 \times \pi \times r \times 20$
 $= 2 \times \frac{22}{7} \times 21 \times 20 = \text{Rs. } 2640$

Solutions (6 - 7):

Let smaller side of rectangular based tank = x m
 So, longer side of rectangular based tank = $x + x \times 1.5 = 2.5x \text{ m}$

ATQ –

2. $5x \times x = 1440$

$x^2 = 576$

$x = 24 \text{ m}$

Let height of rectangular based tank = h

Given, $l \times b \times h = 10800$

$60 \times 24 \times h = 10800$

$h = 7.5 \text{ m}$

6. (a): Total surface area of tank = $(lb + 2bh + 2lh)$
 $= (60 \times 24 + 2 \times 24 \times 7.5 + 2 \times 60 \times 7.5)$
 $= 2700 \text{ m}^2$

7. (c): Radius of conical tank = $24 \times \frac{7}{8} = 21 \text{ m}$

Height of conical tank = $7.5 \times 2 = 15 \text{ m}$

Capacity of water contained by conical tank =

$\frac{1}{3} \pi r^2 h$

$= \frac{1}{3} \times \frac{22}{7} \times 21 \times 21 \times 15$

$= 6930 \text{ m}^3$

8. (e): let length and breadth of the rectangular sheet be 4x and 3x cm respectively.

So, $4x \times 3x = 300$

$x = 5$

Length = 20 cm and breadth = 15 cm

To make a square sheet of max area, length is of the rectangular sheet is cut by 5 cm.

$\therefore \text{area of the square sheet} = 15 \times 15 = 225 \text{ cm}^2$

9. (b): $\pi r^2 + lb = 2136$ (where r- radius of circle, l- length of rectangle & b- breadth of rectangle)

$\frac{22}{7} \times 21 \times 21 + l \times 30 = 2136$

$l = \frac{750}{30} = 25 \text{ cm}$

So, circumference of circle = $2\pi r$

$= 2 \times \frac{22}{7} \times 21$

$= 132 \text{ cm}$

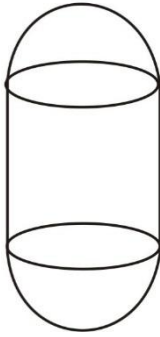
Perimeter of rectangle = $2 \times (l + b)$

$= 2(25 + 30)$

$= 110 \text{ cm}$

$\therefore \text{Required difference} = 132 - 110 = 22 \text{ cm}$

10. (c): ATQ,



$$\text{Radius of the solid} = \frac{14}{2} = 7 \text{ cm}$$

$$\text{Height of cylindrical part of the solid} = 26 - 7 - 7 = 12 \text{ cm}$$

Now,

$$\text{Area to be covered with metal sheet} = 2\pi r^2 + 2\pi rh + 2\pi r^2 = 2\pi r (r + h + r) = 2\pi r (2r + h)$$

$$= 2 \times \frac{22}{7} \times 7 (2 \times 7 + 12) = 44(26)$$

$$= 1144 \text{ cm}^2$$

$$= 1144 \text{ cm}^2$$

$$\text{Required amount} = 15 \times 1144 = \text{Rs. } 17160$$

11. (b): Area of smaller circular park = $\pi(60)^2$

$$= 3600\pi \text{ m}^2$$

$$\text{Area of bigger circular park} = 3600\pi \times \left(100 + \frac{325}{9}\right) \times \frac{1}{100}$$

$$= 4900\pi \text{ m}^2$$

Let radius of bigger circular park = r m

$$\text{Given, } \pi r^2 = 4900\pi$$

$$r = 70 \text{ m}$$

$$\text{Side of square park} = 70 \times \frac{1}{2} = 35 \text{ m}$$

$$\text{Required cost} = 16 \times 4 \times 35 = 2240 \text{ Rs.}$$

12. (c): Volume of cone = $\frac{1}{3}\pi \times 12^2 \times 15 = 720\pi \text{ cm}^3$

Ratio of radius and height of upper cone(after division) = $\frac{r}{h} = \frac{12}{15} = \frac{4}{5}$

$$\text{So, } h = \frac{5}{4}r$$

$$\text{Volume of upper cone} = 720\pi - 320\pi = 400\pi \text{ cm}^3$$

$$\text{Now, } \frac{1}{3}\pi \times r^2 \times \frac{5}{4}r = 400\pi$$

$$r^3 = 960$$

$$r = 4\sqrt[3]{15} \text{ cm}$$

13. (d): Let l = slant height of the cone

h = height of the cone

H = height of cylinder

r = radius

ATQ

$$\frac{\pi r l}{2\pi r H} = \frac{P}{8}$$

$$\Rightarrow \frac{l}{H} = \frac{P}{4}$$

$$\text{So, } H = \frac{60}{P}$$

$$\text{Now, } h = \sqrt{15^2 - 9^2} = 12 \text{ cm}$$

$$\Rightarrow \frac{1}{3}\pi r^2 h + \pi r^2 H = 1944\pi$$

$$\frac{1}{3} \times 81 \times 12 + 81 \times \frac{60}{P} = 1944$$

$$\therefore P = 3$$

14. (a): Let side of square be ' $4x$ ' cm

$$\text{So, length of rectangle} = 4x \times \frac{3}{4} = 3x \text{ cm}$$

$$\text{And, breadth of rectangle} = 2x \text{ cm}$$

ATQ -

$$4 \times 4x - 2(3x + 2x) = 36$$

$$6x = 36$$

$$x = 6 \text{ cm}$$

$$\text{Perimeter of triangle} = \text{perimeter of rectangle} =$$

$$2(18 + 12) = 60 \text{ cm}$$

15. (e): ATQ,

Let side of square be a cm.

$$\text{Area of square} = 676$$

$$a^2 = 676$$

$$a = 26 \text{ cm}$$

$$\text{So, Breadth of rectangle} = 26 - 5 = 21 \text{ cm}$$

$$\text{And Length of rectangle} = 26 \text{ cm}$$

$$\text{Radius of cylindrical toy} = 21 \text{ cm}$$

$$\text{Height of cylindrical toy} = 26 \text{ cm}$$

$$\text{So, required area} = 2\pi (h + r)$$

$$= 2 \times \frac{22}{7} \times 21 \times (26 + 21)$$

$$= 6204 \text{ cm}^2$$

16. (c): Radius of circular plot (r) = $\sqrt{\frac{98.56 \times 7}{22}} = 5.6 \text{ m}$

$$\text{Cost of fencing per meter} = \frac{2816}{2 \times \frac{22}{7} \times 5.6} = 80 \text{ Rs.}$$

$$\text{Side of square plot} = 5.6 + 6.4 = 12 \text{ m}$$

$$\text{Cost of fencing a square plot} = 4 \times 12 \times 80 = 3840 \text{ Rs.}$$

17. (d): Radius of sphere = radius of semicircle

$$\text{Surface area of sphere} = 4\pi (\text{radius})^2$$

$$(\text{radius of sphere})^2 = \frac{616 \times 7}{4 \times 22} = 49 \text{ cm}^2$$

$$(\text{radius of sphere}) = 7 \text{ cm}$$

$$\text{Height of cylinder} = 7 \times 2.5$$

$$= 17.5 \text{ cm}$$

$$\text{Radius of cylinder} = \frac{17.5}{5} = 3.5 \text{ cm}$$

18. (d): Ice-cream Mould
 $r = 2$ cm $R = 6$ cm
 $h = 60\%$ of $10 = 6$ cm $H = 5r = 10$ cm
 Volume of Mould = $\pi R^2 H - 2 \times \frac{1}{3} \pi r^2 h$
 $= \pi (360 - \frac{2}{3} \times 24) = 344 \pi \text{ cm}^3$

19. (d): Let radius of two circles be r cm and $3r$ cm
 Atq,
 $2\pi r + 2\pi(3r) = 176$
 $2\pi(r + 3r) = 176$
 $4r = \frac{176 \times 7}{2 \times 22}$
 $r = 7$ cm
 Let, breadth of rectangle is $3x$ cm and length is $8x$ cm
 Atq,
 $2(l+b) = 176$
 $2(8x + 3x) = 176$
 $11x = 88$
 $x = 8$
 Length of rectangle = 64 cm
 Required difference = $64 - 7 \times 3 = 43$ cm

20. (d): Let length & breadth of rectangle be ' l ' & ' b ' respectively
 ATQ -
 $\frac{l \times (b+4) - (l-4) \times b}{lb} = \frac{4}{9}$
 $9(4l + 4b) = 4lb$
 $9(2l + 2b) = 2lb$
 $(2l + 2b) : lb = 2 : 9$

21. (a): Let inner radius of cylinder be ' r ' cm
 $\frac{4}{3} \pi (12)^3 = \pi \times 64 \times (10^2 - r^2)$
 $\frac{4 \times 12 \times 12 \times 12}{3 \times 64} = 100 - r^2$
 $r^2 = 100 - 36$
 $r^2 = 64$
 $r = 8$ cm
 Hence, uniform thickness of the cylindrical vessel
 $= 10 - 8 = 2$ cm

22. (b): T.S.A = $2\pi r^2 + \pi r^2 + 2\pi rh = 2552$
 $3\pi r^2 + 2\pi r \times 8 = 2552$
 $3r^2 + 16r = \frac{2552}{22} \times 7$
 $3r^2 + 16r = 812$
 $3r^2 + 16r - 812 = 0$
 $3r^2 + 58r - 42r - 812 = 0$

$$r(3r + 58) - 14(3r + 58) = 0$$

$$r = 14, -\frac{58}{3}$$

$$\text{Required volume} = \frac{2}{3} \pi r^3 + \pi r^2 h$$

$$= \frac{2}{3} \times \frac{22}{7} \times (14)^3 + \frac{22}{7} \times (14)^2 \times 8$$

$$= 5749\frac{1}{3} + 4928$$

$$= 10677\frac{1}{3} \text{ cm}^3$$

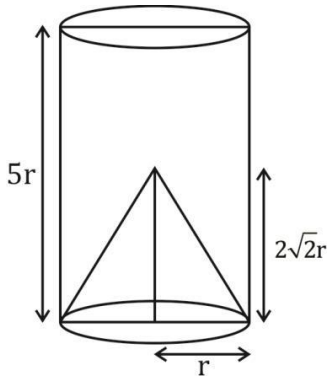
23. (e): Total surface area of sphere = $4\pi r^2$
 Total surface area of hemisphere = $3\pi r^2$
 Let radius of hemisphere and sphere be $3x$ cm
 And $2x$ cm respectively.
 ATQ—
 $3\pi r^3 - 4\pi r^2 = 423.5 \text{ cm}^2$
 $3 \times \frac{22}{7} \times (3x)^2 - 4 \times \frac{22}{7} \times (2x)^2 = 423.5$
 $x = 3.5$ cm
 Radius of hemisphere = $\frac{21}{2}$ cm = 10.5

24. (a): Let the radius of the cylinder and cone be ' r ' cm and ' R ' cm respectively and let their height be h cm respectively
 Given, $\pi r^2 h : \frac{1}{3} \pi R^2 h = 27 : 36$
 $3r^2 : R^2 = 27 : 36$
 $r^2 : R^2 = 9 : 36$
 $r : R = 3 : 6$
 $r = \frac{3}{9} \times 45$
 $= 15$ cm
 $R = 45 - 15$
 $= 30$ cm
 Therefore, Area of rectangle = $R \times r$
 $= 30 \times 15 = 450 \text{ cm}^2$

25. (c): Let r and h be radius and height of cylinder respectively.
 Now, $r + h = 23$ cm
 ATQ,
 $2\pi r (r + h) = 368\pi$
 $\Rightarrow r = 8$ and $h = 15$
 Now, radius of cone = 8 cm.
 ATQ,
 $\pi r (l + r) = 200\pi$
 $\Rightarrow l = 17$ cm
 Volume of cone = $\frac{1}{3} \pi \times 8 \times 8 \times 15$
 $= 320 \pi \text{ cm}^3$

Mains Solutions

1. (c):



Total surface area of cone = $\pi r \times \text{slant height} + \pi r^2$

$$\begin{aligned} &= \pi r (\ell + r) \\ &= \pi r (\sqrt{8r^2 + r^2} + r) \\ &= \pi r (4r) = 4\pi r^2 \end{aligned}$$

Total surface area of remaining part of cylinder

$$\begin{aligned} &= \pi r^2 + 2\pi r h + \pi r \ell \\ &= \pi r (r + 2h + \ell) \\ &= \pi r (r + 10r + 3r) \\ &= 14 \pi r^2 \end{aligned}$$

Required ratio = 2 : 7

2. (c): let height of vessel = h

Let radius of bowl = $\frac{3}{2}h$ = radius of vessel

Volume of hot water = $\frac{2}{3}\pi h^3$

Required percentage

$$= \frac{\frac{2}{3}\pi(\frac{3}{2}h)^3}{\pi(\frac{3}{2}h)^2 \times h} \times 100 = 100\%$$

3. (a): Let radius be 3r then height will be 2r

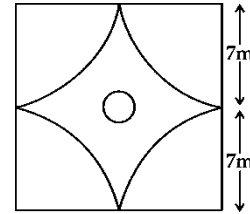
Value of figure formed

$$\begin{aligned} &= \frac{2}{3}\pi \times (3r)^3 + \pi(3r)^2 h \\ &= \frac{2}{3}\pi \times 27r^3 + \pi 9r^2 \times 2r \\ &= 36 \pi r^3 = 3r = 21 r=7 \\ &= 36 \times \frac{22}{7} \times 7 \times 7 \times 7 \\ &= 36 \times 22 \times 49 \text{ cm}^3 \end{aligned}$$

Required time

$$= \frac{36 \times 22 \times 49}{539} = 72 \text{ minute}$$

4. (d):



Area of square = $14 \times 14 = 196 \text{ m}^2$

Area of four quadrants = $\frac{4 \times \pi \times 7 \times 7}{4} = 154 \text{ m}^2$

Ungrazed area = $(196 - 154 - 20) = 22 \text{ m}^2$

5. (b): Radius of circle = $\frac{14}{2} = 7$

Area of circle

$$= \frac{22}{7} \times 7 \times 7 = 154 \text{ sq. cm}$$

Rectangle area = $622 - 154 = 468 \text{ sq. cm}$

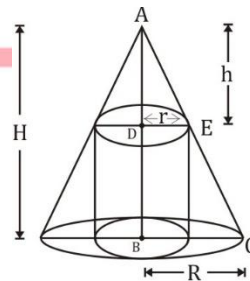
Breadth of rectangle

$$= \frac{468}{26} = 18 \text{ cm}$$

Required sum

$$\begin{aligned} &= 2\pi r + 2(\ell + b) \\ &= 2 \times \frac{22}{7} \times 7 + 2(26 + 18) \\ &= 44 + (44) \times 2 \\ &= 132 \text{ cm.} \end{aligned}$$

6. (b):



$\triangle ADE \sim \triangle ABC$,

$$\text{So, } \frac{R}{r} = \frac{H}{h} = \frac{7}{4}$$

Let $R = 7x$ and $r = 4x$

$H = 7y$ and $h = 4y$

Volume of cone left = $\frac{1}{3}\pi R^2 H - \pi r^2 (H - h) -$

$$\frac{1}{3}\pi r^2 h$$

$$= \frac{1}{3}\pi(49x^2 \cdot 7y - 3 \times 16x^2 \cdot 3y - 16x^2 \cdot 4y)$$

$$= \frac{1}{3}\pi x^2 y (343 - 144 - 64)$$

$$= \frac{135}{3}\pi x^2 y$$

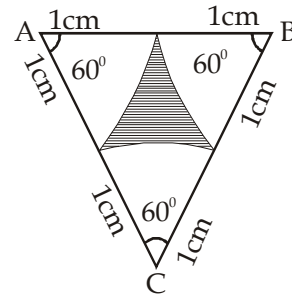
Volume of original cone

$$= \frac{1}{3}\pi \cdot R^2 H = \frac{1}{3}\pi \times 49x^2 \cdot 7y = \frac{343}{3}\pi \times x^2 y$$

Hence, fraction of volume of cone left = $\frac{135}{343}$

7. (c): Let, the no. of floors originally be x
 And the no. of rooms/floor originally be y
 A.T.Q.,
 $xy = 500$
 Also, $(x - 5) \times (y + 5) = \frac{90}{100} \times 500 = 450$
 $\Rightarrow xy + 5x - 5y - 25 = 450$
 $\Rightarrow 5(y - x) = 25$
 $\Rightarrow y - x = 5$
 Going by the options, the answer is option (c).
8. (c): Let the additional no. of rooms to be put in is x
 $(20 - 5) \times (25 + 5 + x) = 600$
 $\Rightarrow 15 \times (30 + x) = 600$
 $\Rightarrow 450 + 15x = 600$
 $\Rightarrow 15x = 150 \Rightarrow x = 10$
9. (a): Let, the planned no. of days be 'n'
 And planned harvest per day be 'x' m^3
 Then, $nx = 216$
 ATQ, $x(n - 1) + 8(n - 4) = 232$
 or, $nx - x + 8n - 32 = 232$
 or, $8n - x = 48$
 or, $8n - \frac{216}{n} = 48$
 or, $8n^2 - 48n - 216 = 0$
 or, $n^2 - 6n - 27 = 0$
 $\Rightarrow (n - 9)(n + 3) = 0$
 $\Rightarrow n = 9$
 Hence, $x = \frac{216}{9} = 24$
10. (b): Amount of wheat harvested in first three days = $24 \times 3 = 72 m^3$
 Remained = $216 - 72 = 144 m^3$
 This has to be harvested in $n - 3 - 2 = 4$ days
 Required Harvest per day = $\frac{144}{4} = 36 m^3$
 Required additional harvest per day = $36 - 24 = 12 m^3$
11. (e): Volume of earth removed = $10 \times 4.5 \times 3 m^3 = 135 m^3$
 Remaining area = $[20 \times 9 - 10 \times 4.5] m^2 = 180 - 45 = 135 m^2$
 Let, rise in height = h
 $h \times 135 = 135 \Rightarrow h = 1 m$
12. (a): Let radius of base and slant height of the two cones be r_1, l_1 and r_2, l_2
 $\pi r_1 l_1 = 3\pi r_2 (3l_1)$ (according to question)
 $r_1 = 9r_2 \Rightarrow \frac{r_1}{r_2} = 9$
 Ratio of area of their bases = $\frac{r_1^2}{r_2^2} = 9^2 = 81 : 1$

13. (c):



ΔABC is an equilateral triangle with each side 2 cm.

$$\text{Area of } \Delta ABC = \frac{\sqrt{3}}{4} a^2 = \frac{\sqrt{3}}{4} \times (2)^2 = \sqrt{3} \text{ cm}^2$$

Now, each angle in an equilateral triangle is $60^\circ = \frac{\pi}{3}$ radians

$$\text{So, area of each sector is} = \frac{\pi}{2\pi} \times \pi(1)^2$$

$$\text{So, total area of these sectors} = 3 \times \frac{\pi}{6} \text{ cm}^2 = \frac{\pi}{2} \text{ cm}^2$$

$$\text{Area of the shaded region} = \text{area of } \Delta ABC - \text{Area of the sectors} = \left(\sqrt{3} - \frac{\pi}{2}\right) \text{ cm}^2$$

14. (a): Area of the shaded portion
 = (Area of the rectangle) - (Area of the circle)
 [The four sectors form a circle of radius 10 cm]
 Area of shaded portion
 = $[28 \times 26 - \pi(10)^2] \text{ cm}^2$
 = $728 - 314.16 \text{ cm}^2 = 413.84 \approx 414 \text{ cm}^2$
 Perimeter of the shaded portion
 = $2\pi r + 2 \times 8 + 2 \times 6$
 = $(2 \times 3.1416 \times 10 + 16 + 12) \text{ cm}$
 = $90.832 \approx 90.8 \text{ cm}$

15. (a): Volume of ice cream
 = volume of cylindrical container
 = $\pi \times (6)^2 \times 16 \text{ cm}^3$
 This ice cream is distributed in 10 equal cones having hemispherical tops.
 So, volume of one cone = $\frac{\pi \times 6^2 \times 15}{10}$
 = $\frac{\pi \times 36 \times 3}{2} = 54\pi \text{ cm}^3$
 Let diameter of base of cone be 'D'
 So, height of conical portion = 2D
 Volume of cone and hemispherical top together
 = $\frac{1}{3} \pi \cdot \left(\frac{D}{2}\right)^2 \cdot (2D) + \frac{2}{3} \cdot \pi \cdot \left(\frac{D}{2}\right)^3$
 = $\frac{\pi D^3}{6} + \frac{\pi D^3}{12} = \frac{2\pi D^3 + \pi D^3}{12} = \frac{\pi D^3}{4}$
 $54\pi = \frac{\pi D^3}{4} \Rightarrow D^3 = 54 \times 4 \Rightarrow D = 6 \text{ cm}$

- 16. (d):** The sheet is rolled along its length
 Let the radius of the cylinder be 'r'
 $2\pi r = 22\text{m} \Rightarrow 2 \times \frac{22}{7} \times r = 22 \Rightarrow r = \frac{7}{2}\text{m}$
 Height of the cylinder = 8 m.
 Volume of the cylinder = $\frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 8\text{m}^3$
 = 308m^3
- 17. (c):** Area of the shaded portion
 = (Area of the square - Area of the circle)
 = $21 \times 21 - \pi \times 10.5 \times 10.5$
 = $(21 \times 21 - \frac{22}{7} \times (10.5)^2)\text{cm}^2 = 94.5\text{cm}^2$
- 18. (d):** Area of paths to be paved
 = $[19.25 \times 2 + 12.5 \times 2 - 2 \times 2]\text{m}^2 = 59.5\text{m}^2$
 Cost of paving these paths = Rs. 59.5×12.32
 = Rs. 733.04

- 19. (a):** $OP = 14\text{cm}$
 Perimeter of semicircle on $OP = \pi r = \pi \times 7$
 $PQ = 14\text{cm}$.
 Perimeter of semi-Circle on $PQ = \pi r = \pi \times 7$
 Perimeter of semi-circle on $OQ = \pi r = \pi \times 14$
 So, Perimeter of the shaded area
 = $(7\pi + 7\pi + 14\pi)\text{cm} = 28\pi\text{cm} = 88\text{cm}$.
- 20. (b):** Circumference of the circular field = $2\pi r$
 = 440m
 $2 \times \frac{22}{7} \times r = 440\text{m} \Rightarrow r = 70\text{m}$.
 width of path = 10m .
 Radius of outer circle, $R = 80\text{m}$.
 Area of path = $\pi(R^2 - r^2) = \frac{22}{7}(80^2 - 70^2)$
 Cost of cultivating the path
 = $\frac{22}{7} \times 150 \times 10 \times 0.7 \Rightarrow \text{Rs. } 3300$

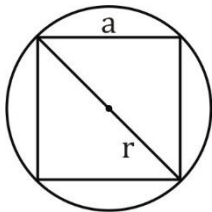
Previous Year Question

- 1. (c):** let length & breadth of rectangle be $4x\text{cm}$ & $7x\text{cm}$
 ATQ, $2(4x + 7x) = 88$
 $x = 4$
 Area of rectangle = $4x \times 7x = 448\text{cm}^2$
- 2. (b):** radius of second circle = $1.5 \times 14 = 21\text{cm}$
 Required area of circle = $\pi r^2 = \frac{22}{7} \times 21 \times 21$
 = 1386cm^2
- 3. (b):** Let width of garden = $x\text{m}$
 So length of garden = $(x+3)\text{m}$
 According to question
 $(x + 6)(x + 9) - x(x + 3) = \frac{273}{0.5}$
 $x^2 + 15x + 54 - x^2 - 3x = 546$
 $12x + 54 = 546$
 $x = 41$
 Area of garden = 41×44
 = 1804m^2
- 4. (c):** let length & breadth of rectangle be $4x\text{cm}$ & $7x\text{cm}$
 ATQ, $2(4x + 7x) = 88$
 $x = 4$
 Area of rectangle = $4x \times 7x = 448\text{cm}^2$
- 5. (b):** radius of second circle = $1.5 \times 14 = 21\text{cm}$
 Required area of circle = $\pi r^2 = \frac{22}{7} \times 21 \times 21$
 = 1386cm^2
- 6. (b):** Let width of garden = $x\text{m}$
 So length of garden = $(x+3)\text{m}$
 According to question
 $(x + 6)(x + 9) - x(x + 3) = \frac{273}{0.5}$
 $x^2 + 15x + 54 - x^2 - 3x = 546$
 $12x + 54 = 546$
 $x = 41$
 Area of garden = 41×44
 = 1804m^2
- 7. (b):** side of square = 42m (area of square $\approx 1764\text{m}^2$)
 length of rectangle = 14m
 breadth of rectangle = 10m
 Required difference = $1767 - 140 = 1627\text{m}^2$
- 8. (c):** Circumference of any circle = $2\pi \times \text{radius}$
 Radius of 1st circle = $\sqrt{\frac{1386}{\pi}} = 21\text{cm}$
 Radius of 2nd circle = $\frac{176}{2\pi} = 28\text{cm}$
 Side of square = $\frac{5}{14} \times 2 \times (21 + 28) = 35\text{cm}$
 Perimeter of square = $4 \times 35 = 140\text{cm}$
- 9. (c):** Here, perimeter of the square = 88cm (given)
 Side of the square = $\frac{88}{4} = 22\text{cm}$
 Area of the square = $a^2 = (22)^2 = 484\text{cm}^2$
 As it is given that area of equilateral triangle is equal to the area of the square
 So, the area of the equilateral triangle is 484cm^2

10. (a): Radius of first circle = $\frac{132 \times 7}{2 \times 22} = 21$ cm
 Area of first circle = $\frac{22}{7} \times 21 \times 21 = 1386$ cm²
 Radius of second circle = $\frac{110 \times 7}{2 \times 22} = 17.5$ cm
 Area of second circle = $\frac{22}{7} \times 17.5 \times 17.5 = 962.5$ cm²
 Required difference = 423.5 cm²

11. (d): Let radius of cylinder = r cm
 And, let height of cylinder = h cm
 ATQ -
 $2r = \frac{2}{3}(r + h)$
 $3r = r + h \Rightarrow h = 2r$
 Curved surface area of cylinder = $2\pi rh$
 And, volume of cylinder = $\pi r^2 h$
 $\frac{2\pi rh}{\pi r^2 h} = \frac{1}{7} \Rightarrow r = 14$ cm
 $h = 28$ cm
 So, $l = \sqrt{r^2 + h^2}$
 $l = \sqrt{14^2 + 28^2}$
 $l = \sqrt{196 + 784} \Rightarrow l = \sqrt{980}$
 $l = \sqrt{7 \times 7 \times 2 \times 2 \times 5} \Rightarrow l = 14\sqrt{5}$ cm

12. (b): Let side of square be a cm and radius of circle be r cm.



Area of the square field = 220.5 m²
 Diagonal of the square field = 21 m
 Radius of the circular field
 = $\frac{\text{Diagonal of the square field}}{2} = 10.5$ m
 Area of the circular field = 346.5 m²
 Area of the remaining circular field = 126 m²

13. (e): Let length of the rectangle be 4x cm
 Then breadth of that rectangle = 3x cm
 ATQ
 $4x \times 3x = 432 \Rightarrow x = 6$
 Length = 24 cm and breadth = 18 cm
 Diagonal = $\sqrt{(576 + 324)} = 30$ cm
 Required ratio = $\frac{120}{900} = 2:15$

14. (c): let radius be r cm
 $132 = 2 \times \frac{22}{7} r \Rightarrow r = 21$ cm $\Rightarrow l = 42$ cm
 Let length, breadth of rectangle be l, b cm respectively
 Square is attached along breadth of rectangle, edge of square = b cm
 Increase in area = area of square
 $b^2 = 144 \Rightarrow b = 12$ cm
 Area of rectangle = $lb = 42 \times 12 = 504$ cm²

15. (c): let length & breadth of rectangle be x & y m respectively
 ATQ, $1.4xy - xy = 24$
 $xy = 60$ (i)
 also, $2(x + y) = 32$
 $x + y = 16$ (ii)
 from (i) & (ii)
 $x = 10$ m, $y = 6$ m
 breadth of rectangle = 6 m

16. (d): Let radius of sphere and cylinder is 'r'.
 So, volume of sphere = $\frac{4}{3}\pi r^3$
 Volume of cylinder = Volume of sphere
 $\frac{4}{3}\pi r^3 = \pi r^2 h$
 $h = \frac{4}{3}r$
 TSA of sphere = $4\pi r^2$
 TSA of cylinder = $2\pi r(r + h)$
 = $2\pi r(r + \frac{4}{3}r)$
 = $\frac{14}{3}\pi r^2$
 Required ratio = $\frac{4\pi r^2}{\frac{14}{3}\pi r^2} = \frac{6}{7}$
 = 6 : 7

17. (a): ATQ -
 $2(l + 18) = 84$
 $2l = 48$
 $l = 24$ meters
 So, measurement of side of square = $72 - 24 = 48$ meters

18. (b): Let width of rectangle A be '4x meters'
 So, length of rectangle A = $4x \times \frac{125}{100} = 5x$ meters
 ATQ,
 $4x \times 5x = 1280$
 $20x^2 = 1280$
 $x^2 = 64$
 $x = 8$
 Hence, side of square = $2 \times 8 = 16$ cm
 Required perimeter = $4 \times 16 = 64$ cm

19. (c): Let radius of circle be 'r' cm
 ATQ -
 $\frac{22}{7} \times r \times r = 616$
 $r = 14$ cm = breadth of rectangle
 Let length of rectangle be 'l' cm
 Perimeter of rectangle = circumference of a circle + 2
 $2(14 + l) = 2 \times \frac{22}{7} \times 14 + 2$
 $2(14 + l) = 90$
 $l = 31$ cm

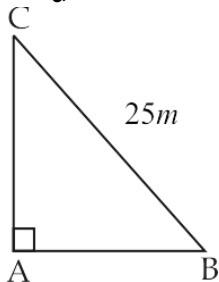
20. (c): Let the length and breadth of rectangle be (x+3) cm and x cm. respectively.
 ATQ,
 $(x+3) \times x = 180$
 $x^2 + 3x - 180 = 0$ ----- (i)
 After solving, we get
 $x = 12$
 So, side of square = 12 cm
 Perimeter of square = $12 \times 4 = 48$ cm

21. (a): Let side of square be '4x' cm
 So, length of rectangle = $4x \times \frac{3}{4} = 3x$ cm
 And, breadth of rectangle = 2x cm
 ATQ -
 $4 \times 4x - 2(3x + 2x) = 36$
 $6x = 36$
 $x = 6$ cm
 Perimeter of triangle = perimeter of rectangle
 $= 2(18 + 12) = 60$ cm

22. (b): Radius of base of cylinder = $\frac{66}{2 \times 22} \times 7 = \frac{21}{2}$ cm
 Volume of cylinder = $\frac{22}{7} \times \frac{21}{2} \times \frac{21}{2} \times 4$
 $= 1386$ cm³

23. (b): Side of the square = 9 cm
 Perpendicular side of the triangle = 12 cm
 Hypotenuse of the triangle = $\sqrt{81 + 144} = \sqrt{225} = 15$ cm
 Perimeter of the triangle = 36 cm

24. (e): ATQ,



Perimeter of triangle ABC = 60
 $AB + BC + CA = 60$
 $AB + 25 + CA = 60$
 $\Rightarrow AB + CA = 35$
 Now, let length of AB be x m. (as AB is the smallest side)
 So, length of CA = $(35 - x)m$
 Now,
 $(AB)^2 + (CA)^2 = (BC)^2$
 $(x)^2 + (35 - x)^2 = (25)^2$
 $\Rightarrow x^2 - 35x + 300 = 0$
 $\Rightarrow x = 15, 20$
 So, length of smallest side is 15m.

25. (c): Radius of a circle = $\frac{\sqrt{6^2 + 8^2}}{2} = \frac{10}{2}$ cm = 5 cm
 Area of the shaded Region
 = area of circle - area of rectangle
 $= \frac{22}{7} \times 5 \times 5 - 48 = 78.57 - 48 = 30.57$ cm²

26. (b): Height of the cylinder = $13 - 7 = 6$ cm
 Radius of the cylinder and the hemisphere = 7 cm
 Volume of the vessel
 = Volume of cylinder + Volume of hemisphere.
 $\Rightarrow \pi r^2 h + \frac{2\pi r^3}{3}$
 $\Rightarrow 3.14 \times 7 \times 7 \times 6 + \frac{2 \times 3.14 \times 7 \times 7 \times 7}{3}$
 $\Rightarrow 1642.67$ cm³

27. (a): Area of shaded region = $\pi \left(\frac{2}{2}\right)^2 - \pi \left(\frac{1}{2}\right)^2$
 $= \pi - \frac{\pi}{4} = \frac{3\pi}{4}$

28. (c): Let radius of a circle = r
 $\pi r^2 = 2\pi \Rightarrow r = \sqrt{2} \Rightarrow d = 2r = 2\sqrt{2}$
 Side of a square = $2d = 4\sqrt{2}$
 Area of a square = $4\sqrt{2} \times 4\sqrt{2} = 32$ unit

29. (b): Radius of the smaller circle = $\frac{y}{2}$
 \therefore Area of the shaded region = $\pi y^2 - \pi \frac{y^2}{4} = \frac{3}{4} \pi y^2$

30. (a): OP and OQ are equal side they are radii of the circle. Hence, DPOQ is isosceles.
 $\angle P = \angle Q = 51^\circ$
 Since, the sum of angles of a triangle is 180° ,
 $y = 180 - (51 + 51) = 78^\circ$

31. (a): Let the breadth of a rectangle be b.
 \therefore length = 3b
 $b \times 3b = 7803 \Rightarrow b^2 = \frac{7803}{3} = 2601 \Rightarrow b = 51$ m



Permutation, Combination and Probability

Permutation, Combination and Probability

Permutation Combination

Rule of Sum (OR): If an experiment has n possible outcomes and another has m possible outcomes, then there are $(n + m)$ possible outcomes when exactly one of these experiments is performed.

Rule of Product (And): If several process can be performed in the following manner; the first process in N ways, the second in M ways, the third in O ways and so on, then the total number of ways in which the whole process can be performed, in the order indicated, is given by their product i.e N.M.O.

Factorial: The continuous product of the first n natural numbers is called factorial n and is denoted by $n!$ or \underline{n}

$$n! = n (n - 1) (n - 2) (n - 3) \dots \dots \dots 3. 2. 1 = 1. 2. 3 \dots \dots \dots n$$

$$(i) (m + n)! \neq m! + n! \quad (ii) (m - n)! \neq m! - n! \quad (iii) (mn)! \neq (m!) (n!) \quad (iv) \left(\frac{m}{n}\right)! \neq \frac{m!}{n!}$$

- Ex.** $3! = 3 \times 2 \times 1 = 6$
 $4! = 4 \times 3 \times 2 \times 1 = 24$
 $5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$
 $0! = 1$

Permutations: The word permutations refers to 'arrangements'

The number of permutations of n objects, taken r at a time, is the total number of arrangements of n objects, in group of r , where the order of the arrangement is important.

$${}^n P_r = \frac{n!}{(n-r)!} \quad \text{or} \quad {}^n P_n = \frac{n!}{(n-n)!} = n!$$

(i) Without repetition: Arranging n objects, taking r at a time in every arrangement, is equivalent to filling r places from n objects.

r-places	1	2	3	4	--	r
No. of choices	n	n - 1	n - 2	n - 3	--	n - r + 1

number of ways of arranging = No. of ways of filling

Example: In how many ways can letters of the word PENCIL be arranged so that E and N are always together.

Sol.: Keep EN together and consider as one letter. Now, we have 5 letters which can be arranged in ${}^5 P_5 = 5! = 120$ ways. But E & N can be put together in $2!$ ways. Hence, total number of ways = $2! \times 5! = 2 \times 120 = 240$ ways.

(ii) With Repetition: Number of arrangements of n objects, taken r at a time, When each object may occur once, twice, thrice & So on upto r times in any arrangement is equivalent to the number of ways of filling r places, each out of n objects.

r places	1	2	3	4	--	r
No. of choices	n	n	n	n	--	n

Number of ways of arrangements = No. of ways to fill r places = $(n)^r$

Example: A telegraph has 5 arms and each arm is capable of 4 distinct positions, including the position of rest. Find the total number of signals that can be made.

Sol.: No. of distinct positions = 4
 No. of Arms = 5
 Therefore, number of signals = $4^5 = 1024$
 But in one case, when all the 5 arms will be in rest position, no signal will be made.
 Hence required number of signals = $1024 - 1 = 1023$.

Circular Permutations: Let n persons ($a_1, a_2, a_3, \dots, a_n$) are to be seated in a row. There are total $n!$ ways. If n persons are to be seated in circle, there are total $(n - 1)!$ ways. Since position of one will be fixed.

There may be two different circular arrangements clockwise and anti-clockwise.

- (i) When distinction is made between the clockwise and the anti-clockwise arrangements of n different objects around the circle. then the number of arrangements is $(n - 1)!$
- (ii) On the other hand, if no distinction is made between the clockwise and anticlockwise arrangement of n different objects around a circle, then the number of arrangements is $\frac{(n - 1)!}{2}$

Example: Find the number of ways in which 10 different beads can be arranged to form a necklace.

Sol. Ten different beads can be arranged in circular form in $(10 - 1)! = 9!$ ways. Since, there is no distinction between the clockwise and anticlockwise arrangements, the required number of arrangements = $9!/2$

Some Important points regarding ${}^n C_r$

- (a) The number of selections from n distinct objects, taking at least one at a time is given by ${}^n C_1 + {}^n C_2 + {}^n C_3 + \dots + {}^n C_n = 2^n - 1$
- (b) The number of selections of r objects out of n identical objects is 1
- (c) Total number of selections of zero or more objects from n identical objects is $(n + 1)$

Example: In how many ways, can 20 identical apples be divided among 5 persons?

Sol. Here, the objects are identical and any person may get any number of apple

$$\begin{aligned} \text{Required number of ways} &= {}^{n+p-1} C_{p-1} \\ &= (20 + 5 - 1) C_{5-1} = {}^{24} C_4 = \frac{24!}{4! 20!} = \frac{24 \times 23 \times 22 \times 21}{4 \times 3 \times 2} = 6 \times 23 \times 11 \times 7 = 10626 \end{aligned}$$

Combinations: The meaning of combination is selection of objects & it is like permutation except that it is unordered. It is denoted by ${}^n C_r$.

$${}^n C_r = \frac{n!}{r! (n - r)!} = \frac{n(n - 1)(n - 2) \dots 3.2.1}{r!(n - r)!}$$

Selection of objects without repetition

- (i) ${}^n C_r = \frac{n!}{r! (n - r)!}$
- (ii) $r = 0, {}^n C_0 = \frac{n!}{0! n!} = 1$
- (iii) $r = 1, {}^n C_1 = \frac{n!}{1! (n - 1)!} = n$
- (iv) $r = n, {}^n C_n = \frac{n!}{n! (n - n)!} = 1$

Selection of objects with repetition: The number of combination of n distinct objects taken r at a time when each may occur once, twice, thrice, and so on upto r times, in any combination is given by ${}^{(n+r-1)} C_r$.

Example: What is the number of ways of choosing 4 cards from a pack of 52 playing cards? in how many of these

- (i) Four cards are of the same suit,
- (ii) Four cards belong to four different suits,
- (iii) are face cards,
- (iv) two are red cards and two are black cards.
- (v) cards are of the same colour?

Explanation:

- (i) There are ${}^{13} C_4$ ways of choosing 4 clubs, ${}^{13} C_4$ ways of choosing 4 spades, ${}^{13} C_4$ ways of choosing 4 hearts and ${}^{13} C_4$ ways of choosing 4 diamonds.

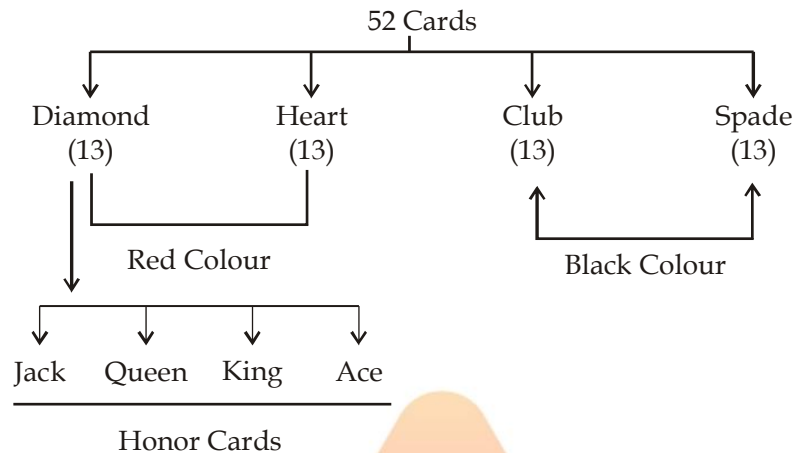
$$\text{Therefore, the required number of ways} = 4 \times {}^{13} C_4 = \frac{4 \times (13)!}{4! 9!} = \frac{4 \times 10 \times 11 \times 12 \times 13}{2 \times 3 \times 4} = 2860$$

- (ii) One card is to be selected from each suit.
This can be done in : ${}^{13} C_1 \times {}^{13} C_1 \times {}^{13} C_1 \times {}^{13} C_1 = (13)^4$ ways.
- (iii) There are 12 face cards and 4 are to be selected out of these 12 cards.

$$\text{Therefore, } {}^{12} C_4 = \frac{12!}{4! 8!} = \frac{9 \times 10 \times 11 \times 12}{2 \times 3 \times 4} = 495$$

Cards:

- (i) There are four suits Diamond, Club, Spade, heart.
- (ii) Each suit contains 13 cards, so total number of cards = $13 \times 4 = 52$
- (iii) Each suit contains 3 face cards, (Jack, Queen, King) so total Number of face cards = $3 \times 4 = 12$
- (iv) Each suit contains 9 number cards (2, 3, 4, 5, 6, 7, 8, 9, 10), so total numbers of cards = $9 \times 4 = 36$.
- (v) There are 26 red cards and 26 black cards.
- (vi) Each suit contains 4 honor cards (Jack, Queen, King & Ace) so total No. of honor cards = $4 \times 4 = 16$



(iv) The required number of ways = ${}^{25}C_2 \times {}^{26}C_2 = \left(\frac{26!}{2! \times 24!}\right)^2 = \left(\frac{25 \times 26}{2}\right)^2 = (325)^2 = 105625$

(v) 4 red cards can be selected out of 26 red cards in ${}^{26}C_4$ ways. 4 black cards can be selected out of 26 black cards in ${}^{26}C_4$ ways, therefore, the required number of ways
 $= {}^{26}C_4 + {}^{26}C_4 = 2 \times \frac{26!}{22!4!} = 2 \times \frac{23 \times 24 \times 25 \times 26}{2 \times 3 \times 4} = 29900$

Probability: If a random experiment has n possible outcomes, which are mutually exclusive, exhaustive & equally likely, and m of these are favourable to an event A, then the probability of the event is defined as the ratio m/n & is denoted by

$$P(A) = \frac{m}{n} = \frac{\text{Number of favourable cases to A}}{\text{Total number of possible cases}}$$

Probability of an event always lies between 0 & 1; i.e $0 \leq P \leq 1$

Addition Theorem of Probability: If two events A and B are mutually exclusive, then the probability of occurrence of either A or B is given by the sum of their probability, i.e,

$$P(A \text{ or } B) = P(A) + P(B)$$

- (1) For only two events A and B, the probability of occurrence of at least one of the two given events is given by $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
- (2) For any three events A, B and C, the probability of occurrence of at least one of the three events is given by $P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(B \cap C) - P(A \cap C) + P(A \cap B \cap C)$
- (3) **Conditional Probability:** The probability that the event A will occur, it being known that B has occurred, is called the conditional probability of A

Solved Example

1. Two unbiased coins are tossed. What is the probability of getting one head and one tail?

Sol. For one coin total number of possible outcomes = 2 (Head or Tail)

For two coins, the total number of possible outcomes = 4 $\Rightarrow n(S) = (HT, HH, TH, TT)$

$n(E) = (HT, TH) \Rightarrow P(E) = \frac{2}{4} = \frac{1}{2}$

2. Two dices are thrown at a time. What is the probability that the sum of the two numbers is 6 or 9?

Sol. Here the events are 6 as sum or 9 as sum and these events are mutually exclusive

for event A (for 6 as sum) = $\{(1, 5), (2, 4), (3, 3), (4, 2), (5, 1)\} = 5$

for event B (for 9 as sum) = $\{(6, 3), (5, 4), (4, 5), (3, 6)\} = 4$

$n(S) = 6^2 = 36 \Rightarrow P(A) = 5/36$ & $P(B) = 4/36$

since A and B are mutually exclusive events, so,

$P(A + B) = P(A) + P(B) = 5/36 + 4/36 = 9/36 = 1/4$

3. A bag contains 4 red & 3 black balls. A second bag contains 2 red & 4 black balls. One bag is selected at random & from the selected bag one ball is drawn. Find the probability that the ball is drawn is red.

Sol. Probability of selecting a bag = $1/2$

Probability of getting red ball from the first bag = $4/7$

Probability of getting red ball from the second bag = $2/6$

Hence, required probability = $\frac{1}{2} \times \frac{4}{7} + \frac{1}{2} \times \frac{2}{6} = \frac{2}{7} + \frac{1}{6}$
 $= \frac{2}{7} + \frac{1}{6} = \frac{12+7}{42} = \frac{19}{42}$

4. If the odds in favour of an event A are 3 : 4 and the odds against another independent event B are 7 : 4 find the probability that at least one of the event will happen.

Sol. The odds in favour of an event A are 3 : 4

Probability of A = $P(A) = \frac{3}{3+4} = 3/7$

The odds against an event B are 7 : 4

Probability of B = $P(B) = \frac{4}{7+4} = 4/11$

The probability of occurrence of atleast one of the events A and B is given by

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= P(A) + P(B) - P(A) \times P(B) = \frac{3}{7} + \frac{4}{11} - \frac{3}{7} \times \frac{4}{11}$

Basic Questions

1. In how many different ways can the letters of the word "TABLE" be arranged?

- (a) 24 (b) 48 (c) 120
(d) 60 (e) None of these

2. In how many different ways can the letters of the word "MATHEMATICS" be arranged?

- (a) $\frac{10!}{2}$ (b) $\frac{11!}{2}$ (c) $\frac{11!}{4}$
(d) $\frac{11!}{8}$ (e) None of these

3. In how many ways can 6 letters be posted in 5 letter boxes available in the locality?

- (a) 5^6 (b) 6^5 (c) 6^6
(d) 625 (e) None of these

4. How many 3-digit numbers are there, with distinct digits, with each digit odd?

- (a) 120 (b) 200 (c) 60
(d) 45 (e) None of these

5. In how many ways can the letters of the word 'UNIVERSAL' be arranged when E, R, S are always together?

- (a) 31240 (b) 32240 (c) 30240
(d) 29240 (e) None of these

6. How many 4-digit numbers are there with distinct digits?

- (a) 4536 (b) 5182 (c) 4886
(d) 5800 (e) None of these

7. In how many different ways can the letters of the word 'DETAIL' be arranged in such a way that the vowels occupy only the odd positions?

- (a) 32 (b) 48 (c) 36
(d) 60 (e) 120

8. A single die is tossed. What is the probability of a 2 turning up?

- (a) $\frac{1}{6}$ (b) $\frac{2}{6}$ (c) 0
(d) 1 (e) None of these

9. Find the probability of a 4 turning up at least once in two tosses of a fair die

- (a) 1 (b) $\frac{1}{36}$ (c) 11
(d) $\frac{11}{36}$ (e) None of these

10. One bag contains 4 white balls and 2 black balls; another contains 3 white balls and 5 black balls. If one ball is drawn from each bag, find the probability that both are white.
 (a) $\frac{1}{4}$ (b) $\frac{1}{36}$ (c) $\frac{4}{11}$
 (d) $\frac{11}{36}$ (e) None of these
11. A die is rolled, find the probability that an even number is obtained.
 (a) $\frac{1}{4}$ (b) $\frac{1}{6}$ (c) $\frac{1}{2}$
 (d) $\frac{1}{3}$ (e) None of these
12. Two coins are tossed, find the probability that two heads are obtained.
 (a) $\frac{1}{4}$ (b) $\frac{1}{6}$ (c) $\frac{1}{2}$
 (d) $\frac{1}{5}$ (e) None of these
13. A dice is rolled and a coin is tossed, find the probability that the die shows an odd number and the coin shows a head.
 (a) $\frac{1}{4}$ (b) $\frac{1}{2}$ (c) $\frac{1}{3}$
 (d) $\frac{1}{12}$ (e) None of these
14. A card is drawn at random from a deck of cards. Find the probability of getting the 3 of diamond.
 (a) $\frac{1}{52}$ (b) $\frac{3}{52}$ (c) $\frac{1}{26}$
 (d) $\frac{3}{26}$ (e) None of these
15. A person draws a card from a pack of playing cards, replaces it and shuffles the pack. He continues doing this until he draws a spade. The chance that he will fail in first two times is
 (a) $\frac{9}{64}$ (b) $\frac{1}{64}$ (c) $\frac{1}{16}$
 (d) $\frac{9}{16}$ (e) None of these

Prelims Questions

Level - 1

1. Two cards are drawn at random from a pack of 52 cards, then find the probability of getting one red face card and one black ace?
 (a) $\frac{1}{221}$ (b) $\frac{2}{221}$ (c) $\frac{76}{221}$
 (d) $\frac{91}{221}$ (e) $\frac{221}{221}$
2. In a bag there are 6 blue, 4 red and 5 green balls. Three balls are chosen at random with replacement, find probability of getting utmost one color.
 (a) $\frac{27}{125}$ (b) $\frac{64}{125}$ (c) $\frac{64}{3375}$
 (d) $\frac{1}{27}$ (e) $\frac{3}{25}$
3. Find the number of 7-digit numbers which can be formed by using all digits 6,5,4,5,3,4,3 only once such that the odd digits occupy odd places only?
 (a) 24 (b) 15 (c) 18
 (d) 20 (e) 30
4. If three coins are tossed simultaneously, find the probability of getting minimum 2 head at a time.
 (a) $\frac{1}{2}$ (b) $\frac{3}{8}$ (c) $\frac{5}{8}$
 (d) $\frac{3}{4}$ (e) $\frac{7}{8}$
5. In a class there are 10 boys and 3 girls. A game was organized, find the probability of coming at least one girl in first three positions when all students participated in that game.
 (a) $\frac{3}{10}$ (b) $\frac{83}{143}$ (c) $\frac{157}{289}$
 (d) $\frac{167}{289}$ (e) $\frac{157}{289}$
6. From numbers 1 to 15 two no. are selected what is the probability that both the selected no. are even numbers.
 (a) 0.20 (b) 0.30 (c) 0.25
 (d) 0.35 (e) 0.40
7. Find the probability of 7 letters word that can be formed from the letters of the word 'CASTING' so that vowels always come together.
 (a) $\frac{2}{7}$ (b) $\frac{19}{42}$ (c) $\frac{4}{15}$
 (d) $\frac{10}{21}$ (e) $\frac{5}{14}$
8. If two dices are rolled together, then find the probability of getting a sum of numbers on both the dice an even number?
 (a) $\frac{3}{4}$ (b) $\frac{2}{3}$ (c) $\frac{1}{6}$
 (d) $\frac{5}{6}$ (e) $\frac{1}{2}$
9. A five letter word is to be formed taking all letters - H, A, R, E and T. What is the probability that the word formed will contain all the vowels together?
 (a) $\frac{2}{5}$ (b) $\frac{3}{5}$ (c) $\frac{1}{2}$
 (d) $\frac{2}{3}$ (e) $\frac{3}{4}$
10. Seven people chosen for Kho -Kho team from a group of 8 boys and 6 girls. In how many ways 3 boys and 4 girls can be chosen for Kho -Kho team ?
 (a) 92 (b) 696 (c) 768
 (d) 840 (e) 864

- 11.** When two dices are rolled simultaneously, then what will be the probability of getting sum more than 4 and less than 7?
 (a) $\frac{1}{3}$ (b) $\frac{1}{6}$ (c) $\frac{1}{18}$
 (d) $\frac{1}{4}$ (e) $\frac{2}{9}$
- 12.** Two dices are rolled simultaneously. Then, find probability that sum of numbers appearing on both dices is a multiple of 3.
 (a) $\frac{1}{9}$ (b) $\frac{1}{12}$ (c) $\frac{1}{4}$
 (d) $\frac{1}{3}$ (e) $\frac{1}{6}$
- 13.** In how many ways can 5 prizes be given away to 7 students when each student is eligible for every prize?
 (a) 7^5 (b) 5^7 (c) $7!$
 (d) $5!$ (e) $(7!)^5$
- 14.** An urn contains 6 red balls and 9 green balls. Two balls are drawn from the urn one after other without replacement. Find the probability of drawing a red ball when a green ball has been drawn from the urn.
 (a) $\frac{3}{15}$ (b) $\frac{3}{7}$ (c) $\frac{9}{14}$
 (d) $\frac{7}{11}$ (e) $\frac{2}{5}$
- 15.** If two dices are rolled together, then find the probability of getting a number of one dice greater than the number on other dice?
 (a) $\frac{3}{4}$ (b) $\frac{2}{3}$ (c) $\frac{1}{6}$
 (d) $\frac{5}{6}$ (e) $\frac{1}{2}$
- 16.** In an objective question there is a choice of five alternatives in which one is correct. Find the probability of wrong option chosen by Anurag, if Anurag correct every two question out of three.
 (a) $\frac{1}{5}$ (b) $\frac{1}{3}$ (c) $\frac{3}{5}$
 (d) $\frac{4}{15}$ (e) $\frac{8}{15}$
- 17.** Bag-A contains 6 blue balls, 7 red balls and 2 green balls and Bag-B contains 5 blue balls, x red balls and 2 green balls. A bag is chosen randomly and two balls are taken out from it randomly, then the probability of getting two red balls is $\frac{2}{15}$. Find number of red balls in Bag-B.
 (a) 2 (b) 5 (c) 1
 (d) 4 (e) None of the above.
- 18.** An urn contains 4 red, 5 green, 6 blue and some yellow balls. If two balls are drawn at random, the probability of getting at least one yellow ball is $\frac{17}{38}$. find the yellow balls in the urn.
 (a) 4 (b) 5 (c) 6
 (d) 10 (e) 15
- 19.** In a bag, there are 4 red, 9 blue and X yellow balls. Two balls are drawn at random and the probability of both balls being blue is $\frac{4}{19}$. Find the value of X ?
 (a) 4 (b) 5 (c) 6
 (d) 7 (e) 8
- 20.** Probability of choosing a tiger over all animals (Ostrich, Tiger and Jackals) is $\frac{7}{16}$. Find probability of picking a jackal, if ratio between number of heads to number of legs in park is 2 : 7.
 (a) Cannot be determined
 (b) $\frac{2}{7}$
 (c) $\frac{5}{16}$
 (d) $\frac{3}{16}$
 (e) $\frac{1}{4}$
- 21.** A bag contains x green balls, 7 blue balls and 8 red balls. When two balls are drawn from bag randomly, then the probability of one ball being green and one ball being red is $\frac{4}{15}$. Find value of x (number of green balls cannot be more than 18 balls).
 (a) 3 (b) 5 (c) 10
 (d) 9 (e) 15
- 22.** In a bag, there are some red, black and yellow balls. Sum of black and yellow balls is 9. Probability of selecting two red balls from that bag is $\frac{1}{7}$ which is 250% of the probability of selecting two black balls. Find number of yellow balls in that bag if the number of black balls is even.
 (a) 3 (b) 5 (c) 6
 (d) 4 (e) None of these
- 23.** What is the probability of drawing 4 red balls and 2 yellow balls from a bag containing 10 red balls and 5 yellow balls?
 (a) $\frac{60}{143}$ (b) $\frac{45}{1001}$ (c) $\frac{2}{5}$
 (d) $\frac{4}{25}$ (e) $\frac{50}{143}$
- 24.** In how many ways can 5 letter words be formed from 2nd, 5th, 6th, 8th and 9th letter of the word 'METICULOUS'?
 (a) 120 (b) 60 (c) 240
 (d) 24 (e) 12
- 25.** In a basket, there are 5 green ,4 blue and 2 red balls in a basket. What is the probability of both balls being blue or green ball, if 2 balls are picked from the basket?
 (a) $\frac{16}{55}$ (b) $\frac{21}{55}$ (c) $\frac{39}{55}$
 (d) $\frac{34}{55}$ (e) none of these
- 26.** What is the probability of drawing 3 red cards from a pack having 2 black cards missing?
 (a) $\frac{3}{50}$ (b) $\frac{2}{17}$ (c) $\frac{13}{98}$
 (d) $\frac{13}{25}$ (e) None of these

27. In how many ways can a Cricket team be selected from a squad of 15 players?
 (a) 2730 (b) 1370 (c) 1400
 (d) 1365 (e) Cannot be determined
28. A dice is rolled twice, determine the probability that number in the second roll will be higher than that in the first roll.
 (a) $\frac{7}{12}$ (b) $\frac{5}{12}$ (c) $\frac{11}{36}$
 (d) $\frac{19}{36}$ (e) $\frac{23}{36}$
29. Out of 7 consonants and 6 vowels, how many words (with or without meaning) can be made each containing 4 consonants and 2 vowels?
 (a) $720 \times 7!$ (b) $500 \times 7!$ (c) $625 \times 6!$
 (d) $525 \times 6!$ (e) none of these
30. How many words can be formed using four letters of word "FATHER"?
 (a) 120 (b) 720 (c) 360
 (d) 480 (e) 180
31. Two coins and one die are thrown simultaneously, find probability of getting at least one head with no. 6?
 (a) 0.333 (b) 0.125 (c) 0.250
 (d) 0.200 (e) 0.800
32. Two dices are rolled simultaneously, then find the probability of getting a sum more than 8 and less than 10.
 (a) $\frac{1}{12}$ (b) $\frac{1}{9}$ (c) $\frac{1}{3}$
 (d) $\frac{1}{6}$ (e) $\frac{1}{18}$
33. If two cards are drawn randomly from a pack of 52 cards, then find probability that at least one drawn card is king card.
 (a) $\frac{33}{221}$ (b) $\frac{19}{221}$ (c) $\frac{45}{221}$
 (d) $\frac{3}{17}$ (e) $\frac{48}{221}$
34. A box contains 5 red balls, 8 green balls and 10 pink balls. A ball is drawn at random from the box. Find the probability that the ball drawn is either red or green.
 (a) $\frac{13}{23}$ (b) $\frac{10}{23}$ (c) $\frac{11}{23}$
 (d) $\frac{13}{529}$ (e) $\frac{12}{23}$

Level - 2

1. If all the alphabets used in the word 'RAINBOW' are arranged such that it always start with a vowel but don't end with 'W'. Find the total no. of arrangement possible.
 (a) 5040 (b) 18000 (c) 14400
 (d) 1800 (e) 1440
2. A bag contains 25 balls numbered from 1 to 25. Two balls are selected one by one with replacement at random. What is the probability that the 1st ball is a prime number and the 2nd ball is a perfect square?
 (a) $\frac{16}{125}$ (b) $\frac{9}{125}$ (c) $\frac{3}{25}$
 (d) $\frac{28}{125}$ (e) $\frac{11}{25}$
3. There is 12 people in a group. When two people are selected at random, difference between probability of either both are male, or both are female is $\frac{1}{6}$. Find difference between male and female in the group (male are more than female in the group)?
 (a) 3 (b) 2 (c) 1
 (d) 4 (e) Can't determine
4. A bag contains 4 white and 6 black balls; another bag contains 4 white and 4 black balls. From any one of these bags a single draw of two balls is made. Find the probability that one of them would be white and other black ball.
 (a) $\frac{29}{105}$ (b) $\frac{58}{105}$ (c) $\frac{29}{210}$
 (d) none of these (e) $\frac{44}{105}$
5. How many different 4-digit numbers are there which have the digits 1, 2, 3, 6, 7 and 0 such that always the digit 3 appears exactly once in the number? (repetition is allowed)
 (a) 350 (b) 300 (c) 500
 (d) 625 (e) 425
6. The probability of solving a question by Jindal is $\frac{3}{5}$ while that of not solving it by Avi $\frac{1}{4}$. What is the probability that the problem be solved?
 (a) $\frac{3}{5}$ (b) $\frac{7}{10}$ (c) $\frac{1}{5}$
 (d) $\frac{3}{10}$ (e) $\frac{3}{20}$
7. In how many ways can Shreyas select 4 seats in a bus of 40 seats (2X2) having 10 window seats already occupied provided he selects 2 window seat & 2 accompanying seats?
 (a) 4050 (b) 2025 (c) 90
 (d) 235 (e) 160
8. In a bag, there are 16 balls of three different colors i.e. red, blue and green. Number of red and blue balls is 9 and difference between red and green ball is 4 then find the probability of getting a ball of each color if three balls are picked at random?
 (a) $\frac{5}{28}$ (b) $\frac{4}{27}$ (c) $\frac{7}{36}$
 (d) $\frac{8}{35}$ (e) $\frac{9}{40}$

Direction (9 – 10): . A bag (X) contains some red balls and some green balls, and their respective ratio is 4 : 5. If three more red balls are added and one green ball is taken out from bag, then the new ratio of red balls to green balls become 11 : 9.

9. If 'n' number of blue balls are added in bag (X) and one ball is taken from the bag, then probability of getting either blue or red is $\frac{2}{3}$. Find 'n'.
- (a) 15 (b) 3 (c) 6
(d) 24 (e) 12
10. Five balls are taken from bag (X), find the probability that the red balls left in the bag 'X' are maximum?
- (a) $\frac{6}{13}$ (b) $\frac{5}{13}$ (c) 1
(d) $\frac{3}{13}$ (e) $\frac{8}{13}$
11. A bag contains 12 balls (Red & blue). Two balls are taken out randomly from the bag and probability of one ball being red and one ball being blue is $\frac{35}{66}$. If 'n' blue balls added in bag and then two balls are taken out randomly from bag, then minimum probability of remaining blue balls in bag is $\frac{9}{14}$, find 'n'? (blue balls are more than red balls in the bag initially).
- (a) 1 (b) 2 (c) 4
(d) 6 (e) 8
12. A bag contains 4 blue and 5 black balls and another bag contains 2 green, 3 black and 5 white balls. If a ball is drawn from each bag then what will be the probability of both balls being of different colors.
- (a) $\frac{5}{6}$ (b) $\frac{5}{9}$ (c) $\frac{4}{9}$
(d) $\frac{13}{18}$ (e) $\frac{2}{3}$
13. What is the probability of picking up 2 red shirts from a pile of 15 shirts of which 7 are blue?(only 2 colours shirts are there in it)
- (a) $\frac{1}{4}$ (b) $\frac{4}{15}$ (c) $\frac{2}{15}$
(d) $\frac{3}{8}$ (e) $\frac{8}{15}$
14. In how many ways can a team of 4 people be formed from 4 boys & 5 girls such that girls are never less than boys and team has both boys and girls?
- (a) 140 (b) 40 (c) 60
(d) 100 (e) 80
15. A bag has 6 blue balls, 'x' red balls and 5 green balls. If two balls are picked randomly, then probability of 1 being red and 1 being green is $\frac{9}{38}$. Find value of x.
- (a) 5 (b) 9 (c) 4
(d) 7 (e) 8

16. A and B invested Rs 2000 and Rs (2000 +x) respectively. B withdraw from the business after 8 months. If at the end of the year profit obtained by B is 20% less than the profit obtained by A then find the value of x
- (a) Rs 500 (b) Rs 400 (c) Rs 450
(d) Rs 600 (e) Rs 200
17. Three cards are drawn randomly from a pack of 52 cards, then find the probability that 2 cards being red cards & 1 card being black card.
- (a) $\frac{13}{34}$ (b) $\frac{19}{52}$ (c) $\frac{7}{39}$
(d) $\frac{3}{43}$ (e) $\frac{25}{43}$
18. Find how many words can be formed from the word 'COMBINATION', such that vowels will always come together.
- (a) 78200 (b) 75600 (c) 64800
(d) 52600 (e) 58400
19. Bag - A contains 8 red balls and 4 green balls and bag-B contains 6 red balls and 9 green balls. If a bag is chosen randomly and two balls are picked randomly from the bag, then find the probability of both drawn balls being green balls.
- (a) $\frac{45}{128}$ (b) $\frac{167}{770}$ (c) $\frac{212}{523}$
(d) $\frac{52}{99}$ (e) None of the above.
20. There are 32 students in a classroom, in which some are girls and rest are boys. One student is chosen at random for being monitor in class. Probability of monitor, being a girl is $\frac{3}{8}$, if two students selected at random from class for debate competition, then find the probability of being it a girl and a boy?
- (a) $\frac{15}{62}$ (b) $\frac{15}{31}$ (c) $\frac{24}{4}$
(d) $\frac{5}{8}$ (e) $\frac{16}{31}$
21. The probability of selection of three candidates A, B and C in an organization is $\frac{2}{5}$, $\frac{5}{6}$ and $\frac{4}{7}$ respectively. Find the probability that at least one of them get selected.
- (a) $\frac{107}{210}$ (b) $\frac{97}{210}$ (c) $\frac{67}{70}$
(d) $\frac{63}{70}$ (e) None of these
22. Respective ratio of number of green, red and white ball in a bag is 3: 4: 5 and when two balls are drawn, probability of being exactly one red and one white ball is $\frac{2}{7}$. Find the probability of getting red balls when two balls are drawn.
- (a) $\frac{14}{107}$ (b) $\frac{3}{35}$ (c) $\frac{11}{105}$
(d) $\frac{3}{34}$ (e) $\frac{14}{111}$

- 23.** what is the probability of getting a pair of even numbered cards when two cards draw from a well shuffled pack of card?
 (a) $\frac{32}{221}$ (b) $\frac{37}{663}$ (c) $\frac{95}{663}$
 (d) $\frac{39}{661}$ (e) $\frac{41}{221}$
- 24.** A bag contains 5 black, 7 blue and 4 brown colour balls. 3 balls are drawn at random. Find the probability that all 3 balls are of same colour.
 (a) $\frac{7}{90}$ (b) $\frac{9}{80}$ (c) $\frac{7}{80}$
 (d) $\frac{7}{60}$ (e) None of these
- 25.** Find the probability of forming a 2 digit number by using starting four prime number such that it is divisible by 3.
 (a) $\frac{1}{3}$ (b) $\frac{1}{4}$ (c) $\frac{5}{16}$
 (d) $\frac{1}{2}$ (e) $\frac{3}{8}$
- 26.** There are 2 red, 3 black and 3 white colored balls out of which, three balls are picked at random from the bag. Then, what is the probability that there is a ball of each color.
 (a) $\frac{7}{50}$ (b) $\frac{9}{56}$ (c) $\frac{7}{52}$
 (d) $\frac{9}{28}$ (e) $\frac{5}{26}$
- 27.** A bag contains 5 black, 7 blue and 4 brown colour balls. 3 balls are drawn at random. Find the probability that all 3 balls are of same colour.
 (a) $\frac{29}{280}$ (b) $\frac{1}{4}$ (c) $\frac{7}{80}$
 (d) $\frac{13}{80}$ (e) $\frac{11}{80}$
- 28.** In how many ways four-digit numbers can be formed such that all the four digits are odd?
 (a) 256 (b) 729 (c) 125
 (d) 400 (e) 625
- 29.** In how many ways, 5 different chocolate can put in 5 identical boxes, such that one box can contain only one chocolate.
 (a) 14400 (b) 720 (c) 72
 (d) 120 (e) 36
- 30.** There are total 36 fruits in a basket in which some are banana and some are Apple. If one fruit is taken out at random and probability of getting an Apple is $\frac{1}{6}$, then find the number of bananas in the basket.
 (a) 20 (b) 28 (c) 24
 (d) 30 (e) 16
- 31.** Anurag, Anil and Anand got a circular chocolate cake from the shop. They cut the cake into 7 unequal pieces. One of them gets only one piece and the other two get equal number of pieces. What is the number of ways in which they could have shared the cake pieces??
 (a) 280 (b) 360 (c) 420
 (d) 450 (e) 300
- 32.** A basket contains only three kinds of fruits – guavas, mangoes and pears. What is the minimum number of fruits that should be picked from the basket to ensure that at least 5 guavas or at least 7 mangoes or at least 8 pears are picked?
 (a) 20 (b) 19 (c) 17
 (d) 18 (e) can't be determined
- 33.** A bag has 15 balls – each of them is either red, blue or green. In every trial, one ball is drawn and put back in the bag before the next trial. The probability of not getting a blue ball in two consecutive trials is $\frac{9}{25}$. The probability of getting two green balls in two consecutive trials is $\frac{1}{25}$. What is the probability of getting balls of three different colors in three consecutive trials?
 (a) $\frac{18}{125}$ (b) $\frac{24}{125}$ (c) $\frac{4}{125}$
 (d) $\frac{30}{125}$ (e) $\frac{12}{125}$
- 34.** A basket contains only four kinds of fruits – guavas, mangoes, oranges and pears. What is the minimum number of fruits that should be picked from the basket to ensure that at least 5 guavas or at least 6 mangoes or at least 7 oranges or at least 8 pears are picked?
 (a) 25 (b) 26 (c) 24
 (d) 22 (e) 23
- 35.** There are two buckets, which contains some fruits. First bucket contains three mangos and six oranges, second bucket contains seven mangos and two oranges. One bucket is selected at random and one fruit is drawn from it. Find the probability of selected fruit is not mango?
 (a) $\frac{2}{9}$ (b) $\frac{5}{9}$ (c) $\frac{1}{9}$
 (d) $\frac{4}{9}$ (e) $\frac{7}{9}$

Mains Questions

1. In how many ways 8 people can sit around a circular table so that Abhishek and Ayush should never sit opposite to each other.
(a) 3600 (b) 7200 (c) 1440
(d) 720 (e) 1580
2. A bag contains balls of Red, Black, White, and Brown colour. Probability of getting one Red ball from a bag full of balls is $\frac{2}{13}$ and number of Black balls in the bag is 5. If white ball is 30% less than Brown ball and 40% more than the black balls then find the number of Red balls.
(a) 5 (b) 4 (c) 6
(d) 10 (e) 13
3. There are five mangos and six oranges in a bucket. What will be probability of Picking up four fruits which contains at least two orange?
(a) $\frac{53}{66}$ (b) $\frac{43}{66}$ (c) $\frac{59}{66}$
(d) $\frac{49}{66}$ (e) $\frac{3}{5}$
4. Three mountaineers Amit, Vinit and Nishit are climbing up a mountain with their respective probabilities of reaching the summit being $\frac{1}{3}$, $\frac{1}{5}$ and $\frac{1}{4}$ respectively. What is the probability that Exactly one of them reaches the Summit?
(a) $\frac{13}{30}$ (b) $\frac{17}{30}$ (c) $\frac{19}{30}$
(d) $\frac{11}{30}$ (e) none of these
5. A coin is so biased that the heads occurs four times as frequently as tails. Another coin is biased such that the heads occurs 65% of the times. When the two coins are tossed simultaneously, what is the probability of at least one tail turning up?
(a) 35% (b) 87% (c) 48%
(d) 73% (e) None of these

Directions (6-7): There are four boxes. Each box contains two balls. One red and one blue. You draw one ball from each of the four boxes.

6. What is the probability of drawing at least one red ball?
(a) $\frac{13}{16}$ (b) $\frac{15}{16}$ (c) $\frac{9}{16}$
(d) $\frac{11}{16}$ (e) None of these
7. If in each bag, a green ball is added, then find the probability of drawing at least one blue ball?
(a) $\frac{1}{9}$ (b) $\frac{16}{81}$ (c) $\frac{65}{81}$
(d) $\frac{8}{9}$ (e) None of these

Directions (8-10): There are three sections A, B and C in a class. Every section has some boy and some girl students in it. Probability of a girl being selected when one student is selected randomly from section A is $\frac{2}{5}$, that from section B is $\frac{4}{9}$ and that from section C is $\frac{5}{9}$.

8. If the ratio of total number of students in sections A, B and C is 10 : 12 : 9, then what is the probability of a girl being selected when one student is selected randomly from the students from all the three sections together?
(a) $\frac{14}{31}$ (b) $\frac{11}{23}$ (c) $\frac{13}{31}$
(d) $\frac{43}{93}$ (e) Cannot be determined
9. If the number of girls in sections A is same as the number of boys in section C, then what is the ratio of number of boys in section A to the number of boys in section C?
(a) 2 : 3 (b) 3 : 4 (c) 3 : 2
(d) 4 : 3 (e) None of these
10. If 20 girls leaves section B, then the probability of a boy being selected when one student is selected randomly from this section will be $\frac{5}{8}$. What is the number of boys in section B?
(a) 120 (b) 100 (c) 75
(d) 60 (e) Cannot be determined

Direction (11-12): In a bag there are three types of colored boxes of black, blue and white colors. The probability of selecting one black box out of the total boxes is $\frac{2}{5}$ and the probability of selecting one blue box out of the total boxes is $\frac{3}{7}$. The number of white boxes in the bag is 18.

11. One-third of the boxes are numbered even, one-third are numbered odd and the remaining are numbered '0'. If two boxes are picked up at random, then find the probability of getting an even sum of the numbers written on the boxes.
(a) $\frac{103}{312}$ (b) $\frac{101}{312}$ (c) $\frac{97}{312}$
(d) $\frac{107}{312}$ (e) None of these
12. What is the total number of boxes in the bag?
(a) 117 (b) 105 (c) 114
(d) 120 (e) none of these

Direction (13-14): In a stationary shop there are four types of colored sheets of red, blue, green and white colors. The probability of selecting one red sheet out of the total sheets is $\frac{1}{3}$, the probability of selecting one blue sheet out of the total sheets is $\frac{2}{7}$ and the probability of selecting one white sheet out of the total sheets is $\frac{1}{4}$. The number of green sheets in the bag is 22.

13. If all the sheets are numbered as 1,2,3,...and so on and one sheet is picked up at random, then find the probability of picking up a sheet which is numbered as a multiple of 13 or 17.

- (a) $\frac{1}{8}$ (b) $\frac{1}{7}$ (c) $\frac{5}{8}$
 (d) $\frac{9}{10}$ (e) none of these

14. What is the total number of sheets in the bag?

- (a) 117 (b) 168 (c) 154
 (d) 120 (e) none of these

Directions (15-17): In a circus there are two Jokers Shunty and Bunty who juggle the balls. Each one has different number of balls of different color (Red, Green and White). No one have the same number of balls of same color. Ratio of total number of balls having Shunty to that of Bunty is 2 : 3. If each Joker choose one ball from their respective set of balls then probability of getting Green ball are same for both Jokers. The number of white balls with Shunty is equal to the difference between the number of Green and Red balls with him. The number of Red and White balls with Bunty is $33\frac{1}{3}\%$ more than the number of green balls with him. Shunty has Red ball greater than Green ball which is equal to the number of white ball of Bunty. Total number of Green balls is 15 and total number of white balls is 8.

15. When Shunty picks 3 balls randomly, what is the probability of getting all green balls from the set?

- (a) $\frac{5}{91}$ (b) $\frac{13}{95}$ (c) $\frac{6}{95}$
 (d) $\frac{17}{91}$ (e) None of these

16. Bunty choose 3 ball for juggling, what is the probability that all the chosen balls are of different color.

- (a) $\frac{19}{38}$ (b) $\frac{9}{38}$ (c) $\frac{5}{38}$
 (d) $\frac{3}{38}$ (e) None of these

17. Shunty is good juggler as compare to Bunty, and chances of performance being performed by Shunty is 60%. What is the probability that Shunty performed with 4 balls in which atleast 2 balls are Red.

- (a) $\frac{101}{325}$ (b) $\frac{309}{715}$ (c) $\frac{103}{325}$
 (d) Can't be determined
 (e) None of these

Direction (18-20)- There are three bags A, B and C. In each bag there are three types of colored balls Orange, White and Red.

In bag A, no. of Orange colored balls are O and no. of White colored balls are W. Number of White colored balls are 5 more than the number of Orange colored balls. When one ball is picked at random then the probability of getting Red color ball is $\frac{15}{52}$. The value of W is $31\frac{1}{4}\%$ more then O.

In bag B, number of Orange colored balls is $18\frac{3}{4}\%$ more than that of orange colored balls in bag A. If two balls are picked at random from bag B without replacement then the probability of getting both White color ball is $\frac{1}{185}$. Total number of balls in bag B is 75.

In bag C, the ratio of number of White colored balls and number of Red colored balls is 5 : 3. Total number of White and Red colored balls is 24. If one ball is picked at random then the probability of getting one Orange ball is $\frac{1}{2}$.

18. If x number of white balls from bag B are taken and placed into bag C and $22\frac{2}{9}\%$ of Red balls from bag C are taken and placed into in bag B. If we pick one ball from bag C then the probability that the ball is of orange color is $\frac{1}{2}$. Then find the value of x?

- (a) 5 (b) 6 (c) 3
 (d) 2 (e) None of these

19. Difference between the number of Red balls in bag A and bag C is how much percent more/less than the sum of the number of orange balls in bag A and bag C together?

- (a) 100% (b) 85% (c) 97.5%
 (d) 102.5% (e) None of these

20. If one ball picked at random from each of the bag A and bag B then find the probability that both of the balls are of the orange color?

- (a) $\frac{76}{975}$ (b) $\frac{43}{975}$
 (c) $\frac{47}{975}$ (d) Can't be determined
 (e) None of these

Previous Year Question

1. A dice is rolled twice what is the probability that the number in the second roll will be lesser than that in the first?

(a) $\frac{1}{4}$ (b) $\frac{1}{2}$ (c) $\frac{7}{12}$
 (d) $\frac{5}{12}$ (e) $\frac{1}{6}$

IBPS Clerk Mains 2019

2. There are 5 red, 6 black and 5 blue balls in a bag. Out of these balls, four balls are picked at random from the bag. Then, what is the probability that one is red, two are black and one is blue ball?

(a) $\frac{75}{362}$ (b) $\frac{75}{364}$ (c) $\frac{71}{362}$
 (d) $\frac{70}{363}$ (e) $\frac{5}{26}$

IBPS RRB PO Prelims 2019

3. A basket contains 8 Blue, 5 Red and 6 Green balls. 3 Balls are drawn from the basket, then find the probability of getting all 3 balls drawn are of different colors?

(a) $\frac{80}{323}$ (b) $\frac{883}{969}$ (c) $\frac{73}{223}$
 (d) $\frac{86}{969}$ (e) $\frac{67}{173}$

RRB PO Mains 2019

4. A bag contains 12 balls (Red & blue). Two balls are taken out randomly from the bag and probability of one ball being red and one ball being blue is $\frac{35}{66}$. If 'n' blue balls added in bag and then two balls are taken out randomly from bag, then minimum probability of remaining blue balls in bag is $\frac{9}{14}$, find 'n'? (blue balls are more than red balls in the bag initially).

(a) 1 (b) 2 (c) 4
 (d) 6 (e) 8

RRB Clerk Mains 2019

5. A box contains 12 red, 6 green and 'x' yellow balls. Probability of choosing one green ball out of the box is $\frac{2}{9}$, then find the probability of choosing one ball which can be either red or yellow?

(a) $\frac{4}{9}$ (b) $\frac{5}{9}$ (c) $\frac{2}{3}$
 (d) $\frac{7}{9}$ (e) $\frac{8}{9}$

SBI PO Prelims 2020

6. Three are 5 green balls, 7 blue balls and 3 red balls in a bag. If 2 balls are chosen randomly from the bag, then find the probability that at least one ball is green ball.

(a) $\frac{1}{9}$ (b) $\frac{2}{7}$ (c) $\frac{3}{8}$
 (d) $\frac{3}{5}$ (e) $\frac{4}{7}$

IBPS RRB PO Prelims 2020

7. When 2 cards are drawn randomly from a pack of cards, then find the probability of getting at most 1 ace card.

(a) $\frac{209}{221}$ (b) $\frac{10}{13}$ (c) $\frac{215}{221}$
 (d) $\frac{16}{17}$ (e) $\frac{220}{221}$

SBI Clerk Mains 2019

8. A bag contains balls of two colours, 3 black and 3 white. What is the minimum number of balls which must be drawn from the bag, without looking, so that among these there are two of the same colour?

(a) 2 (b) 3 (c) 4
 (d) 5 (e) None of these

9. A box contains 10 identical electronic components of which 4 are defective. If 3 components are selected at random from the box in succession, without replacing the units already drawn, what is the probability that two components of the selected components are defective?

(a) $\frac{1}{5}$ (b) $\frac{5}{24}$ (c) $\frac{3}{10}$
 (d) $\frac{1}{40}$ (e) None of these

10. How many numbers of four digits can be formed with the digits 1, 2, 3, 4 and 5?

(If repetition of digits is not allowed)
 (a) 100 (b) 720 (c) 120
 (d) 24 (e) None of these

11. A question paper had ten questions. Each question could only be answered as True (T) or False (F). Each candidate answered all the questions. Yet, no two candidates wrote the answer in an identical sequence. How many different sequences of answers are possible?

(a) 20 (b) 40 (c) 512
 (d) 1024 (e) None of these

12. When ten persons shake hands with one another, in how many ways is it possible?

(a) 20 (b) 25 (c) 40
 (d) 45 (e) None of these

13. In how many ways can four children be made to stand in a line such that two of them, A and B are always together?

(a) 6 (b) 12 (c) 18
 (d) 24 (e) None of these

14. In how many ways 6 persons can stand in a queue at a time?

(a) 120 (b) 240 (c) 480
 (d) 720 (e) None of these

15. A card is drawn from a well-shuffled deck of cards. Find the probability of drawing a face card.
 (a) $\frac{1}{52}$ (b) $\frac{4}{13}$ (c) $\frac{3}{13}$
 (d) $\frac{16}{53}$ (e) None of these
16. One card is drawn from a well shuffled deck of 52 cards. Calculate the probability that the card will not be a black card
 (a) $\frac{1}{4}$ (b) $\frac{1}{2}$ (c) $\frac{3}{4}$
 (d) $\frac{5}{8}$ (e) None of these
17. One ticket is drawn at random out of 30 tickets numbered from 1 to 30. Find the probability that the number on the ticket is a multiple of 5 or 7.
 (a) $\frac{1}{2}$ (b) $\frac{1}{3}$ (c) $\frac{1}{4}$
 (d) $\frac{1}{5}$ (e) None of these
18. 10 coins are tossed. What is the probability that exactly 5 heads appear?
 (a) $\frac{63}{256}$ (b) $\frac{126}{256}$ (c) $\frac{186}{256}$
 (d) $\frac{65}{256}$ (e) None of these
19. If $P(A) = \frac{2}{3}$, $P(B) = \frac{1}{2}$ and $P(A \cap B) = \frac{14}{45}$, then find $P(A \cup B)$
 (a) $\frac{4}{5}$ (b) $\frac{1}{5}$ (c) $\frac{2}{5}$
 (d) $\frac{7}{9}$ (e) None of these
20. Find the chance of throwing 6 at least once in six throws with a single die.
 (a) $\left(\frac{5}{6}\right)^6$ (b) $1 - \left(\frac{5}{6}\right)^6$ (c) $\left(\frac{1}{6}\right)^6$
 (d) $1 - \left(\frac{1}{6}\right)^6$ (e) None of these
21. If a number of two digits is formed with the digits 2, 3, 5, 7, 9 without repetition of digits, what is the probability that the number formed is 35?
 (a) $\frac{1}{10}$ (b) $\frac{1}{20}$ (c) $\frac{1}{5}$
 (d) $\frac{1}{2}$ (e) None of these
22. What is the probability of getting a total of less than 12 in the throw of two dice?
 (a) $\frac{1}{36}$ (b) $\frac{1}{18}$ (c) $\frac{35}{36}$
 (d) $\frac{33}{36}$ (e) None of these
23. From 21 tickets numbered 1, 2, 3,.....21 one ticket is drawn at random. Find the probability that the ticket drawn has a number divisible by 3.
 (a) $\frac{1}{2}$ (b) $\frac{1}{3}$ (c) $\frac{1}{4}$
 (d) $\frac{1}{5}$ (e) None of these
24. A bag contains 4 white balls and 2 black balls. Another bag contains 3 white balls and 5 black balls. If one ball is drawn from each bag, then the probability that both the balls are black, is
 (a) $\frac{1}{24}$ (b) $\frac{3}{24}$ (c) $\frac{5}{24}$
 (d) $\frac{9}{24}$ (e) None of these
25. A bag contains 3 red and 7 black balls. Two balls are taken out at random, without replacement. If the first ball is red, then what is the probability that the second ball is also red?
 (a) $\frac{1}{10}$ (b) $\frac{1}{15}$ (c) $\frac{3}{10}$
 (d) $\frac{2}{21}$ (e) None of these

Solutions

Basic Questions

1. (c): No of ways in which the letters of the word 'TABLE' can be arranged = $5! = 120$
2. (d): No. of ways of arranging the letters of the word MATHEMATICS = $\frac{11!}{2! \times 2! \times 2!} = \frac{11!}{8}$
3. (a): No. of ways in which 6 letters can be posted in 5 letter boxes = $5 \times 5 \times 5 \times 5 \times 5 = 5^6$
4. (c): There are 5 odd digits in total
 No. of ways to form 3-digit numbers with distinct digits = $5 \times 4 \times 3 = 60$
5. (c): UNIVERSAL has 9 letters,
 No of ways E R S can be arranged = $3!$
 Taking E R S as 1 letter, then no of letters is 7
 Required no. of ways = $7! \times 3! = 5040 \times 6 = 30240$.
6. (a): In 4 digit no. zero can't come at 1000s place
 Total no. of ways
 = $\frac{9}{1000s\ place} \times \frac{9}{100s\ place} \times \frac{8}{10s\ place} \times \frac{7}{Units\ place}$
 = 4536
7. (c): In the word 'DETAIL' there are three vowels (AEI) and 3 consonants (D, T, L)
 No. of ways vowels can be arranged at odd place = $3! = 6$
 and number of ways consonants can be arranged at even places = $3! = 6$
 \therefore Total no. of ways in which letters of the word DETAIL can be arranged = $6 \times 6 = 36$

8. (a): Numbers of favourable out comes = 1 {2}
Total number of possible out comes = 6 {1, 2, 3, 4, 5, 6}.
∴ Probability of a 2 turning up = $\frac{1}{6}$
9. (d): Probability of not getting 4 in a single toss = $\frac{5}{6}$
Probability of not getting 4 in two tosses
= $\frac{5}{6} \times \frac{5}{6} = \frac{25}{36}$
Probability of getting 4 atleast once = $1 - \frac{25}{36} = \frac{11}{36}$
10. (a): Probability of getting white ball from 1st bag
= $\frac{4}{4+2} = \frac{4}{6} = \frac{2}{3}$
Probability of getting white ball from 2nd bag = $\frac{3}{8}$
∴ Probability that both balls are white = $\frac{2}{3} \times \frac{3}{8} = \frac{1}{4}$
11. (c): Even numbers in a die = (2, 4, 6)
Sample space = (1, 2, 3, 4, 5, 6)
∴ Probability of getting an even number = $\frac{3}{6} = \frac{1}{2}$
12. (a): Total sample space when two coins are tossed

$$= \{HH, HT, TH, TT\}$$

No of favourable outcomes of getting two heads
= {HH}

$$\text{Required probability} = \frac{1}{4}$$

13. (a): There are 3 odd numbers out of 6 i.e. (1, 3, 5)
Probability of getting odd number = $\frac{3}{6} = \frac{1}{2}$
Probability of getting head = $\frac{1}{2}$
Required Probability = $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$
14. (a): Total sample space of a deck of cards = 52
There is only one 3 of diamond
So, required Probability = $\frac{1}{52}$
15. (d): The probability of not getting a spade first time
= $\frac{39}{52} = \frac{3}{4}$
The probability of not getting a spade second time
= $\frac{39}{52} = \frac{3}{4}$
Required probability = $\frac{3}{4} \times \frac{3}{4} = \frac{9}{16}$

Prelims Solutions

Level - 1

1. (b): Required probability = $\frac{{}^6C_1 \times {}^2C_1}{{}^{52}C_2}$
= $\frac{6 \times 2}{\frac{52 \times 51}{1 \times 2}}$
= $\frac{6 \times 2}{26 \times 51} = \frac{2}{221}$
2. (e): Required solution = $\frac{6}{15} \times \frac{6}{15} \times \frac{6}{15} + \frac{4}{15} \times \frac{4}{15} \times \frac{4}{15} +$
 $\frac{5}{15} \times \frac{5}{15} \times \frac{5}{15}$
⇒ $\frac{216+64+125}{3375} = \frac{3}{25}$
3. (c): Number of ways such that four odd digits
(5,5,3,3) can be arranged in 4 odd places = $\frac{4!}{2! \times 2!} =$
6 ways
Number of ways such that three even digits
(6,4,4) can be arranged in 3 even places = $\frac{3!}{2!} =$
3 ways
Hence, the required number of ways = $6 \times 3 = 18$
4. (a): Total Possible outcome = $2^3 = 8$
Possible outcome = 4 (HHH, THH, HHT, HTH)
Required Probability = $\frac{4}{8} = \frac{1}{2}$
5. (b): required probability = 1 - probability of three boys
in first three positions
= $1 - {}^{10}C_3 / {}^{13}C_3 = \frac{83}{143}$

6. (a): required probability = $\frac{7}{15} \times \frac{6}{14} = 0.20$

7. (a): In the word CASTING, there are two vowels (A, I)
and five consonants (C, S, T, N, G).
So, required probability = $\frac{6! \times 2!}{7!} = \frac{2}{7}$

8. (e): When two dices are rolled together,
Total number of possible cases = 36
Favourable cases =
(1,1),(1,3),(1,5),(2,2),(2,4),(2,6),(3,1),(3,3),(3,5),(
4,2),(4,4),(4,6),(5,1)
,(5,3),(5,5),(6,2),(6,4),(6,6) = 18 cases
Required probability = $\frac{1}{2}$

9. (a): Total words than can be formed = $5! = 120$
As vowels are together
i.e. H, R, T, AE
total words = $4! \times 2! = 48$
So, required probability = $\frac{48}{120} = \frac{2}{5}$

10. (d): Required number of the ways
= ${}^8C_3 \times {}^6C_4$
= $\frac{8 \times 7 \times 6 \times 5!}{3! \times 5!} \times \frac{6 \times 5 \times 4!}{2! \times 4!}$
= 840

- 11. (d):** Possible outcomes = 9 [(1,4) (1,5)(2,3) (2,4)(3,2)(3,3)(4,1)(4,2)(5,1)]
So, required probability = $\frac{9}{36} = \frac{1}{4}$
- 12. (d):** Possible outcomes = 12 [(1, 2) (1, 5) (2, 1) (2, 4) (3, 3) (3, 6) (4, 2) (4, 5) (5, 1) (5, 4) (6, 3) (6, 6)]
Required probability = $\frac{12}{36} = \frac{1}{3}$
- 13. (a):** First prize can be given to any of 7 students, same way next prize can be given to any of 7 students and so on with every prize.
No. of ways = $7 \times 7 \times 7 \times 7 \times 7 = 7^5$
- 14. (b):** Required probability = $\frac{6}{14} = \frac{3}{7}$
- 15. (d):** Total number of cases when two dices are rolled simultaneously = 36
total cases of getting same number on both the dices = (1,1), (2,2), (3,3), (4,4), (5,5), (6,6) = 6
required probability = $1 - \frac{6}{36} = \frac{5}{6}$
- 16. (d):** Required probability = $\frac{4}{5} \times \frac{1}{3} = \frac{4}{15}$
- 17. (e):** Probability of choosing a bag = $\frac{1}{2}$
Probability of choosing two red balls from Bag -
 $A = \frac{{}^7C_2}{{}^{15}C_2} = \frac{21}{105} = \frac{1}{5}$
Probability of choosing two red balls from Bag -
 $B = \frac{{}^x C_2}{{}^{x+7} C_2} = \frac{x(x-1)}{(x+6)(x+7)}$
ATQ,
 $\frac{2}{15} = \frac{1}{2} \left[\frac{1}{5} + \frac{x(x-1)}{(x+6)(x+7)} \right]$
 $x = 3, -1$
So, required numbers of balls is 3 as numbers of balls cannot be negative.
- 18. (b):** Let yellow balls be x
P (at least a yellow ball) = $({}^x C_1 \cdot {}^{15} C_1 + {}^x C_2) / {}^{15+x} C_2$
 $= \frac{(2 \times x \times 15) + x(x-1)}{(15+x)(14+x)} = \frac{x^2 + 29x}{x^2 + 29x + 210} = \frac{17}{38}$
 $21x^2 + 609x - 3570 = 0$
On solving, $x = 5$ (alternatively, solve equation using options)
No. of yellow balls = 5
- 19. (c):** ATQ,
 $\frac{{}^9 C_2}{{}^{x+13} C_2} = \frac{4}{19}$
 $\Rightarrow \frac{72}{(13+x)(12+x)} = \frac{4}{19}$
 $\Rightarrow 342 = 156 + 25X + X^2$
 $\Rightarrow X^2 + 25X - 186 = 0$
 $\Rightarrow X^2 + 31X - 6X - 186 = 0$
 $\Rightarrow X = 6$

- 20. (c):** Probability of a Tiger = $\frac{7}{16}$
Let total Tiger $\rightarrow 7a$
Total Animal $\rightarrow 16a$
Now,
Total head = Total animal = $16a$
So, Total legs $\Rightarrow \frac{16a}{2} \times 7 = 56a$
Now Ostrich $\rightarrow 2$ legs
Tiger & Jackals $\rightarrow 4$ legs
Total heads (Ostrich + Jackal) = $9a$
Let no. of Ostrich $\rightarrow x$
And no. of Jackal $\rightarrow 9a - x$
ATQ
 $x \times 2 + (9a - x) \times 4 = 56a - 7a \times 4$
 $x = 4a$
So. no. of Jackals = $5a$
Probability of choosing jackal = $\frac{5}{16}$

- 21. (c):** ATQ,
 $\frac{{}^x C_1 \times {}^8 C_1}{{}^{x+15} C_2} = \frac{4}{15}$
 $\frac{x \times 8}{\frac{(x+15)(x+14)}{2}} = \frac{4}{15}$
 $\Rightarrow \frac{16x}{x^2 + 29x + 210} = \frac{4}{15}$
 $\Rightarrow x^2 + 29x + 210 = 60x$
 $\Rightarrow x^2 - 31x + 210 = 0$
 $x^2 - 21x - 10x + 210 = 0$
 $x(x-21) - 10(x-21) = 0$
 $(x-21)(x-10) = 0$
 $x = 10, 21$
Required answer = 10

- 22. (b):** Let the number of red and black colored balls be x and y respectively.
ATQ,
 $\frac{{}^x C_2}{{}^{(9+x)} C_2} = \frac{1}{7}$
 $\Rightarrow \frac{x \times (x-1)}{(9+x) \times (8+x)} = \frac{1}{7}$
 $\Rightarrow x = 6$
Total number of balls = 15
 $\Rightarrow \frac{{}^y C_2}{{}^{15} C_2} = \frac{1}{7} \times \frac{100}{250}$
 $\Rightarrow y = 4$
Number of yellow colored ball = $15 - (6+4) = 5$

- 23. (a):** required probability = $\frac{{}^{10} C_4 \times {}^5 C_2}{{}^{15} C_6} = \frac{60}{143}$

- 24. (b):** Letters which are to be used to make 5 letter words = E, C, U, O, U
No. of ways = $\frac{5!}{2!} = 60$

25. (a): Here, there is 5 green, 4 blue and 2 red balls
Probability of both ball being blue or green =
 $\frac{{}^5C_2 + {}^4C_2}{{}^{11}C_2} = \frac{10+6}{55}$
 $= \frac{16}{55}$

26. (c): total cards left in pack = $52 - 2 = 50$
Required probability = $\frac{{}^{26}C_3}{{}^{50}C_3} = \frac{26 \times 25 \times 24}{50 \times 49 \times 48} = \frac{13}{98}$

27. (d): required players = 11
No. of ways = $15C_{11} = 1365$

28. (b): Sample space when a dice is rolled twice = 36
Excluding the cases when number on second roll come equal or less than the first roll.
so, cases are
[(1,1), (2, 1), (2, 2), (3,1), (3, 2), (3, 3)
..... (6, 6)]
 $\Rightarrow [1 + 2 + 3 + 4 + 5 + 6] = 21$
Favorable case = $36 - 21 = 15$
Required probability = $\frac{15}{36} = \frac{5}{12}$

29. (d): Required arrangement = ${}^7C_4 \times {}^6C_2 \times 6!$
 $= 35 \times 15 \times 6!$
 $= 525 \times 6!$

30. (c): The word father has 6 different letters
So, required no. of words = 6P_4
 $= \frac{6!}{6!-4!} = \frac{6!}{2!}$
 $= \frac{720}{2} = 360 \text{ words}$

31. (b): Total outcome = $6 \times 4 = 24$
Feasible cases = (6HH, 6HT, 6TH) = 3
Required probability = $\frac{3}{24} = \frac{1}{8}$
 $= 0.125$

32. (b): Possible cases = 4{(3, 6)(4, 5)(5,4)(6, 3)}
Required probability = $\frac{4}{36} = \frac{1}{9}$

33. (a): Required probability = $\frac{{}^4C_1 \times {}^{48}C_1}{{}^{52}C_2} + \frac{{}^4C_2}{{}^{52}C_2}$
 $= \frac{32}{221} + \frac{1}{221} = \frac{33}{221}$

34. (a): Required Probability = $\frac{5}{23} + \frac{8}{23} = \frac{13}{23}$

Level - 2

1. (d): The word 'RAINBOW' contains three vowels (A, I, O) and rest are consonant.
Total arrangement = ${}^3C_1(-5! - \dots) {}^5C_1 = 3 \times 120 \times 5 = 1800$

2. (b): Total balls = 25 balls
Total prime number between 1 to 25 = 9
Total perfect square = 5
Probability of selecting 1st ball = $\frac{9}{25}$
Probability of selecting 2nd ball = $\frac{1}{5}$
Required probability = $\frac{9}{25} \times \frac{1}{5} = \frac{9}{125}$

3. (b): Let total female = x
So, total male = (12 - x)
 $\frac{(12-x)(11-x)}{12 \times 11} - \frac{x(x-1)}{12 \times 11} = \frac{1}{6}$
 $132 - 23x + x^2 - x^2 + x = 22$
 $22x = 110$
 $x = 5$
 \therefore Female = 5
So male = (12 - 5) = 7
Required difference = $7 - 5 = 2$

4. (b): The probability of selecting one bag out of the two bags is $\frac{1}{2}$
So required probability = $\frac{1}{2} \left(\frac{{}^6C_1 \times {}^4C_1}{{}^{10}C_2} + \frac{{}^4C_1 \times {}^4C_1}{{}^8C_2} \right) =$
 $\frac{1}{2} \left(\frac{8}{15} + \frac{4}{7} \right) = \frac{58}{105}$

5. (e): The various possibilities are described as
i) Number starts with 3
no. of ways = 1×5^3
 $= 125$ (since other digits can be repeated)
ii) Number doesn't start with 3
no. of ways = $4 \times 5^2 \times 3 = 300$ (digit 3 can appear at 3 different places i.e. in 2nd, 3rd and 4th places in the number and 0 can't be placed as 1st digit of the number)
total ways = $125 + 300 = 425$

6. (a): the probability of solving the problem by
Jindal = $\frac{3}{5}$
Avi = $1 - \frac{1}{4} = \frac{3}{4}$
The probability of not solving the problem by
Jindal = $1 - \frac{3}{5} = \frac{2}{5}$
Avi = $\frac{1}{4}$
Required probability = $\frac{3}{5} \times \frac{1}{4} + \frac{2}{5} \times \frac{3}{4} + \frac{3}{5} \times \frac{1}{4} =$
 $\frac{3+6+3}{20} = \frac{3}{5}$

7. (b): seat pattern is 2X2 which means 40 seats are distributed in 10 rows
So there are only 20 window seats and 20 non window seats
10 window seats are already occupied, remaining window seats = $20 - 10 = 10$

Ways to select window seat = ${}^{10}C_2$

Shreyas wants seats together, so non window seats should be next to selected window seats.

No. of ways for non-window seats = ${}^{10}C_2$

Total no of ways = ${}^{10}C_2 \times {}^{10}C_2$

$$= \frac{10 \times 9}{2} \times \frac{10 \times 9}{2} = 2025$$

8. (e): Number of green balls = $16 - 9 = 7$

Number of red balls = $7 - 4 = 3$

Number of blue balls = $9 - 3 = 6$

ATQ,

$$\text{Required probability} = \frac{{}^3C_1 \times {}^6C_1 \times {}^7C_1}{{}^{16}C_3} = \frac{9}{40}$$

Solution (9 - 10):

Let red balls & green balls in the bag are $4x$ & $5x$ respectively

ATQ -

$$\frac{4x+3}{5x-1} = \frac{11}{9}$$

$$36x + 27 = 55x - 11$$

$$19x = 38$$

$$x = 2$$

Number of red balls = 8

Number of green balls = 10

9. (e): ATQ -

$$\frac{n}{18+n} + \frac{8}{18+n} = \frac{2}{3}$$

$$36 + 2n = 3n + 24$$

$$n = 12$$

10. (e): In order to get maximum red balls left in bag, the only condition which satisfies is that all balls taken out from the bag are of green color.

So. Total balls left in bag = $10 - 5 + 8 = 13$

$$\text{Required probability} = \frac{8}{13}$$

11. (c): Let total number of red balls = x

So, total number of blue balls = $(12 - x)$

ATQ -

$$\frac{x(12-x)}{6 \times 11} = \frac{35}{66}$$

$$12x - x^2 = 35$$

$$x^2 - 12x + 35 = 0$$

$$x(x - 5) - 7(x - 5) = 0$$

$$x = 5 \text{ \& } 7$$

Now new number of blue balls in bag = $(7 + n)$

$$\text{Given, } \frac{(5+n)}{(10+n)} = \frac{9}{14}$$

$$70 + 14n = 90 + 9n$$

$$5n = 20$$

$$n = 4$$

12. (a): $\therefore P$ (two different colored balls) = P (1st blue and 2nd green) + P (1st blue and 2nd black) + P (1st blue and 2nd white) + P (1st black and 2nd green) + P (1st black and 2nd white)

$$= \left(\frac{4}{9} \times \frac{1}{5}\right) + \left(\frac{4}{9} \times \frac{3}{10}\right) + \left(\frac{4}{9} \times \frac{1}{2}\right) + \left(\frac{5}{9} \times \frac{1}{5}\right) + \left(\frac{5}{9} \times \frac{1}{2}\right) = \frac{5}{6}$$

13. (b): red shirts = $15 - 7 = 8$

$$\text{Required probability} = \frac{{}^8C_2}{{}^{15}C_2} = \frac{8 \times 7}{15 \times 14} = \frac{4}{15}$$

14. (d): possible cases

$$(1 \text{ boy, } 3 \text{ girls}) = 4C_1 \times 5C_3 = 40$$

$$(2 \text{ boys, } 2 \text{ girls}) = 4C_2 \times 5C_2 = 60$$

$$\text{Total ways} = 40 + 60 = 100$$

15. (b): ATQ,

$$\frac{x C_1 \times {}^5 C_1}{x + 11 C_2} = \frac{9}{38}$$

$$\frac{x \times 5}{(x+11)(x+10)} \times 2 = \frac{9}{38}$$

$$\Rightarrow \frac{10x}{x^2 + 21x + 110} = \frac{9}{38}$$

$$\Rightarrow 380x = 9x^2 + 189x + 990$$

$$\Rightarrow 9x^2 - 191x + 990 = 0$$

$$9x^2 - 110x - 81x + 990 = 0$$

$$x(9x - 110) - 9(9x - 110) = 0$$

$$(9x - 110)(x - 9) = 0$$

$$x = 9, \frac{110}{9}$$

$$\text{So, } x = 9$$

16. (b): According to question

$$\frac{2000 \times 12}{(2000+x)8} = \frac{5}{4}$$

$$50 \times 48 = 2000 + x$$

$$x = \text{Rs } 400$$

17. (a): Required probability = $\frac{{}^{26}C_2 \times {}^{26}C_1}{{}^{52}C_3}$

$$= \frac{8450}{22100} = \frac{13}{34}$$

18. (b): In 'COMBINATION', there are 5 vowels (O, O, I, I, A)

$$\text{So, required number of words} = \frac{7! \times 5!}{2! \times 2! \times 2!}$$

$$= \frac{604800}{8} = 75600$$

19. (b): Probability of choosing a bag = $\frac{1}{2}$

$$\text{Required probability} = \frac{1}{2} \left[\frac{{}^4C_2}{{}^{12}C_2} + \frac{{}^9C_2}{{}^{15}C_2} \right]$$

$$= \frac{1}{2} \left[\frac{6}{166} + \frac{36}{105} \right]$$

$$= \frac{1}{2} \left[\frac{1}{11} + \frac{12}{35} \right]$$

$$= \frac{1}{2} \times \left[\frac{35+132}{385} \right]$$

$$= \frac{167}{770}$$

20. (b): Let total number of girls in classroom = x

ATQ—

$$\frac{{}^x C_1}{{}^{32} C_1} = \frac{3}{8}$$

$$\frac{x}{32} = \frac{3}{8}$$

$$x = 12$$

Total number of boys in class = $32 - 12 = 20$

$$\text{Required probability} = \frac{12 \times 20 \times 2}{31 \times 32} = \frac{15}{31}$$

21. (c): Required probability

$$= \frac{2}{5} \times \frac{1}{6} \times \frac{3}{7} + \frac{3}{5} \times \frac{5}{6} \times \frac{3}{7} + \frac{3}{5} \times \frac{1}{6} \times \frac{4}{7} + \frac{2}{5} \times \frac{5}{6} \times \frac{3}{7} +$$

$$\frac{2}{5} \times \frac{1}{6} \times \frac{4}{7} + \frac{3}{5} \times \frac{5}{6} \times \frac{4}{7} + \frac{2}{5} \times \frac{5}{6} \times \frac{4}{7}$$

$$= \frac{201}{210} = \frac{67}{70}$$

Or

$$\text{Probability that no one is selected} = \frac{3}{5} \times \frac{1}{6} \times \frac{3}{7} = \frac{3}{70}$$

$$\text{Required probability} = 1 - \frac{3}{70} = \frac{67}{70}$$

22. (c): Let the number of green, red and white ball in the bag be $3x$, $4x$ and $5x$ respectively.

ATQ

$$\frac{4x \times 5x}{12x} = \frac{2}{7}$$

$$x = 3$$

Total number of balls = 36

$$\text{Required probability} = \frac{12}{36} = \frac{1}{3}$$

23. (c): Even number card = 2, 4, 6, 8, 10

Total even number card = $4 \times 5 = 20$

Favorable cases = ${}^{20}C_2$

Total cases = ${}^{52}C_2$

$$\text{Probability} = \frac{{}^{20}C_2}{{}^{52}C_2} = \frac{20 \times 19}{52 \times 51} = \frac{95}{663}$$

24. (c): Required probability = $\frac{{}^5C_3}{{}^{16}C_3} + \frac{{}^7C_3}{{}^{16}C_3} + \frac{{}^4C_3}{{}^{16}C_3}$

$$= \frac{10+35+4}{560} = \frac{7}{80}$$

25. (c): Starting four prime number = 2, 3, 5, 7

Total two-digit numbers can be formed = $4 \times 4 = 16$

Numbers which are divisible by 3

= {27, 72, 57, 75, 33}

$$\text{Required probability} = \frac{5}{16}$$

26. (d): Ways to select 3 balls out of 8 balls = 8C_3

Ways to select one red ball = 2C_1

Ways to select two black ball = 3C_2

Ways to select one white balls = 3C_1

∴ Required probability

$$= \frac{{}^2C_1 \times {}^3C_2 \times {}^3C_1}{{}^8C_3} = \frac{9}{28}$$

27. (c): Required Probability = $\frac{{}^5C_3 + {}^7C_3 + {}^4C_3}{{}^{16}C_3}$

$$= \frac{10+35+4}{560}$$

$$= \frac{7}{80}$$

28. (e): Four digits number with all four digits odd = $5 \times 5 \times 5 \times 5 = 625$

29. (d): To put 5 different chocolate in identical boxes →

Boxes treated as one box → 1 way

Choices vary in selection of chocolates

⇒ to choose 5 chocolates → 5!

Answer

$$5! \times 1 \Rightarrow 120$$

30. (d): Lets total number apple in basket = x

Atq,

$$\frac{{}^x C_1}{{}^{36} C_1} = \frac{1}{6}$$

$$\frac{x}{36} = \frac{1}{6}$$

$$x = 6$$

Total number of banana in basket = $36 - 6 = 30$

31. (c):

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1 3 3

3 1 3

3 3 1

One particular piece out of seven can be selected in 7 ways & to second person it can be given in 6C_3

Required number of ways = $3 \times {}^7C_1 \times {}^6C_3 = 7 \times 20 \times 3 = 420$

32. (d): If we pick exactly 4 guavas, 6 mangoes and 7 pears from the basket, the total number of fruits picked from the basket will be 17.

If one more fruit is picked from the basket, irrespective of what it is, it can be said that at least 5 guavas or at least 7 mangoes or at least 8 pears have been picked from the basket.

Hence, required number of fruits = $17 + 1 = 18$

33. (b): Probability of not getting a blue ball in two consecutive trials = $\frac{9}{25} = \frac{81}{225}$

i.e. number of blue balls = $15 - 9 = 6$

probability of getting two green balls in two consecutive trials = $\frac{1}{25} = \frac{9}{225}$

i.e. number of green balls = 3

so, the number of red balls = 6

$$\text{required probability} = \frac{6}{15} \times \frac{3}{15} \times \frac{6}{15} \times 3! = \frac{24}{125}$$

34. (e): If we pick exactly 4 guavas, 5 mangoes, 6 oranges and 7 pears then total number of fruits picked from the basket will be 22.

And when we further pick 1 more fruit irrespective of what it is, we have at least 5 guavas or at least 6 mangoes or at least 7 oranges or at least 8 pears.

So the required minimum, number of fruits picked from the basket = $22 + 1 = 23$

35. (d): Probability of getting mango = $\frac{1}{2} \times \frac{{}^3C_1}{{}^9C_1} + \frac{1}{2} \times \frac{{}^7C_1}{{}^9C_1}$

$$= \frac{1}{2} \times \frac{3}{9} + \frac{1}{2} \times \frac{7}{9}$$

$$= \frac{5}{9}$$

Probability of not getting mango = $1 - \frac{5}{9}$

$$= \frac{4}{9}$$

Mains Solutions

1. **(a);** 8 people can sit in $7!$ Ways around a table.
 Now ATQ
 Abhishek and Ayush doesn't sit opposite
 Let fix their sit so other 6 can sit anywhere
 $= 7! - 2 \times 6! = 6! (7 - 2) = 3600$
2. **(b);** Let number of red balls is $2x$
 Total balls = $13x$
 Now ATQ
 Black balls = 5
 White balls = $\frac{5 \times 140}{100} = 7$
 Brown balls = $\frac{7}{70} \times 100 = 10$
 Now $\rightarrow 2x + 5 + 7 + 10 = 13x$
 $x = 2$
 Red balls = 4
3. **(a);** Favorable case = (20, 2M) or (30, 1M) or 40
 \therefore Probability
 $= \frac{{}^6C_2 \times {}^5C_2}{{}^{11}C_4} + \frac{{}^6C_3 \times {}^5C_1}{{}^{11}C_4} + \frac{{}^6C_4}{{}^{11}C_4}$
 $= \frac{15 \times 10}{330} + \frac{20 \times 5}{330} + \frac{15}{330}$
 $= \frac{265}{330} = \frac{53}{66}$
4. **(a);** Required probability
 $= \frac{1}{3} \times \frac{4}{5} \times \frac{3}{4} + \frac{2}{3} \times \frac{1}{5} \times \frac{3}{4} + \frac{2}{3} \times \frac{4}{5} \times \frac{1}{4} = \frac{13}{30}$
5. **(c);** Probability of getting tail on Ist coin = $\frac{1}{5}$
 Probability of getting tail on IInd coin = $\frac{7}{20}$
 Required probability = $\frac{1}{5} \times \frac{13}{20} + \frac{4}{5} \times \frac{7}{20} + \frac{1}{5} \times \frac{7}{20} = \frac{48}{100} = 48\%$
6. **(b);** The probability of at least one red ball = $1 -$
 (probability of no red ball)
 $= 1 - \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$
 $= 1 - \frac{1}{16} = \frac{15}{16}$
7. **(c);** The probability of at least one blue ball = $1 -$
 (Probability of no blue ball)
 $= 1 - \frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} \times \frac{2}{3}$
 $= 1 - \frac{16}{81} = \frac{65}{81}$
8. **(d);** Probability of a girl being selected from a section
 $= \frac{\text{Total girls in the section}}{\text{Total students in the section}}$
 Let the number of girls, number of boys and total number of students respectively:
 For section A: $2x, 3x$ and $5x$.
 For section B: $4y, 5y$ and $9y$.
 For section C: $5z, 4z$ and $9z$.
 According to the question,

Ratio of total number of students in the three sections:

$$\Rightarrow 5x : 9y : 9z = 10 : 12 : 9$$

$$\Rightarrow x : y : z = 6 : 4 : 3$$

Let the values of x, y and z be $6k, 4k$ and $3k$ respectively.

Total number of girls in all the three sections = $2x + 4y + 5z = 12k + 16k + 15k = 43k$

Total number of students in all the three sections = $5x + 9y + 9z = 30k + 36k + 27k = 93k$

Probability of a girl being selected from the students from all the three sections together

$$= \frac{\text{Total girls in all sections}}{\text{Total students in all sections}} = \frac{43k}{93k} = \frac{43}{93}$$

9. **(c);** According to the question,
 Number of girls in sections A = Number of boys in section C
 $\Rightarrow 2x = 4z$
 $\Rightarrow x = 2z$
 Number of boys in section A : Number of boys in section C = $3x : 4z = 6z : 4z = 3 : 2$
10. **(b);** Probability of a boy being selected from this section B after 20 girls left the section = $\frac{5}{8}$
 $\Rightarrow \frac{\text{Number of boys in section B}}{\text{Total number of students in section B} - 20} = \frac{5}{8}$
 $\Rightarrow \frac{5y}{9y - 20} = \frac{5}{8}$
 $\Rightarrow 40y = 45y - 100$
 $\Rightarrow y = 20$
 Number of boys in section B = $5y = 100$

11. **(a);** Let, total no. of boxes be $35x$,
 Then no. of black boxes = $\frac{2}{5} \times 35x = 14x$
 And no. of blue boxes = $\frac{3}{7} \times 35x = 15x$
 Now,
 $14x + 15x + 18 = 35x$
 or, $6x = 18$
 or, $x = 3$
 Total no. of boxes = $35x = 105$
 An even sum can be obtained in three ways:
 1. both the numbers are even
 2. one number is even and the other is 0.
 3. both numbers are odd.
 Required probability = $\frac{35}{105} \times \frac{34}{104} + \frac{35}{105} \times \frac{34}{104} + \frac{35}{105} \times \frac{35}{104} = \frac{35(34+34+35)}{105 \times 104} = \frac{103}{312}$
12. **(b);** Total no. of boxes = 105

13. (a); Let, total no. of sheets be $84x$,
 Then no. of red sheets = $\frac{1}{3} \times 84x = 28x$
 no. of blue sheets = $\frac{2}{7} \times 84x = 24x$
 no. of white sheets = $\frac{1}{4} \times 84x = 21x$
 Now, $28x + 24x + 21x + 22 = 84x$
 or, $11x = 22$
 or, $x = 2$
 Total no. of sheets = $84x = 168$
 There are 12 multiples of 13 and 9 multiples of 17
 from 1 to 168.
 Also, there is no multiple of 13 and 17 from 1 to
 168. (because, $13 \times 17 = 221$)
 Hence, required probability = $\frac{21}{168} = \frac{1}{8}$

14. (b); Total no. of sheets = 168

15. (a); Total no. of Green balls = 15
 Total no. of white balls = 8
 Shunty \Rightarrow
 Let he have no. of Red balls = x
 No. of Green balls = y
 No. of white balls = $x - y$
 No. of Red balls > no. of Green balls
 Probability of getting Green ball when one ball is
 chosen

$$= \frac{y}{x+y+x-y} = \frac{y}{2x}$$

Total no. of balls Shunty have = $2x$

Bunty \Rightarrow

Total no. of balls = $\frac{2x}{2} \times 3 = 3x$

Let Bunty have Green balls = Z

$$\frac{y}{2x} = \frac{Z}{3x}$$

$$\Rightarrow z = \frac{3}{2}y$$

Total no. of Green ball

$$\Rightarrow 15 = y + \frac{3}{2}y$$

$$\Rightarrow y = 6$$

Total no. of Red and white ball Bunty have

$$= \frac{4}{3} \times \frac{3}{2}y = \frac{4}{3} \times \frac{3}{2} \times 6 = 12$$

Now,

Total no. of balls Bunty have = $12 + 9 = 21$

$$21 = 3x, 2x = 14$$

$$x \Rightarrow 7$$

Shunty have \rightarrow 14 Total balls

7 Red, 6 Green, 1 white

Bunty have \rightarrow 21 Total balls

5 Red, 9 Green, 7 white

\Rightarrow Probability of getting 3 Green balls by Shunty

$$= \frac{{}^6C_3}{{}^{14}C_3} = \frac{5}{91}$$

16. (b); Probability of getting three balls of different
 colour of Bunty

$$= \frac{{}^5C_1 \times {}^7C_1 \times {}^9C_1}{{}^{21}C_3} = \frac{9}{38}$$

17. (b); Required probability
 $= \frac{6}{10} \left(\frac{{}^7C_2({}^6C_1 + {}^6C_2) + {}^7C_3({}^6C_1 + {}^1C_1) + {}^7C_4}{{}^{14}C_4} \right)$
 Required probability = $\frac{6}{10} \left(\frac{21(6+15) + 35(6+1) + 35}{{}^{14}C_4} \right)$
 Required probability = $\frac{6}{10} \left(\frac{441 + 245 + 35}{1001} \right)$
 Required probability = $\frac{6}{10} \left(\frac{721}{1001} \right)$
 Required probability = $\frac{309}{715}$

Solutions (18-20)

For Bag A

$$W = O + 5 \dots (i)$$

Let No. of Red Colored balls = x

$$\therefore \text{Total balls} = O + W + x$$

$$\therefore \frac{x}{O + W + x} = \frac{15}{52} \dots (ii)$$

and Given — $W = 131 \frac{1}{4} \% \text{ of } O$

$$W = \frac{21}{16} O$$

$$\frac{W}{O} = \frac{21}{16}$$

$$\frac{O}{O} = \frac{16}{16}$$

From eqn. (i)

No. of white colored balls = 21

No. of Orange colored balls = 16

From eqn. (ii)

$$\frac{x}{21+16+x} = \frac{15}{52}$$

$$\frac{x}{37+x} = \frac{15}{52}$$

$$52x = 37 \times 15 + 15x$$

$$37x = 37 \times 15$$

$$x = 15$$

\therefore No. of red colored balls = 15

\therefore for bag A —

Red = 15

White = 21

Orange = 16

Similarly, For bag B —

Orange = 19

White = 6

Red = 50

For Bag C —

White = 15

Red = 9

Orange = 24

18. (d); After replacement

No. of white balls in Bag C = $15 + x$

No. of Red balls in Bag C = $9 - 2 = 7$

No. of Orange balls in Bag C = 24

$$\therefore \frac{24}{15+x+7+24} = \frac{1}{2}$$

$$48 = 46 + x \Rightarrow x = 2$$

19. (b); Required % = $\frac{(16+24)-(15-9)}{(16+24)} \times 100$

$$= \frac{40-6}{40} \times 100 = 85\%$$

20. (a); Required Probability = $\frac{16}{52} \times \frac{19}{75} = \frac{76}{975}$

Previous Year Question

1. **(d):** When dice is rolled two times
 Total number of possibilities = 36 (i.e. 6^2)
 Desired possibilities = ${}^6C_2 \times 1$
 (i.e. two number are selected for two rolls)
 1 No. of way to arrange number in descending orders.

$$\therefore \text{Required probability} = \frac{{}^6C_2}{36} = \frac{5}{12}$$

2. **(b):** Ways to select 4 balls out of 16 balls = $16C_4$
 Ways to select one red balls = $5C_1$
 Ways to select two black balls = $6C_2$
 Ways to select one blue balls = $5C_1$
 \therefore Required probability = $\frac{5C_1 \times 6C_2 \times 5C_1}{16C_4} = \frac{75}{364}$

3. **(b):** Total Balls = $8 + 5 + 6 = 19$ balls
 Probability of getting all balls of same color
 $= \frac{{}^8C_3 + {}^5C_3 + {}^6C_3}{{}^{19}C_3}$
 $= \frac{\left(\frac{8 \times 7 \times 6}{3 \times 2 \times 1} + \frac{5 \times 4}{2 \times 1} + \frac{6 \times 5 \times 4}{3 \times 2 \times 1}\right)}{\frac{19 \times 18 \times 17}{3 \times 2 \times 1}} = \frac{86}{969}$

$$\text{Required probability} = 1 - \frac{86}{969} = \frac{883}{969}$$

4. **(c):** Let total number of red balls = x
 So, total number of blue balls = $(12 - x)$
 ATQ -
 $\frac{x(12-x)}{6 \times 11} = \frac{35}{66}$
 $12x - x^2 = 35 \Rightarrow x^2 - 12x + 35 = 0$
 $x(x - 5) - 7(x - 5) = 0 \Rightarrow x = 5 \text{ \& } 7$
 Now new number of blue balls in bag = $(7 + n)$
 Given, $\frac{(5+n)}{(10+n)} = \frac{9}{14}$
 $70 + 14n = 90 + 9n \Rightarrow 5n = 20 \Rightarrow n = 4$

5. **(d):** ATQ,
 $\frac{6}{12+6+x} = \frac{2}{9}$
 $\Rightarrow x = \frac{18}{2} = 9$
 Required probability = $\frac{9+12}{12+6+9} = \frac{21}{27} = \frac{7}{9}$
 Alternate,
 Required Probability = $1 - \text{Probability of choosing one green ball}$
 $= 1 - \frac{6}{27} = \frac{7}{9}$

6. **(e):** Possible cases = 1 green ball or 2 green balls
 Required probability = $\frac{{}^5C_1 \times {}^{10}C_1}{{}^{15}C_2} + \frac{{}^5C_2}{{}^{15}C_2}$
 $= \frac{5 \times 10}{15C_2} + \frac{10}{15C_2} = \frac{50}{105} + \frac{10}{105}$
 $= \frac{60}{105} = \frac{4}{7}$

7. **(e):** Required probability = $\left(\frac{{}^{48}C_1 \times {}^4C_1 + {}^{48}C_2}{{}^{52}C_2}\right)$
 $= \frac{192 + 1128}{1326} = \frac{220}{221}$

8. **(b):** The minimum possible no. of balls which must be drawn so that among these there are two of the same color = 3

9. **(c):** Required probability
 $= \frac{{}^6C_1 \times {}^4C_2}{{}^{10}C_3} = \frac{6 \times 6 \times 6}{10 \times 9 \times 8} = \frac{3}{10}$

10. **(c):** No. of digits = 5
 No. of places = 4
 Required number = ${}^5P_4 = \frac{5!}{1!} = 5 \times 4 \times 3 \times 2 = 120$

11. **(d):** Each question can be answered in 2 ways.
 Hence, total No. of sequences = $2 \times 2 \times 2 \dots 10$ times = $2^{10} = 1024$

12. **(d):** Total no. of possible ways = ${}^{10}C_2 = \frac{9 \times 10}{2} = 45$

13. **(b):** If A and B are always together, then total no. of children is 3
 \therefore No. of ways = 3!
 and A and B also interchange their places. So no. of ways = 2!
 \Rightarrow Total no. of ways = $3! \times 2! = 12$

14. **(d):** No. of ways in which 6 persons can stand in a queue at a time = $6! = 720$

15. **(b):** Total no. of face cards (Ace, King, Queen and Jack of all suits) = $4 \times 4 = 16$
 Required Probability = $\frac{16}{52} = \frac{4}{13}$

16. **(b):** No. of black cards = 26
 No. of cards which are not black = $52 - 26 = 26$
 Required Probability = $\frac{26}{52} = \frac{1}{2}$

17. **(b):** Sample space $S = \{1, 2, 3, \dots, 30\}$; $n(S) = 30$
 Let A = The event of drawing a ticket having a number which is multiple of 5
 B = The event of drawing a ticket having a number which is a multiple of 7
 Then, $A = \{5, 10, 15, 20, 25, 30\}$ $n\{A\} = 6$
 $B = \{7, 14, 21, 28\}$ $n\{B\} = 4$
 Hence $P(A \cup B) = P(A) + P(B) = \frac{n(A)}{n(S)} + \frac{n(B)}{n(S)}$
 $= \frac{6}{30} + \frac{4}{30} = \frac{10}{30} = \frac{1}{3}$

18. **(a):** Total no. of outcomes = 2^{10}
 Again, the number of favourable cases of getting exactly 5 heads = ${}^{10}C_5$
 \therefore Required probability = $\frac{{}^{10}C_5}{2^{10}} = \frac{63}{256}$

19. (a); Given, $P(A) = \frac{2}{3}$, $P(B) = \frac{4}{9}$, and $P(A \cap B) = \frac{14}{45}$
 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
 $= \frac{2}{3} + \frac{4}{9} - \frac{14}{45} = \frac{30 + 20 - 14}{45} = \frac{36}{45} = \frac{4}{5}$

20. (b); Probability of not getting 6 in one throw
 $= 1 - \frac{1}{6} = \frac{5}{6}$
 The chance of not getting six in six throws is given by $\left(\frac{5}{6}\right)^6$
 Hence the chance of throwing six at least once in six throws is given by $\left[1 - \left(\frac{5}{6}\right)^6\right]$

21. (b); Formation of two-digit numbers with the digits 2, 3, 5, 7, 9 without repetition:
 Let S = The sample space
 and E = The event that the number formed is 35
 Now $n(E) = 1$
 and $n(S) =$ total numbers of two digit formed with the digits 2, 3, 5, 7, 9 without repetition.
 $= {}^5P_2 = 5 \times 4 = 20$
 Required probability $P(E) = \frac{n(E)}{n(S)} = \frac{1}{20}$

22. (c); Total sample space $n(S) = 6 \times 6 = 36$
 E = The even that the sum of numbers coming up is 12 (6, 6); $n(E) = 1$
 $\therefore P(E) = \frac{n(E)}{n(S)} = \frac{1}{36}$
 Required Probability = $P(\bar{E}) = 1 - P(E)$
 $= 1 - \frac{1}{36} = \frac{35}{36}$

23. (b); $S = \{1, 2, 3, \dots, 21\}$ $n(S) = 21$
 $E = \{3, 6, 9, 12, 15, 18, 21\}$ $n(E) = 7$
 $\therefore P(E) = \frac{n(E)}{n(S)} = \frac{7}{21} = \frac{1}{3}$

24. (c); Given: In the first bag no. of white balls = 4 and no. of black balls = 2
 And in second bag, no. of white balls = 3 and no. of black balls = 5
 We know that probability of drawing one black ball from the first bag out of 6 balls = $\frac{2}{6} = \frac{1}{3}$
 Similarly, probability of drawing one black ball from the second bag out of 8 balls = $\frac{5}{8}$
 Therefore probability that both balls are black = $\frac{1}{3} \times \frac{5}{8} = \frac{5}{24}$

25. (b); Given no. of red balls = 3, No. of black balls = 7
 No. of balls taken out at random = 2
 we know that total balls in the bag = 3 + 7 = 10
 we also know that probability for taking out one red ball out of 10 balls = $\frac{3}{10}$
 Similarly, probability for taking out one red ball out of the remaining 9 balls = $\frac{2}{9}$
 Therefore, required probability = $\frac{3}{10} \times \frac{2}{9} = \frac{1}{15}$



Let us begin by observing the following series:

2, 4, 6, 8, 10,

clearly, it is an even number series.

Now, let us observe the following series:

62, 127, 214, 345, 510,

This series is obtained by alternatively subtracting and adding 2 to the cubes of natural numbers beginning with 4.

i.e., 62, 127, 214, 345, 510,

$$\begin{array}{ccccccccc} & \downarrow & & \downarrow & & \downarrow & & \downarrow & & \downarrow \\ (4^3 - 2) & (5^3 + 2) & (6^3 - 2) & (7^3 + 2) & (8^3 - 2) & & & & & \end{array}$$

The pattern of the first series can be more easily understood as compared to the second one because we are more familiar with the first pattern, i.e; even numbers.

So, let us familiarise ourselves with more such patterns.

Type 1: Even/odd number series

Example 1: 2, 4, 6, 8, 10,

The above series is an even number series. The next term in this series is 12.

Example 2: 1, 3, 5, 7, 9,.....

This is an odd number series. The next term will be 11.

Type 2: Prime number series

Example 1: 2, 3, 5, 7,

The next term will be 11.

Example 2: 3, 7, 13, 19,

This series is formed by picking up alternate terms from the prime number series beginning with 3.

3, 5, 7, 11, 13, 17, 19, 23, 29

So, the next term will be 29.

Example 3: 3, 7 17,

This series is formed by picking up terms from the prime number series beginning with 3 and leaving out one term, two terms, three terms and so on successively in between.

3, 5, 7, 11, 13, 17, 19, 23, 29, 31

So, the next term will be 31.

Type 3: Series formed by squares of numbers

Example 1: 4, 9, 16, 25, 36,

This series is formed by squares of successive numbers beginning with 2

$2^2, 3^2, 4^2, 5^2, 6^2, 7^2$

So, the next term will be 49.

Example 2: 1, 9, 25, 49, 81,

These are squares of odd numbers.

$1^2, 3^2, 5^2, 7^2, 9^2, 11^2$

So, the next term will be 121.

Type 4: Series formed by Cubes of numbers

Example 1: 64, 125, 216, 343,

These are cubes of successive numbers beginning with 4.

So, the next term will be 512.

Example 2: 8, 27, 125, 343,

These are cubes of prime numbers.

So, the next term will be $11^3 = 1331$.

Type 5 : Series formed by addition

Example 1: 12, 13, 15, 17,

This series is formed by adding 10 to each term of the prime number series beginning with 2.

$(2 + 10), (3 + 10), (5 + 10), (7 + 10)$

So, the next term will be $(11 + 10) = 21$.

Example 2: 1, 3, 4, 8, 15, 27,

Previous three terms are added to find the terms beginning from 8.

$1 + 3 + 4 = 8, 3 + 4 + 8 = 15, 4 + 8 + 15 = 27, 8 + 15 + 27 = 50$

So, the next term will be 50.

Type 6: Series formed by multiplication

Example 1: 0.5, 1.5, 4.5, 13.5,

Here, each term is formed by multiplying the previous term by 3. So, the next will be 40.5.

Example 2: 1, 3, 7, 15, 31, 63,

Each term is formed by multiplying the previous term by 2 and adding 1

So, the next term will be $\rightarrow 63 \times 2 + 1 = 127$.

Type 7: Series formed by division

Example 1: 840, 168, 42, 14, 7,

$(840 \div 5) = 168, (168 \div 4) = 42, (42 \div 3) = 14, (14 \div 2) = 7, (7 \div 1) = 7$.

So, the next term will be 7.

Example 2: 240, ...?..., 120, 40, 10, 2.

$240 \div 1 = 240, 240 \div 2 = 120, 120 \div 3 = 40, 40 \div 4 = 10, 10 \div 5 = 2$.

So, the missing term is 240.

Type 8: Series formed by subtracting or adding something to squares of successive terms.

Example 1: 12, 20, 30, 42,

This series is formed by squaring a term and adding the same term to the square.

$3^2 + 3 = 12, 4^2 + 4 = 20, 5^2 + 5 = 30, 6^2 + 6 = 42, 7^2 + 7 = 56$.

So, the next term will be 56.

Example 2: 3, 7, 13, 21,

$1^2 + 2, 2^2 + 3, 3^2 + 4, 4^2 + 5, 5^2 + 6$.

So, the next term will be 31.

Type 9: Series formed by subtracting or adding something to cubes of successive terms.

Example 1: 0, 6, 24, 60, 120,

$1^3 - 1 = 0, 2^3 - 2 = 6, 3^3 - 3 = 24, 5^3 - 5 = 120, 6^3 - 6 = 210$

So, the next term will be 210.

Example 2: 10, 24, 68, 120,

$2^3 + 2 = 10, 3^3 - 3 = 24, 4^3 + 4 = 68, 5^3 - 5 = 120, 6^3 + 6 = 222$.

So, the next term will be 222.

Type 10: Combination of two different series.

Example 1: $\frac{1}{2}, \frac{3}{4}, \frac{5}{8}, \frac{7}{16}, \dots\dots$

The numerators term a series of odd numbers. The series of denominators is formed by multiplying the previous number by 2.

Numerators: 1, 3, 5, 7, 9 ; Denominators : 2, 4, 8, 16, 32

So, the next term will be $\frac{9}{32}$

Example 2: 512, 16, 343, 25,

It is a combination of two series.

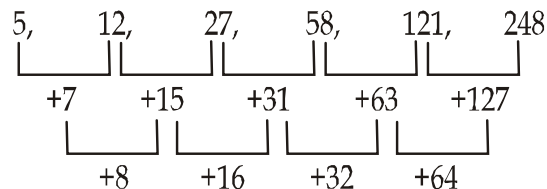
$8^3, 4^2, 7^3, 5^2, \dots$

So, the next term will be $6^3 = 216$.

Type 11: Series formed by adding terms at more than one level

Example: 5, 12, 27, 58, 121,

Sol.



So, the next term will be 248.

Some Important Series

(i) 8, 4, 4, 6, 12,

$$8 \times \frac{1}{2}, 4 \times 1 = 4, 4 \times \frac{3}{2} = 6, 6 \times 2 = 12, 12 \times \frac{5}{2} = 30$$

So, the next term will be 30.

(ii) 6, 9, 18, 45,

$$6 \times \frac{3}{2} = 9, 9 \times 2 = 18, 18 \times \frac{5}{2} = 45, 45 \times 3 = 135.$$

Some point to remember

(i) If a series increases abruptly then it may be a case of series formed by multiplication.

Example: 2, 3, 6, 18, 108, 1944.

Here, each term is formed by multiplying previous two terms.

(ii) if a series decreases abruptly, then it may be a case of series formed by division.

Example: 6120, 1020, 204, 51, 17.

$6120 \div 6 = 1020, 1020 \div 5 = 204, 204 \div 4 = 51$ and so on.

(iii) if a series decreases in the beginning and then goes on increasing, it may be a case of multiplication by fractional values.

Example: 8, 4, 4, 6, 12,

$$8 \times \frac{1}{2} = 4, 4 \times 1 = 4, 4 \times \frac{3}{2} = 6, 6 \times 2 = 12, \text{ and so on.}$$

(iv) The given series may be a combination of two different series in the following cases:

(a) Fractional terms are given in the question with numerators forming one series and denominators forming another series.

(b) Series increases and then decreases and again increases and then decreases and so on.

Example: 15, 14, 19, 11, 23, 8, 27,

1st series $\div 15, 19, 23, 27, \dots$ 2nd series $\div 14, 11, 8, \dots$

(c) When more terms are given in the question as compared to normal cases.

for example in case (b) above we have 7 terms given in the question. in such a situation check for the case of two different series being mixed.

Basic Questions

Directions (1 - 40): What will come in place of question mark (?) in the following number series?

- | | |
|--|--|
| <p>1. 2, 3, 5, 7, ?
(a) 9 (b) 10 (c) 8
(d) 11 (e) None of these</p> <p>2. 1, 3, 6, 10, 15, ?
(a) 17 (b) 18 (c) 20
(d) 21 (e) None of these</p> <p>3. 4, 9, 16, 25, ?
(a) 49 (b) 30 (c) 36
(d) 42 (e) None of these</p> <p>4. 7, 11, 13, 17, 19, 23, ?
(a) 18 (b) 28 (c) 27
(d) 22 (e) None of these</p> <p>5. 41, 43, 47, 53, 59, ?
(a) 61 (b) 67 (c) 64
(d) 65 (e) None of these</p> <p>6. 3, 6, 11, 18, 27, ?
(a) 29 (b) 35 (c) 38
(d) 36 (e) None of these</p> <p>7. 4, 9, 19, 34, 54, ?
(a) 64 (b) 74 (c) 78
(d) 79 (e) None of these</p> | <p>8. 2, 3, 5, 8, 12, ?
(a) 13 (b) 14 (c) 15
(d) 16 (e) None of these</p> <p>9. 100, 81, 64, 49, ?
(a) 48 (b) 46 (c) 40
(d) 36 (e) None of these</p> <p>10. 8, 27, 64, 125, 216, 343, ?
(a) 443 (b) 612 (c) 512
(d) 543 (e) None of these</p> <p>11. 56, 63, 70, 77, ?
(a) 84 (b) 91 (c) 80
(d) 85 (e) None of these</p> <p>12. 36, 48, 60, 72, ?
(a) 80 (b) 78 (c) 84
(d) 85 (e) None of these</p> <p>13. 54, 72, 90, 108, ?
(a) 110 (b) 115 (c) 120
(d) 126 (e) None of these</p> <p>14. 2, 4, 8, 16, 32, ?
(a) 64 (b) 48 (c) 42
(d) 45 (e) None of these</p> <p>15. 3, 6, 12, 24, 48, ?
(a) 64 (b) 70 (c) 94
(d) 96 (e) None of these</p> |
|--|--|

Prelims Questions

Level - 1

Directions (1-5): What should come in place of question mark (?) in the following questions.

- | | |
|---|---|
| <p>1. 0.5, 1, 1.5, ?, 0.75, 0
(a) 2 (b) 1.5 (c) 1.25
(d) 1 (e) 0.75</p> <p>2. 5, 15, 45, 135, ?, 1215
(a) 415 (b) 395 (c) 410
(d) 405 (e) 400</p> <p>3. 90, 96, 102, 108, 114, ?
(a) 116 (b) 124 (c) 118
(d) 122 (e) 120</p> | <p>4. 389, 380, 370, 359, ?, 334
(a) 347 (b) 345 (c) 351
(d) 350 (e) 348</p> <p>5. 1, 3, 6, ?, 18, 29
(a) 10 (b) 11 (c) 9
(d) 12 (e) 8</p> <p>Directions (6-10): What will come in place of question mark (?) in the following series questions?</p> <p>6. 280, 295, 325, 370, 430, ?
(a) 515 (b) 525 (c) 505
(d) 490 (e) 520</p> |
|---|---|

7. 4, 2, 3, 7.5, ?, 118.125
 (a) 24.25 (b) 28.25 (c) 27.25
 (d) 25.25 (e) 26.25
8. 18, 25, 30, ?, 42, 49
 (a) 37 (b) 35 (c) 39
 (d) 41 (e) 43
9. 1, 2, 4, 8, ?, 32
 (a) 32 (b) 24 (c) 12
 (d) 16 (e) 20
10. 121, ?, 169, 196, 225, 256
 (a) 148 (b) 144 (c) 140
 (d) 136 (e) 132

Directions (11-15): What will come in place of question mark (?) in the following series questions?

11. 21, 22, ?, 35, 51, 76
 (a) 28 (b) 23 (c) 24
 (d) 26 (e) 29
12. 128, ?, 32, 16, 8, 4
 (a) 64 (b) 60 (c) 68
 (d) 56 (e) 72
13. 16, 22, 28, 34, 40, ?
 (a) 44 (b) 46 (c) 48
 (d) 42 (e) 50
14. 1, 8, 27, ?, 125, 216
 (a) 68 (b) 66 (c) 62
 (d) 60 (e) 64
15. 20, ?, 12, 19, 39, 98.5
 (a) 9 (b) 10 (c) 11
 (d) 24 (e) 12

Directions (16-20): What will come in place of question mark (?) in the following series questions?

16. 31, 33, 36, ?, 48, 59
 (a) 38 (b) 37 (c) 43
 (d) 41 (e) 40
17. 6, 36, 180, 720, ?, 4320
 (a) 3600 (b) 1080 (c) 1440
 (d) 2880 (e) 2160
18. 23, 29, ?, 41, 47, 53
 (a) 33 (b) 35 (c) 37
 (d) 36 (e) 39
19. 1, 5, ?, 30, 55, 91
 (a) 13 (b) 10 (c) 9
 (d) 14 (e) 18
20. 5, 10, 20, 35, 55, ?
 (a) 85 (b) 75 (c) 80
 (d) 70 (e) 65

Directions (21-25): What will come in place of question mark (?) in the following series questions?

21. 20, 24, 32, ?, 60, 80
 (a) 40 (b) 44 (c) 48
 (d) 52 (e) 46
22. 125, 216, 343, 512, 729, ?
 (a) 990 (b) 1331 (c) 1000
 (d) 1020 (e) 1100
23. 100, 180, 294, 448, 648, ?
 (a) 1040 (b) 1020 (c) 980
 (d) 1000 (e) 900
24. 35, 42, ?, 56, 63, 70
 (a) 48 (b) 52 (c) 45
 (d) 49 (e) 51
25. 2, 4, 12, 48, ?, 1440
 (a) 240 (b) 216 (c) 192
 (d) 288 (e) 180

Directions (26-30): What will come in place of question mark (?) in the following series questions?

26. 1, 2, 6, 15 ?
 (a) 31 (b) 30 (c) 25
 (d) 40 (e) 28
27. 12, 14, 17, 22, 29 ?
 (a) 41 (b) 40 (c) 38
 (d) 45 (e) 46
28. 1, 2, 10, 37, 101, ?
 (a) 225 (b) 227 (c) 226
 (d) 220 (e) 221
29. 101, 123, 147, 173, ?
 (a) 200 (b) 201 (c) 202
 (d) 203 (e) 204
30. 24, 30, 23, 31, 22, ?
 (a) 32 (b) 33 (c) 31
 (d) 34 (e) 35

Directions (31-35): Find the missing term in the following number series questions.

31. 6, 7, 16, 51, 208, ?
 (a) 970 (b) 845 (c) 1085
 (d) 985 (e) 1045
32. 2000, ?, 2164, 2308, 2504, 2760
 (a) 2049 (b) 2036 (c) 2064
 (d) 2100 (e) 2081
33. 800, 770, 728, 672, ?, 510,
 (a) 616 (b) 600 (c) 580
 (d) 624 (e) 560

34. 500, 548, 620, ?, 836, 980

- (a) 716 (b) 736 (c) 756
(d) 696 (e) 746

35. 10, 20, 60, 300, ?, 23100

- (a) 1650 (b) 1500 (c) 1800
(d) 2100 (e) 2400

Directions (36-40): What will come in place of question mark (?) in the following series questions?

36. 3, 8, 18, 33, 53, ?

- (a) 72 (b) 80 (c) 76
(d) 78 (e) 73

37. 9, 64, 25, 216, ?, 512

- (a) 49 (b) 343 (c) 81
(d) 100 (e) 121

38. 12, 36, 80, 164, 328, ?

- (a) 648 (b) 664 (c) 660
(d) 656 (e) 652

39. 15, 23, 30, 36, 41, ?

- (a) 48 (b) 52 (c) 49
(d) 4 (e) 51

40. 7, 14, 28, ?, 112, 224

- (a) 56 (b) 64 (c) 58
(d) 62 (e) 60

Directions (41-45): What will come in place of question mark (?) in the following series questions?

41. 250, 375, 591, ?, 1446, 2175

- (a) 954 (b) 934 (c) 914
(d) 894 (e) 974

42. 30, 90, 360, 1800, 10800, ?

- (a) 54000 (b) 73200 (c) 72800
(d) 75600 (e) 64800

43. 39600, 6600, ?, 330, 110, 55

- (a) 1320 (b) 1650 (c) 1100
(d) 1160 (e) 1280

44. 200, ?, 236, 284, 380, 572

- (a) 228 (b) 208 (c) 224
(d) 220 (e) 212

45. 8000, 7100, 6475, 6075, ?, 5750

- (a) 5975 (b) 5850 (c) 5675
(d) 5875 (e) 5775

Directions (46-46): What will come in place of question mark (?) in the following series questions?

46. 9, 10, 18, 27, 91, ?

- (a) 100 (b) 144 (c) 125
(d) 162 (e) 116

47. 12, 30, 56, 90, ?, 182

- (a) 121 (b) 132 (c) 144
(d) 156 (e) 160

48. 5, 15, 75, 525, 4725, ?

- (a) 52052 (b) 54450 (c) 48840
(d) 50490 (e) 51975

49. 999, ?, 778, 669, 561, 454

- (a) 888 (b) 887 (c) 877
(d) 878 (e) 886

50. 1, 3, 9, 31, 129, ?

- (a) 661 (b) 671 (c) 651
(d) 641 (e) 631

Level - 2

Directions (1-5): Find the wrong term in the following number series questions.

1. -5, -10, -15, -30, -45, -90, -180

- (a) -10 (b) -30 (c) -180
(d) -45 (e) -5

2. 5, 10, 30, 120, 600, 3000, 25200

- (a) 10 (b) 600 (c) 30
(d) 3000 (e) 25200

3. -12, -6, 2, 6, 12, 18, 24

- (a) 2 (b) 6 (c) -6
(d) 18 (e) 12

4. 599, 591, 580, 569, 557, 544, 530

- (a) 599 (b) 557 (c) 530
(d) 591 (e) 544

5. 700, 710, 675, 690, 660, 670, 640

- (a) 710 (b) 675 (c) 660
(d) 690 (e) 670

Directions (6-10): Find the wrong term in the following number series questions.

6. 132, 156, 182, 210, 235, 272, 306

- (a) 306 (b) 132 (c) 235
(d) 272 (e) 156

7. 100, 148, 220, 316, 436, 580, 752

- (a) 752 (b) 220 (c) 316
(d) 100 (e) 436

8. 12, 6, 6, 12, 48, 382, 6144

- (a) 6144 (b) 6 (c) 48
(d) 382 (e) 12

9. 140, 137, 131, 120, 110, 95, 77
 (a) 140 (b) 120 (c) 131
 (d) 77 (e) 95

10. 16, 9, 10, 16, 34, 83.5, 251.5
 (a) 16 (b) 10 (c) 34
 (d) 83.5 (e) 251.5

Directions (11-15): Find the wrong term in the following number series questions.

11. 5, 13, 29, 61, 125, 255, 509
 (a) 125 (b) 509 (c) 13
 (d) 61 (e) 255
12. 7200, 1200, 6000, 1800, 4500, 2250, 2250
 (a) 7200 (b) 1800 (c) 6000
 (d) 2250 (e) 1200
13. 4000, 3424, 3024, 2768, 2624, 2560, 2524
 (a) 3424 (b) 2768 (c) 2524
 (d) 2560 (e) 3024
14. 80, 40, 60, 180, 525, 2362.5, 12993.75
 (a) 180 (b) 40 (c) 80
 (d) 2362.5 (e) 525
15. 24, 68, 120, 210, 336, 504, 720
 (a) 504 (b) 210 (c) 24
 (d) 68 (e) 336

Directions (16-20): Find the wrong term in the following number series questions.

16. 110, 156, 210, 282, 342, 420, 506
 (a) 342 (b) 282 (c) 110
 (d) 420 (e) 506
17. 2000, 2000, 1000, 3000, 600, 3750, 625
 (a) 1000 (b) 3750 (c) 625
 (d) 600 (e) 3000
18. 2, 2, 5, 17, 72, 359, 2159
 (a) 72 (b) 359 (c) 5
 (d) 17 (e) 2159
19. 9000, 7920, 7020, 6300, 5760, 5400, 5200
 (a) 5400 (b) 9000 (c) 6300
 (d) 7020 (e) 5200
20. 100, 120, 154, 192, 248, 320, 410
 (a) 100 (b) 248 (c) 410
 (d) 154 (e) 120

Directions (21-25): Find the wrong number in the following number series questions.

21. 7, 4, 5, 8.5, 20, 52.5, 160.
 (a) 4 (b) 20 (c) 8.5
 (d) 52.5 (e) 7

22. 160, 207, 260, 319, 380, 449, 518
 (a) 160 (b) 319 (c) 207
 (d) 449 (e) 380

23. 12, 6, 6, 12, 36, 231, 1848
 (a) 12 (b) 1848 (c) 36
 (d) 231 (e) Series is right

24. 14700, 2100, 12600, 2500, 10080, 3360, 6720
 (a) 2100 (b) 12600 (c) 10080
 (d) 3360 (e) 2500

25. 20.25, 23.04, 26.01, 29.16, 32.56, 36.00, 39.69
 (a) 36.00 (b) 23.04 (c) 32.56
 (d) 20.25 (e) 29.16

Directions (26-30): Find the wrong number in the following number series.

26. 8, 12, 24, 60, 180, 640, 2520
 (a) 60 (b) 180 (c) 2520
 (d) 640 (e) 8
27. -1, 1, 2, 6, 14, 30, 62
 (a) 1 (b) 62 (c) -1
 (d) 14 (e) 30
28. 3, 4, 12, 41, 103, 228, 444
 (a) 228 (b) 3 (c) 41
 (d) 444 (e) 103
29. 5, 3, 4, 7, 17, 45, 138
 (a) 3 (b) 7 (c) 17
 (d) 45 (e) 138
30. 17, 25, 38, 53, 79, 107, 140
 (a) 79 (b) 140 (c) 25
 (d) 53 (e) 107

Directions (31-35): In each of the following questions, find the wrong term in the given series.

31. 102, 83, 66, 50, 38, 27, 18
 (a) 102 (b) 83 (c) 38
 (d) 50 (e) 66
32. 2, 12, 36, 80, 150, 251, 392
 (a) 36 (b) 80 (c) 251
 (d) 392 (e) 150
33. 2, 3, 5, 7, 11, 15, 17
 (a) 3 (b) 11 (c) 15
 (d) 17 (e) 7
34. 11, 22, 34, 47, 61, 77, 92
 (a) 77 (b) 61 (c) 92
 (d) 22 (e) 34
35. 2, 6, 11, 23, 47, 95, 191
 (a) 6 (b) 11 (c) 47
 (d) 2 (e) 23

Directions (36-40): Find the wrong number in the following number series questions

36. 100, 142, 212, 310, 436, 595, 772
 (a) 142 (b) 595 (c) 310
 (d) 772 (e) 436
37. 72, 80, 144, 360, 864, 1872, 3600
 (a) 360 (b) 144 (c) 80
 (d) 864 (e) 1872
38. 12, 14, 31, 96, 393, 1971, 11833
 (a) 393 (b) 31 (c) 96
 (d) 1971 (e) 11833
39. 132, 156, 182, 210, 240, 272, 310
 (a) 132 (b) 272 (c) 210
 (d) 182 (e) 310
40. 16000, 8000, 24000, 6000, 30000, 7500, 35000
 (a) 8000 (b) 7500 (c) 30000
 (d) 6000 (e) 35000

Direction (41 - 45) : Find the wrong number in the following number series ?

41. 3, 10, 31, 94, 283, 848, 2551
 (a) 31 (b) 10 (c) 2551
 (d) 848 (e) 3
42. 8, 127, 1015, 4059, 8117, 8116, 4055
 (a) 8 (b) 4055 (c) 127
 (d) 4059 (e) None of these

43. 180, 200, 225, 254, 286, 322, 355
 (a) 322 (b) 180 (c) 286
 (d) 355 (e) 200
44. 1750, 1750, 1743, 1717, 1654, 1529, 1315
 (a) 1750 (b) 1743 (c) 1529
 (d) 1717 (e) 1315
45. 5, 19, 75, 299, 1195, 4779, 19125
 (a) 5 (b) 19 (c) 299
 (d) 4779 (e) 19125

Directions (46-50): Find the wrong number in the following number series.

46. 158, 156, 168, 148, 176, 140, 184
 (a) 158 (b) 148 (c) 140
 (d) 156 (e) 176
47. 3, 3, 9, 45, 313, 2835, 31185
 (a) 31185 (b) 9 (c) 313
 (d) 2835 (e) 45
48. 10, 260, 480, 685, 860, 1010, 1135
 (a) 1010 (b) 860 (c) 260
 (d) 10 (e) 480
49. 229, 240, 257, 280, 311, 352, 400
 (a) 229 (b) 400 (c) 257
 (d) 311 (e) 352
50. 1201, 1200, 1197, 1188, 1161, 1082, 837
 (a) 1200 (b) 1188 (c) 837
 (d) 1201 (e) 1082

Mains Questions

Directions (1 - 4): In each of the following questions a number series is given. After the series a number is given followed by (a), (b), (c), (d) and (e). You have to complete the series starting with the number given, following the sequence of the original series and answer the questions that follow the series.

1. 12 30 120 460 1368 2730
 16 (a) (b) (c) (d) (e)
 What will come in place of (d)?
 (a) 1384 (b) 2642 (c) 2808
 (d) 1988 (e) None of these
2. 7 91 1001 7007 35035 105105
 14.5 (a) (b) (c) (d) (e)
 What will come in place of (c) ?
 (a) 21132.5 (b) 14514.5 (c) 20020.5
 (d) 13864.5 (e) None of these

3. 582 574 601 537 662 446
 204 (a) (b) (c) (d) (e)
 What will come in place of (d)?
 (a) 284 (b) 68 (c) 174
 (d) 331 (e) None of these
4. 85 43 44 67.5 137 345
 125 (a) (b) (c) (d) (e)
 What will come in place of (c) ?
 (a) 86 (b) 107.5 (c) 112.5
 (d) 97.5 (e) None of these

Directions (5 - 15): What will come in place of the question mark (?) in the following number series?

5. 1 6 36 240 1960 ?
 (a) 19660 (b) 3680 (c) 36800
 (d) 19600 (e) None of these

6. 949 189.8 ? 22.776 11.388 6.8328
 (a) 48.24 (b) 53.86 (c) 74.26
 (d) 56.94 (e) None of these
7. 14 43.5 264 ? 76188
 (a) 3168 (b) 3176 (c) 1587
 (d) 1590 (e) None of these
8. 41 164 2624 ? 6045696
 (a) 104244 (b) 94644 (c) 94464
 (d) 102444 (e) None of these
9. 12 12 18 45 180 1170 ?
 (a) 12285 (b) 10530 (c) 11700
 (d) 12870 (e) 7605
10. 40280625 732375 16275 465 18.6 1.24 ?
 (a) 0.248 (b) 0.336 (c) 0.424
 (d) 0.512 (e) 0.639
11. 14 12 21 59 231 1149 ?
 (a) 6987 (b) 6787 (c) 6887
 (d) 6687 (e) 6587
12. 1728 2744 4096 5832 8000 10648 ?
 (a) 12167 (b) 13824 (c) 15625
 (d) 9261 (e) 17576
13. 120 15 105 17.5 87.5 ?
 (a) 18.5 (b) 19.5 (c) 21.875
 (d) 17.5 (e) 90
14. 3 6 21 28 55 66 ? 120
 (a) 103 (b) 104 (c) 108
 (d) 106 (e) 105
15. 529 841 961 1369 1681 1849 ?
 (a) 2809 (b) 2601 (c) 3249
 (d) 3481 (e) 2209

Directions (16 - 19): In the following number series only one number is wrong. Find out the wrong number.

16. 3 35 226 1160 4660 13998
 (a) 13998 (b) 4660 (c) 226
 (d) 1160 (e) None of these
17. 18 119 708 3534 14136 42405
 (a) 708 (b) 3534 (c) 14136
 (d) 42405 (e) None of these
18. 4 6 18 49 201 1011
 (a) 1011 (b) 201 (c) 18
 (d) 49 (e) None of these

19. 2 54 300 1220 3674 7350
 (a) 3674 (b) 1220 (c) 300
 (d) 54 (e) None of these

Directions (20 - 30): What should come in place of the question mark (?) in the following number series?

20. 0 5 18 43 84 145 ?
 (a) 220 (b) 240 (c) 260
 (d) 280 (e) None of these
21. 10 17 48 165 688 3475 ?
 (a) 27584 (b) 25670 (c) 21369
 (d) 20892 (e) None of these
22. 1 3 24 360 8640 302400 ?
 (a) 14525100 (b) 154152000 (c) 14515200
 (d) 15425100 (e) None of these
23. 12 14 32 102 416 2090 ?
 (a) 15522 (b) 12552 (c) 13525
 (d) 17552 (e) None of these
24. 10 15 15 12.5 9.375 6.5625 ?
 (a) 4.375 (b) 3.2375 (c) 4.6275
 (d) 3.575 (e) None of these
25. 3 22 ? 673 2696 8093
 (a) 133 (b) 155 (c) 156
 (d) 134 (e) None of these
26. 6 13 38 ? 532 2675
 (a) 129 (b) 123 (c) 172
 (d) 164 (e) None of these
27. 17 9 ? 16.5 35 90
 (a) 5 (b) 15 (c) 10
 (d) 20 (e) None of these
28. 3 4 12 ? 196
 (a) 45 (b) 40 (c) 41
 (d) 49 (e) None of these
29. 16 8 12 30 ?
 (a) 75 (b) 105 (c) 95
 (d) 115 (e) None of these
30. 7 12 32 105 ?
 (a) 428 (b) 214 (c) 218
 (d) 416 (e) None of these

Previous Year Question

Direction (1-5): What will come in the place of question (?) mark in following number series:

1. ?, 100, 150, 375, 1312.5
(a) 100 (b) 200 (c) 150
(d) 400 (e) 50
2. 104, ?, 96, 120, 88, 128
(a) 112 (b) 110 (c) 114
(d) 118 (e) 108
3. 15, 8, 9, 15, 32, ?
(a) 66 (b) 99 (c) 80
(d) 82.5 (e) 80.5
4. 6, 8, 14, 26, 46, ?
(a) 72 (b) 84 (c) 96
(d) 80 (e) 76
5. 72000, 36000, 12000, 3000, 600, ?
(a) 120 (b) 200 (c) 300
(d) 150 (e) 100

SBI Clerk Prelims 2020

Direction (6 - 10): What will come in the place of question mark in following number series:

6. 9.8, ?, 8.9, 11.6, 8, 12.5
(a) 10.7 (b) 11.7 (c) 10.5
(d) 10.9 (e) 11.3
7. 400, 274, 209, 181, 172, ?
(a) 169 (b) 173 (c) 168
(d) 171 (e) 170
8. 1, 1, ?, 15, 105, 945
(a) 2 (b) 3 (c) 4
(d) 1.5 (e) 2.5
9. 12, ?, 6, 9, 18, 45
(a) 15 (b) 8 (c) 6
(d) 12 (e) 4
10. 34, 18, 10, 6, ?, 3
(a) 9 (b) 4 (c) 3
(d) 2 (e) 6

IBPS PO Prelims 2020

Directions (11-16): Find the value of (?) in the following number series.

11. 1.5, 3, 12, 72, 576, ?
(a) 5480 (b) 5620 (c) 5580
(d) 5340 (e) 5760
12. 80, 66, 85, 61, 90, ?
(a) 50 (b) 56 (c) 64
(d) 60 (e) 63

13. 163, ?, 43, 23, 13, 8
(a) 92 (b) 83 (c) 78
(d) 54 (e) 69
14. 150, 152, 157, 167, 184, ?
(a) 229 (b) 245 (c) 232
(d) 210 (e) 206
15. 3.5, 2.5, 3, 6, 20, ?
(a) 95 (b) 80 (c) 65
(d) 75 (e) 90
16. 6300, ?, 525, 105, 17.5, 2.5
(a) 2400 (b) 2100 (c) 4200
(d) 5200 (e) 3600

RRB PO Prelims 2020

Direction (17-21): Find the wrong number in following number series.

17. 2, 6, 12, 48, 240, 1440, 10080
(a) 12 (b) 6 (c) 2
(d) 48 (e) 240
18. 5, 9, 25, 59, 125, 225, 369
(a) 369 (b) 225 (c) 25
(d) 59 (e) 9
19. 540, 550, 575, 585, 608, 620, 645
(a) 608 (b) 550 (c) 575
(d) 645 (e) 585
20. 4, 11, 30, 67, 128, 221, 346
(a) 11 (b) 4 (c) 221
(d) 67 (e) 346
21. 189, 186, 181, 174, 165, 155, 141
(a) 189 (b) 181 (c) 165
(d) 155 (e) 141

RBI Assistant Prelims 2020

Directions (22-26): What will come in place of (?) in the following number series problems?

22. 200, 197, 185, 163, 130, ?
(a) 95 (b) 85 (c) 105
(d) 86 (e) 84
23. 15, 8, 9, 15, 32, ?
(a) 98 (b) 66 (c) 80.5
(d) 82.5 (e) 84.5
24. 5, 30, 150, 600, ?
(a) 1200 (b) 1500 (c) 2400
(d) 1800 (e) 600
25. 222, 110, 54, 26, ?
(a) 10 (b) 12 (c) 8
(d) 6 (e) 14

26. 104, ?, 96, 120, 88, 128

- (a) 112 (b) 96 (c) 116
(d) 120 (e) 92

SBI PO Prelims 2019

Directions (27-28): There are three series given in a question, you have to find value of x, y and z in each question and then establish relation among them.

27. 1, 601, 721, 751, (x), 766
753, 769, (y), 765, 763, 764
23, 24, 50, 153, (z), 3085

- (a) $x = y = z$ (b) $x > y > z$ (c) $x > y = z$
(d) $x = y > z$ (e) $x = z > y$

28. 102, 107, 117, 134, (x)
130, 115, 135, 110, (y)
(z), 80, 120, 300, 1050

- (a) $x > y = z$ (b) $y < x = z$ (c) $x = y = z$
(d) $y > x > z$ (e) $x = z < y$

SBI PO Mains 2019

Directions (29-33): What will come in the place of question mark (?) in the following number series:

29. 11, ?, 16, 21, 29, 41

- (a) 12 (b) 14 (c) 15
(d) 13 (e) 11

30. 1800, ?, 60, 15, 5, 2.5

- (a) 300 (b) 600 (c) 120
(d) 240 (e) 360

31. 4, 3, 4, 9, 32, ?

- (a) 75 (b) 155 (c) 125
(d) 175 (e) 165

32. ?, 100, 150, 375, 1312.5

- (a) 50 (b) 100 (c) 75
(d) 25 (e) 200

33. 0, 6, 24, 60, ?, 210

- (a) 130 (b) 170 (c) 90
(d) 120 (e) 150

SBI Clerk Prelims 2019

Directions (34-40): Find the wrong number in the following number series.

34. 8, 10, 20, 70, 320, 1570, 7830

- (a) 7830 (b) 10 (c) 8
(d) 320 (e) 1570

35. 18, 20, 43, 133, 537, 2691, 16163

- (a) 43 (b) 16163 (c) 133
(d) 537 (e) 2691

36. 124, 140, 108, 156, 92, 172, 78

- (a) 108 (b) 124 (c) 78
(d) 92 (e) 140

37. 260, 380, 510, 618, 759, 856, 1008

- (a) 759 (b) 1008 (c) 260
(d) 510 (e) 618

38. 267, 343, 610, 953, 1563, 2515, 4079

- (a) 4079 (b) 953 (c) 343
(d) 267 (e) 2515

39. 36, 80, 166, 340, 690, 1392, 2798

- (a) 690 (b) 36 (c) 340
(d) 1392 (e) 80

40. 30, 100, 230, 490, 1010, 2050, 4130

- (a) 30 (b) 4130 (c) 1010
(d) 490 (e) 2050

SBI Clerk Mains 2019

Directions (41-45): Find the wrong number in the following number series.

41. 2, 3, 6, 15, 45, 156.5, 630

- (a) 2 (b) 15 (c) 3
(d) 156.5 (e) 630

42. 36, 20, 12, 8, 6, 5.5, 4.5

- (a) 8 (b) 36 (c) 5.5
(d) 4.5 (e) 6

43. 1, 3, 9, 31, 128, 651, 3913

- (a) 31 (b) 3 (c) 1
(d) 3913 (e) 128

44. 2, 3, 10, 40, 172, 885, 5346

- (a) 40 (b) 885 (c) 172
(d) 3 (e) 10

45. 5, 8, 16, 26, 50, 98, 194

- (a) 5 (b) 194 (c) 8
(d) 16 (e) 98

IBPS Clerk Prelims 2019

Directions (46-50): Find the missing term in the following number series:

46. 1864, 1521, 1305, ?, 1116, 1089

- (a) 1160 (b) 1180 (c) 1095
(d) 1205 (e) 1220

47. 18, ?, 9, 18, 72, 576

- (a) 12 (b) 9 (c) 18
(d) 10 (e) 6

48. 12, 6.5, 7.5, 12.75, 27.5, ?

- (a) 66.5 (b) 68.75 (c) 63.75
(d) 71.25 (e) None of these

49. 5, 15, 50, ?, 1030, 6185

- (a) 210 (b) 205 (c) 225
(d) 200 (e) 195

50. 130, 154, 186, ?, 274, 330

- (a) 216 (b) 220 (c) 240
(d) 226 (e) 230

RRB PO Prelims 2019

Directions (51-54): Given questions are based on a missing series pattern and following that pattern find the relation between P, Q and R.

- 51.** 300, 324, 384, 504, P, 1050
450, 474, Q, 654, 864, 1200
200, 224, 284, 404, R, 850
(a) $P > Q < R$ (b) $P < Q < R$ (c) $P = Q > R$
(d) $P < Q = R$ (e) $P < Q > R$
- 52.** 2700, 5400, P, 7200, 1440, 8640
2100, Q, 1400, 5600, 1120, 6720
1500, 3000, 1000, R, 800, 4800
(a) $P > Q > R$ (b) $P < Q = R$ (c) $P < Q > R$
(d) $P = Q > R$ (e) $P < Q < R$
- 53.** 35, 70, 210, P, 4200, 25200
140, 280, Q, 3360, 16800, 100800
40, 80, 240, R, 4800, 28800
(a) $P > Q < R$ (b) $P < Q > R$ (c) $P < Q < R$
(d) $P = Q < R$ (e) $P > Q > R$
- 54.** 7, 15, 47, 191, Q, 5754
9, 19, 59, P, 1199, 7199
11, 23, 71, 287, R, 8639
(a) $P > Q < R$ (b) $P < Q > R$ (c) $P < Q < R$
(d) $P = Q < R$ (e) $P > Q > R$

RRB PO Mains 2019

Direction (55-58) Find the wrong term in following number series

- 55.** 1, 2, 5, 16, 65, 328, 1957
(a) 5 (b) 328 (c) 16
(d) 1957 (e) 65
- 56.** 4, 11, 25, 46, 74, 129, 151
(a) 129 (b) 11 (c) 151
(d) 4 (e) 46
- 57.** 84, 96, 83, 95, 80, 94, 81
(a) 95 (b) 81 (c) 83
(d) 80 (e) 84

- 58.** 3, 5, 8, 17, 33, 58, 94
(a) 8 (b) 94 (c) 58
(d) 3 (e) 5

IBPS RRB Clerk Prelims 2019

Directions (59-63): What will come in place of (?) in the following number series?

- 59.** 120, 60, 60, 90, 180, ?
(a) 420 (b) 450 (c) 400
(d) 500 (e) 540
- 60.** ?, 190, 210, 238, 274, 318
(a) 170 (b) 198 (c) 186
(d) 178 (e) 190
- 61.** 112, ?, 166, 238, 382, 670
(a) 152 (b) 135 (c) 144
(d) 126 (e) 130
- 62.** 138, 210, 66, 282, -6, ?
(a) 354 (b) 320 (c) 336
(d) 348 (e) 360
- 63.** 72, 80, 71, 135, ?, 326
(a) 125 (b) 110 (c) 90
(d) 105 (e) 95

RBI Grade B Phase I 2019

Solutions

Basic Questions

- 1. (d):** It is prime number series. next prime number is 11.
- 2. (d):** $1 + 2 = 3$, $3 + 3 = 6$, $6 + 4 = 10$,
 $10 + 5 = 15$, $15 + 6 = 21$
- 3. (c):** 2^2 , 3^2 , 4^2 , 5^2 . Next number is $6^2 = 36$.
- 4. (e):** 7, 11, 13, 17, 19, 23

Prime numbers. Next prime number is 29.

- 5. (a):** 41, 43, 47, 53, 59, ? ; Next prime number is 61.
- 6. (c):** $3 + 3 = 6$, $6 + 5 = 11$,
 $+ 3, + 5, + 7, + 9, + 11$
So, the next number is $27 + 11 = 38$
- 7. (d):** $+ 5, + 10, + 15, + 20$

So, the next number is $54 + 25 = 79$

8. (e): $+ 1, + 2, + 3, + 4$

So, the next number is $12 + 5 = 17$

9. (d): $10^2, 9^2, 8^2, 7^2$; The next number is $6^2 = 36$

10. (c): $2^3, 3^3, 4^3, 5^3, 6^3, 7^3$; Next is $8^3 = 512$

11. (a): $+ 7, +7, +7, \dots$

So, next in the series is $77 + 7 = 84$

12. (c): $+ 12, + 12, + 12, \dots$

So, the next number is $72 + 12 = 84$

13. (d): Each number increases by 18.

So, the next one is : $108 + 18 = 126$

14. (a): $2^1, 2^2, 2^3, 2^4, 2^5, \dots$

So, the next one is $2^6 = 64$.

15. (d): The previous number is multiplied by 2 to obtain the next number.

So, the next number is : $48 \times 2 = 96$

Prelims Solutions

Level - 1

1. (b): Pattern is

$$\begin{aligned} 0.5 \times (2 - 0) &= 1 \\ 1 \times (2 - 0.5) &= 1.5 \\ 1.5 \times (2 - 1) &= 1.5 \\ 1.5 \times (2 - 1.5) &= 0.75 \\ 0.75 \times (2 - 2) &= 0 \end{aligned}$$

2. (d): Pattern is

$$\begin{aligned} 5 \times 3 &= 15 \\ 15 \times 3 &= 45 \\ 45 \times 3 &= 135 \\ 135 \times 3 &= 405 \\ 405 \times 3 &= 1215 \end{aligned}$$

3. (e): Pattern is

$$\begin{aligned} 90 + 6 &= 96; 96 + 6 = 102 \\ 102 + 6 &= 108; 108 + 6 = 114 \\ 114 + 6 &= 120 \end{aligned}$$

4. (a): Pattern is

$$\begin{aligned} 389 - (9 + 0) &= 380 \\ 380 - (9 + 1) &= 370 \\ 370 - (9 + 2) &= 359 \\ 359 - (9 + 3) &= 347 \\ 347 - (9 + 4) &= 334 \end{aligned}$$

5. (b): Pattern is addition of prime no.

$$\begin{aligned} 1 + 2 &= 3 \\ 3 + 3 &= 6 \\ 6 + 5 &= 11 \\ 11 + 7 &= 18 \\ 18 + 11 &= 29 \end{aligned}$$

6. (c):

$$\begin{array}{ccccccccc} 280 & 295 & 325 & 370 & 430 & 505 \\ \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow \\ +15 & +30 & +45 & +60 & +75 & \\ \uparrow & \uparrow & \uparrow & \uparrow & & \\ +15 & +15 & +15 & +15 & & \end{array}$$

7. (e):

$$\begin{array}{ccccccccc} 4 & 2 & 3 & 7.5 & 26.25 & 118.125 \\ \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow \\ \times 0.5 & \times 1.5 & \times 2.5 & \times 3.5 & \times 4.5 & \end{array}$$

8. (a):

$$\begin{array}{ccccccccc} & & +12 & & +12 & & & & \\ & & \uparrow & & \uparrow & & & & \\ 18 & 25 & 30 & 37 & 42 & 49 \\ \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow \\ +12 & & +12 & & & & & & \end{array}$$

9. (d):

$$\begin{array}{ccccccccc} 1 & 2 & 4 & 8 & 16 & 32 \\ \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow \\ \times 2 & \times 2 & \times 2 & \times 2 & \times 2 & \times 2 \end{array}$$

10. (b):

$$\begin{array}{ccccccccc} 121 & 144 & 169 & 196 & 225 & 256 \\ \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow \\ 11^2 & 12^2 & 13^2 & 14^2 & 15^2 & 16^2 \end{array}$$

11. (d):

$$\begin{array}{ccccccccc} 21 & 22 & 26 & 35 & 51 & 76 \\ \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow \\ +1 & +4 & +9 & +16 & +25 & \\ \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \\ 1^2 & 2^2 & 3^2 & 4^2 & 5^2 & \end{array}$$

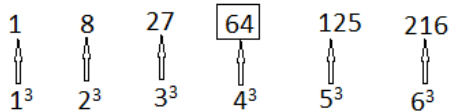
12. (a):

$$\begin{array}{ccccccccc} 128 & 64 & 32 & 16 & 8 & 4 \\ \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow \\ \times 0.5 & \times 0.5 & \times 0.5 & \times 0.5 & \times 0.5 & \times 0.5 \end{array}$$

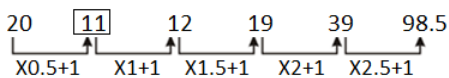
13. (b):

$$\begin{array}{ccccccccc} 16 & 22 & 28 & 34 & 40 & 46 \\ \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow \\ +6 & +6 & +6 & +6 & +6 & \end{array}$$

14. (e):



15. (c):



16. (d): addition of prime numbers

Pattern is

$$31 + 2 = 33$$

$$33 + 3 = 36$$

$$36 + 5 = \mathbf{41}$$

$$41 + 7 = 48$$

$$48 + 11 = 59$$

17. (e): Pattern is

$$6 \times 6 = 36$$

$$36 \times 5 = 180$$

$$180 \times 4 = 720$$

$$720 \times 3 = \mathbf{2160}$$

$$2160 \times 2 = 4320$$

18. (b): Pattern is

$$23 + 6 = 29$$

$$29 + 6 = \mathbf{35}$$

$$35 + 6 = 41$$

$$41 + 6 = 47$$

$$47 + 6 = 53$$

19. (d): $1 + 2^2 = 5$

$$5 + 3^2 = \mathbf{14}$$

$$14 + 4^2 = 30$$

$$30 + 5^2 = 55$$

$$55 + 6^2 = 91$$

20. (c): Pattern is

$$5 + (5 \times 1) = 10$$

$$10 + (5 \times 2) = 20$$

$$20 + (5 \times 3) = 35$$

$$35 + (5 \times 4) = 55$$

$$55 + (5 \times 5) = \mathbf{80}$$

21. (b): Pattern is

$$20 + (4 \times 1) = 24$$

$$24 + (4 \times 2) = 32$$

$$32 + (4 \times 3) = \mathbf{44}$$

$$44 + (4 \times 4) = 60$$

$$60 + (4 \times 5) = 80$$

22. (c): Pattern is

$$5^3 = 125$$

$$6^3 = 216$$

$$7^3 = 343$$

$$8^3 = 512$$

$$9^3 = 729$$

$$10^3 = \mathbf{1000}$$

23. (e): Pattern is

$$5^3 - 5^2 = 100$$

$$6^3 - 6^2 = 180$$

$$7^3 - 7^2 = 294$$

$$8^3 - 8^2 = 448$$

$$9^3 - 9^2 = 648$$

$$10^3 - 10^2 = \mathbf{900}$$

24. (d): $35 + 7 = 42$

$$42 + 7 = \mathbf{49}$$

$$49 + 7 = 56$$

$$56 + 7 = 63$$

$$63 + 7 = 70$$

25. (a): Pattern is

$$2 \times 2 = 4$$

$$4 \times 3 = 12$$

$$12 \times 4 = 48$$

$$48 \times 5 = \mathbf{240}$$

$$240 \times 6 = 1440$$

26. (a): $1 + 1^2 = 2$

$$2 + 2^2 = 6$$

$$6 + 3^2 = 15$$

$$\therefore 15 + 4^2 = 31$$

27. (b): $12 + 2 = 14$

$$14 + 3 = 17$$

$$17 + 5 = 22$$

$$22 + 7 = 29$$

$$\therefore 29 + 11 = 40 \text{ (addition of prime numbers)}$$

28. (c): $1 + 1^3 = 2$

$$2 + 2^3 = 10$$

$$10 + 3^3 = 37$$

$$37 + 4^3 = 101$$

$$\therefore 101 + 5^3 = 226$$

29. (b): $10^2 + 1 = 101$

$$11^2 + 2 = 123$$

$$12^2 + 3 = 147$$

$$13^2 + 4 = 173$$

$$\therefore 14^2 + 5 = 201$$

30. (a): $24 + 6 = 30$

$$30 - 7 = 23$$

$$23 + 8 = 31$$

$$31 - 9 = 22$$

$$\therefore 22 + 10 = 32$$

31. (e): Pattern is

$$6 \times 1 + 1 = 7$$

$$7 \times 2 + 2 = 16$$

$$16 \times 3 + 3 = 51$$

$$51 \times 4 + 4 = 208$$

$$208 \times 5 + 5 = 1045$$

32. (c): Pattern is

$$2000 + (8)^2 = 2064$$

$$2064 + (10)^2 = 2164$$

$$2164 + (12)^2 = 2308$$

$$2308 + (14)^2 = 2504$$

$$2504 + (16)^2 = 2760$$

33. (b): Pattern is

$$800 - (5 \times 6) = 770$$

$$770 - (6 \times 7) = 728$$

$$728 - (7 \times 8) = 672$$

$$672 - (8 \times 9) = 600$$

$$600 - (9 \times 10) = 510$$

34. (a): Pattern is

$$500 + 48 = 548$$

$$548 + 72 = 620$$

$$620 + 96 = 716$$

$$716 + 120 = 836$$

$$836 + 144 = 980$$

35. (d): Pattern is

$$10 \times 2 = 20$$

$$20 \times 3 = 60$$

$$60 \times 5 = 300$$

$$300 \times 7 = 2100$$

$$2100 \times 11 = 23100$$

36. (d): Pattern is

$$3 + (5 \times 1) = 8$$

$$8 + (5 \times 2) = 18$$

$$18 + (5 \times 3) = 33$$

$$33 + (5 \times 4) = 53$$

$$53 + (5 \times 5) = 78$$

37. (a): Pattern is

$$3^2 = 9$$

$$4^3 = 64$$

$$5^2 = 25$$

$$6^3 = 216$$

$$7^2 = 49$$

$$8^3 = 512$$

38. (e): Pattern is

$$12 \times 2 + 12 = 36$$

$$36 \times 2 + 8 = 80$$

$$80 \times 2 + 4 = 164$$

$$164 \times 2 + 0 = 328$$

$$328 \times 2 - 4 = 652$$

39. (d): $15 + 8 = 23$

$$23 + 7 = 30$$

$$30 + 6 = 36$$

$$36 + 5 = 41$$

$$41 + 4 = 45$$

40. (a): Pattern is

$$7 \times 2 = 14$$

$$14 \times 2 = 28$$

$$28 \times 2 = 56$$

$$56 \times 2 = 112$$

$$112 \times 2 = 224$$

41. (b): Pattern followed is

$$250 + (5)^3 = 375$$

$$375 + (6)^3 = 591$$

$$591 + (7)^3 = 934$$

$$934 + (8)^3 = 1446$$

$$1446 + (9)^3 = 2175$$

42. (d): Pattern followed is

$$30 \times 3 = 90$$

$$90 \times 4 = 360$$

$$360 \times 5 = 1800$$

$$1800 \times 6 = 10800$$

$$10800 \times 7 = 75600$$

43. (a):

Pattern followed is

$$39600 \div 6 = 6600$$

$$6600 \div 5 = 1320$$

$$1320 \div 4 = 330$$

$$330 \div 3 = 110$$

$$110 \div 2 = 55$$

44. (e): Pattern followed is

$$200 + (12 \times 1) = 212$$

$$212 + (12 \times 2) = 236$$

$$236 + (12 \times 4) = 284$$

$$284 + (12 \times 8) = 380$$

$$380 + (12 \times 16) = 572$$

45. (b): Pattern followed is

$$8000 - (30)^2 = 7100$$

$$7100 - (25)^2 = 6475$$

$$6475 - (20)^2 = 6075$$

$$6075 - (15)^2 = 5850$$

$$5850 - (10)^2 = 5750$$

46. (e): $9 + 1^2 = 10$

$$10 + 2^3 = 18$$

$$18 + 3^2 = 27$$

$$27 + 4^3 = 91$$

$$91 + 5^2 = 116$$

47. (b): $3 \times 4 = 12$

$$5 \times 6 = 30$$

$$7 \times 8 = 56$$

$$9 \times 10 = 90$$

$$11 \times 12 = 132$$

$$13 \times 14 = 182$$

48. (e): $5 \times 3 = 15$
 $15 \times 5 = 75$
 $75 \times 7 = 525$
 $525 \times 9 = 4725$
 $4725 \times 11 = 51975$

49. (a): $999 - 111 = 888$
 $888 - 110 = 778$
 $778 - 109 = 669$

$669 - 108 = 561$
 $561 - 107 = 454$

50. (c): $1 \times 1 + 2 = 3$
 $3 \times 2 + 3 = 9$
 $9 \times 3 + 4 = 31$
 $31 \times 4 + 5 = 129$
 $129 \times 5 + 6 = 651$

Level - 2

1. (c): Pattern is
 $-5 \times 2 = -10$
 $-10 \times 1.5 = -15$
 $-15 \times 2 = -30$
 $-30 \times 1.5 = -45$
 $-45 \times 2 = -90$
 $-90 \times 1.5 = -135$
 wrong number is -180 which should be replaced with -135

2. (d): Pattern is
 $5 \times 2 = 10$
 $10 \times 3 = 30$
 $30 \times 4 = 120$
 $120 \times 5 = 600$
 $600 \times 6 = 3600$
 $3600 \times 7 = 25200$
 wrong number is 3000 which should be replaced with 3600

3. (a): Pattern is
 $-12 + 6 = -6$;
 $-6 + 6 = 0$
 $0 + 6 = 6$;
 $6 + 6 = 12$
 $12 + 6 = 18$;
 $18 + 6 = 24$
 wrong number is 2 which should be replaced with 0

4. (d): Pattern is
 $599 - (9 + 0) = 590$
 $590 - (9 + 1) = 580$
 $580 - (9 + 2) = 569$
 $569 - (9 + 3) = 557$
 $557 - (9 + 4) = 544$
 $544 - (9 + 5) = 530$
 wrong number is 591 which should be replaced with 590

5. (b): Pattern is
 $700 + 10 = 710$
 $710 - 30 = 680$
 $680 + 10 = 690$
 $690 - 30 = 660$
 $660 + 10 = 670$
 $670 - 30 = 640$
 (alternate addition of 10 and subtraction of 30 is followed in the given pattern)
 wrong number is 675 which should be replaced with 680

6. (c): Pattern is
 $11^2 + 11 = 132$
 $12^2 + 12 = 156$
 $13^2 + 13 = 182$
 $14^2 + 14 = 210$
 $15^2 + 15 = 240$
 $16^2 + 16 = 272$
 $17^2 + 17 = 306$
 wrong number is 235 which should be replaced with 240

7. (a): Pattern is

100	148	220	316	436	580	748
	+48	+72	+96	+120	+144	+168
		+24	+24	+24	+24	+24

wrong number is 752 which should be replaced with 748

8. (d): Pattern is
 $12 \times 0.5 = 6$
 $6 \times 1 = 6$
 $6 \times 2 = 12$
 $12 \times 4 = 48$
 $48 \times 8 = 384$
 $384 \times 16 = 6144$
 wrong number is 382 which should be replaced with 384

9. (b): Pattern is
 $140 - 3 = 137$
 $137 - 6 = 131$
 $131 - 9 = 122$
 $122 - 12 = 110$
 $110 - 15 = 95$
 $95 - 18 = 77$
 wrong number is 120 which should be replaced with 122

10. (c): Pattern is
 $16 \times 0.5 + 1 = 9$
 $9 \times 1 + 1 = 10$
 $10 \times 1.5 + 1 = 16$
 $16 \times 2 + 1 = 33$
 $33 \times 2.5 + 1 = 83.5$
 $83.5 \times 3 + 1 = 251.5$
 wrong number is 34 which should be replaced with 33

11. (e): Pattern is
 $5 \times 2 + 3 = 13$
 $13 \times 2 + 3 = 29$
 $29 \times 2 + 3 = 61$
 $61 \times 2 + 3 = 125$
 $125 \times 2 + 3 = 253$
 $253 \times 2 + 3 = 509$
 wrong number is 255 which should be replaced with 253

12. (b): Pattern is
 $7200 \div 6 = 1200$
 $1200 \times 5 = 6000$
 $6000 \div 4 = 1500$
 $1500 \times 3 = 4500$
 $4500 \div 2 = 2250$
 $2250 \times 1 = 2250$
 wrong number is 1800 which should be replaced with 1500

13. (c): Pattern is
 $4000 - 24^2 = 3424$
 $3424 - 20^2 = 3024$
 $3024 - 16^2 = 2768$
 $2768 - 12^2 = 2624$
 $2624 - 8^2 = 2560$
 $2560 - 4^2 = 2544$
 wrong number is 2524 which should be replaced with 2544

14. (a): Pattern is
 $80 \times 0.5 = 40$
 $40 \times 1.5 = 60$
 $60 \times 2.5 = 150$
 $150 \times 3.5 = 525$
 $525 \times 4.5 = 2362.5$

$2362.5 \times 5.5 = 12993.75$
 wrong number is 180 which should be replaced with 150

15. (d): Pattern is
 $3^3 - 3 = 24$
 $4^3 - 4 = 60$
 $5^3 - 5 = 120$
 $6^3 - 6 = 210$
 $7^3 - 7 = 336$
 $8^3 - 8 = 504$
 $9^3 - 9 = 720$
 wrong number is 68 which should be replaced with 60

16. (b): Pattern is
 $10^2 + 10 = 110$
 $12^2 + 12 = 156$
 $14^2 + 14 = 210$
 $16^2 + 16 = 272$
 $18^2 + 18 = 342$
 $20^2 + 20 = 420$
 $22^2 + 22 = 506$
 wrong number is 282 which should be replaced with 272

17. (d): Pattern is
 $2000 \times 1 = 2000$
 $2000 \div 2 = 1000$
 $1000 \times 3 = 3000$
 $3000 \div 4 = 750$
 $750 \times 5 = 3750$
 $3750 \div 6 = 625$
 wrong number is 600 which should be replaced with 750

18. (a): Pattern is
 $2 \times 1 + 0 = 2$
 $2 \times 2 + 1 = 5$
 $5 \times 3 + 2 = 17$
 $17 \times 4 + 3 = 71$
 $71 \times 5 + 4 = 359$
 $359 \times 6 + 5 = 2159$
 wrong number is 72 which should be replaced with 71

19. (e): Pattern is
 $9000 - (180 \times 6) = 7920$
 $7920 - (180 \times 5) = 7020$
 $7020 - (180 \times 4) = 6300$
 $6300 - (180 \times 3) = 5760$
 $5760 - (180 \times 2) = 5400$
 $5400 - (180 \times 1) = 5220$
 wrong number is 5200 which should be replaced with 5220

20. (d): Pattern is

$$100 + (4 \times 5) = 120$$

$$120 + (5 \times 6) = 150$$

$$150 + (6 \times 7) = 192$$

$$192 + (7 \times 8) = 248$$

$$248 + (8 \times 9) = 320$$

$$320 + (9 \times 10) = 410$$

wrong number is 154 which should be replaced with 150

21. (c): Pattern followed is

$$7 \times 0.5 + 0.5 = 4$$

$$4 \times 1 + 1 = 5$$

$$5 \times 1.5 + 1.5 = 9$$

$$9 \times 2 + 2 = 20$$

$$20 \times 2.5 + 2.5 = 52.5$$

$$52.5 \times 3 + 3 = 160.5$$

So, wrong number is 8.5 which should be replaced by 9

22. (d): Pattern followed is

$$160 + 47 = 207$$

$$207 + 53 = 260$$

$$260 + 59 = 319$$

$$319 + 61 = 380$$

$$380 + 67 = 447$$

$$447 + 71 = 518$$

So, wrong number is 449 which should be replaced by 447

23. (c): Pattern followed is

$$12 \times 0.5 = 6$$

$$6 \times 1 = 6$$

$$6 \times 2 = 12$$

$$12 \times 3.5 = 42$$

$$42 \times 5.5 = 231$$

$$231 \times 8 = 1848$$

So, wrong number is 36 which should be replaced by 42

24. (e): Pattern followed is

$$14700 \div 7 = 2100$$

$$2100 \times 6 = 12600$$

$$12600 \div 5 = 2520$$

$$2520 \times 4 = 10080$$

$$10080 \div 3 = 3360$$

$$3360 \times 2 = 6720$$

So, wrong number is 2500 which should be replaced by 2520

25. (c): Pattern followed is

$$(4.5)^2 = 20.25$$

$$(4.8)^2 = 23.04$$

$$(5.1)^2 = 26.01$$

$$(5.4)^2 = 29.16$$

$$(5.7)^2 = 32.49$$

$$(6.0)^2 = 36.00$$

$$(6.3)^2 = 39.69$$

So, wrong number is 32.56 and it should be replaced by 32.49

26. (d):

$$8 \xrightarrow{\times 1.5} 12 \xrightarrow{\times 2} 24 \xrightarrow{\times 2.5} 60 \xrightarrow{\times 3} 180 \xrightarrow{\times 3.5} 630 \xrightarrow{\times 4} 2520$$

So, the wrong no. in this series is 640

27. (a):

$$-1 \xrightarrow{+1} 0 \xrightarrow{\times 2} 2 \xrightarrow{+2} 4 \xrightarrow{\times 2} 8 \xrightarrow{+4} 14 \xrightarrow{\times 2} 30 \xrightarrow{+8} 38 \xrightarrow{\times 2} 76 \xrightarrow{+16} 92 \xrightarrow{\times 2} 184 \xrightarrow{+32} 216$$

So, the wrong no. in this series is 1

28. (c):

$$3 \xrightarrow{+1} 4 \xrightarrow{+8} 12 \xrightarrow{+27} 39 \xrightarrow{+64} 103 \xrightarrow{+125} 228 \xrightarrow{+216} 444$$

$(1)^3 \quad (2)^3 \quad (3)^3 \quad (4)^3 \quad (5)^3 \quad (6)^3$

So, the wrong no. in this series is 41.

29. (b):

$$5 \xrightarrow{\times 0.5 + 0.5} 3 \xrightarrow{\times 1 + 1} 4 \xrightarrow{\times 1.5 + 1.5} 7.5 \xrightarrow{\times 2 + 2} 17 \xrightarrow{\times 2.5 + 2.5} 45 \xrightarrow{\times 3 + 3} 138$$

So, the wrong no. in this series is 7.

30. (d):

$$17 \xrightarrow{+8} 25 \xrightarrow{+13} 38 \xrightarrow{+18} 56 \xrightarrow{+23} 79 \xrightarrow{+28} 107 \xrightarrow{+33} 140$$

$\xrightarrow{+5} \xrightarrow{+5} \xrightarrow{+5} \xrightarrow{+5} \xrightarrow{+5}$

So, the wrong no. in this series is 53.

31. (d): $10^2 + 2 = 102$

$$9^2 + 2 = 83$$

$$8^2 + 2 = 66$$

$$7^2 + 2 = 51$$

$$6^2 + 2 = 38$$

$$5^2 + 2 = 27$$

$$4^2 + 2 = 18$$

Hence, wrong term is 50.

32. (c): $1^2 + 1^3 = 2$

$$2^2 + 2^3 = 12$$

$$3^2 + 3^3 = 36$$

$$4^2 + 4^3 = 80$$

$$5^2 + 5^3 = 150$$

$$6^2 + 6^3 = 252$$

$$7^2 + 7^3 = 392$$

So, wrong number is 251

33. (c): All numbers in the series are prime except 15.

So, wrong term is 15.

34. (a): $11 + 11 = 22$

$$22 + 12 = 34$$

$$34 + 13 = 47$$

$$47 + 14 = 61$$

$$61 + 15 = 76$$

$$76 + 16 = 92$$

So, wrong term is 77

35. (a): $2 \times 2 + 1 = 5$
 $5 \times 2 + 1 = 11$
 $11 \times 2 + 1 = 23$
 $23 \times 2 + 1 = 47$
 $47 \times 2 + 1 = 95$
 $95 \times 2 + 1 = 191$
 So, wrong term is 6.

36. (b): Pattern followed is
 $100 + (14 \times 3) = 142$
 $142 + (14 \times 5) = 212$
 $212 + (14 \times 7) = 310$
 $310 + (14 \times 9) = 436$
 $436 + (14 \times 11) = 590$
 $590 + (14 \times 13) = 772$
 So, wrong number is 595 which should be replaced by 590

37. (d): Pattern followed is
 $72 + (2)^3 = 80$
 $80 + (4)^3 = 144$
 $144 + (6)^3 = 360$
 $360 + (8)^3 = 872$
 $872 + (10)^3 = 1872$
 $1872 + (12)^3 = 3600$
 So, wrong number is 864 which should be replaced by 872

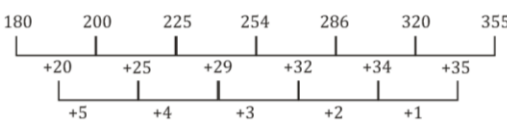
38. (c): Pattern followed is
 $12 \times 1 + 2 = 14$
 $14 \times 2 + 3 = 31$
 $31 \times 3 + 4 = 97$
 $97 \times 4 + 5 = 393$
 $393 \times 5 + 6 = 1971$
 $1971 \times 6 + 7 = 11833$
 So, wrong number is 96 which should be replaced by 97

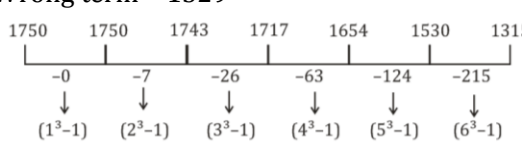
39. (e): Pattern followed is
 $(12)^2 - 12 = 132$
 $(13)^2 - 13 = 156$
 $(14)^2 - 14 = 182$
 $(15)^2 - 15 = 210$
 $(16)^2 - 16 = 240$
 $(17)^2 - 17 = 272$
 $(18)^2 - 18 = 306$
 So, wrong number is 310 which should be replaced by 306

40. (b): Pattern followed is
 $16000 \div 2 = 8000$
 $8000 \times 3 = 24000$
 $24000 \div 4 = 6000$
 $6000 \times 5 = 30000$
 $30000 \div 6 = 5000$
 $5000 \times 7 = 35000$
 So, wrong number is 7500 which should be replaced by 5000

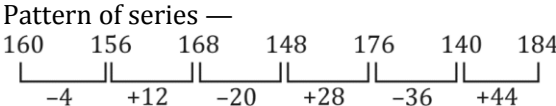
41. (d): Wrong number = 848
 Pattern of series is,
 $3 \times 3 + 1 = 10$
 $10 \times 3 + 1 = 31$
 $31 \times 3 + 1 = 94$
 $94 \times 3 + 1 = 283$
 $283 \times 3 + 1 = 850$
 $850 \times 3 + 1 = 2551$
 So, 850 should be in the place of 848

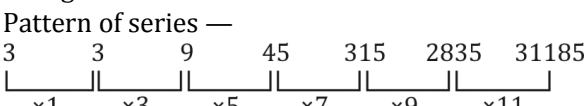
42. (b): Wrong number = 4055
 Pattern of series -
 $8 \times 16 - 1 = 127$
 $127 \times 8 - 1 = 1015$
 $1015 \times 4 - 1 = 4059$
 $4059 \times 2 - 1 = 8117$
 $8117 \times 1 - 1 = 8116$
 $8116 \times 0.5 - 1 = 4057$
 So, 4057 should be in the place of 4055

43. (a): Wrong term = 322

 So, 320 should be in the place of 322

44. (c): Wrong term = 1529

 So, 1530 should be in the place of 1529

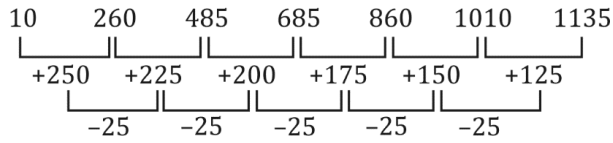
45. (e): Wrong number = 19125
 Pattern of series -
 $5 \times 4 - 1 = 19$
 $19 \times 4 - 1 = 75$
 $75 \times 4 - 1 = 299$
 $299 \times 4 - 1 = 1195$
 $1195 \times 4 - 1 = 4779$
 $4779 \times 4 - 1 = 19115$
 So, should be 19115 in the place of 19125

46. (a): Wrong number = 158
 Pattern of series —

 So, there should be 160 in place of 158.

47. (c): Wrong number = 313
 Pattern of series —

 So, there should be 315 in place of 313.

48. (e): Wrong number = 480

Pattern of series—



So, there should be 485 in place of 480.

59. (b): Wrong number = 400

Pattern of series —

$$229 + 11 = 240$$

$$240 + 17 = 257$$

$$257 + 23 = 280$$

$$280 + 31 = 311$$

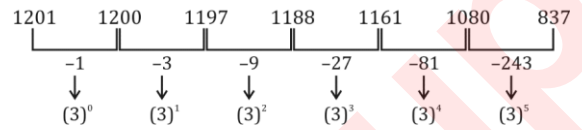
$$311 + 41 = 352$$

$$352 + 47 = 399$$

So, there should be 399 in place of 400. (Alternate prime number)

50. (e): Wrong number = 1082

Pattern of series—



So, there should be 1080 in place of 1082.

Mains Solutions

1. (c): The given series is based on the pattern :

$$30 = 12 \times 6 - 7 \times 6$$

$$120 = 30 \times 5 - 6 \times 5$$

$$460 = 120 \times 4 - 5 \times 4$$

$$1368 = 460 \times 3 - 4 \times 3$$

$$2730 = 1368 \times 2 - 3 \times 2$$

Similarly,

$$(a) = 16 \times 6 - 7 \times 6 = 96 - 42 = 54$$

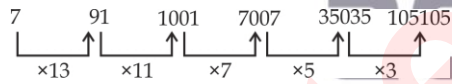
$$(b) = 54 \times 5 - 6 \times 5 = 240$$

$$(c) = 240 \times 4 - 5 \times 4 = 940$$

$$(d) = 940 \times 3 - 4 \times 3 = 2808$$

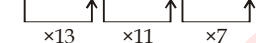
Hence 2808 will be there in place of (d).

2. (b):



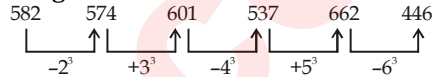
Similarly,

$$14.5 \quad 188.5 \quad 2073.5 \quad 14514.5$$



Hence, 14514.5 will come in place of (c).

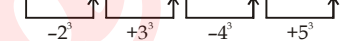
3. (a): The given series is based on the following pattern:



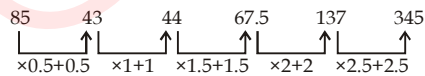
Similarly,

$$(a) \quad (b) \quad (c) \quad (d)$$

$$204 \quad 196 \quad 223 \quad 159 \quad 284$$



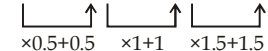
4. (d):



Similarly,

$$(a) \quad (b) \quad (c)$$

$$125 \quad 63 \quad 64 \quad 97.5$$



Hence, 97.5 will come in place of (c).

5. (a): $1 \times 2 + 2 \times 2 = 6$

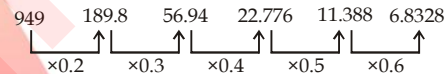
$$6 \times 4 + 4 \times 3 = 36$$

$$36 \times 6 + 6 \times 4 = 240$$

$$240 \times 8 + 8 \times 5 = 1960$$

$$1960 \times 10 + 10 \times 6 = 19660$$

6. (d):



Hence, missing term 56.94

7. (e): $14 \times 3 + 1.5 = 43.5$

$$43.5 \times 6 + 1.5 \times 2 = 264$$

$$264 \times 12 + 1.5 \times 4 = 3174$$

$$3174 \times 24 + 1.5 \times 8 = 76188$$

Hence, missing term is 3174.

8. (c): $41 \times 2^2 = 164$

$$164 \times 4^2 = 2624$$

$$2624 \times 6^2 = 94464$$

$$94464 \times 8^2 = 6045696$$

9. (a): $12 \times 1 = 12$

$$12 \times 1.5 = 18$$

$$18 \times (1 + 1.5) = 18 \times 2.5 = 45$$

$$45 \times (1.5 + 2.5) = 45 \times 4 = 180$$

$$180 \times (4 + 2.5) = 180 \times 6.5 = 1170$$

So, next term is :

$$1170 \times (4 + 6.5) = 12285$$

10. (a): $40280625 \div 55 = 732375$

$$732375 \div 45 = 16275$$

$$16275 \div 35 = 465$$

$$465 \div 25 = 18.6$$

$$18.6 \div 15 = 1.24$$

So, next term = $1.24 \div 5 = 0.248$

So, next term is 0.248

11. (c): $14 \times 1 - 2 = 14 - 2 = 12$
 $12 \times 2 - 3 = 24 - 3 = 21$
 $21 \times 3 - 4 = 63 - 4 = 59$
 $59 \times 4 - 5 = 236 - 5 = 231$
 $231 \times 5 - 6 = 1155 - 6 = 1149$
 So, next term is:
 $1149 \times 6 - 7 = 6894 - 7 = 6887$

12. (b): $12 \times 12 \times 12 = 1728$
 $14 \times 14 \times 14 = 2744$
 $16 \times 16 \times 16 = 4096$
 $18 \times 18 \times 18 = 5832$
 $20 \times 20 \times 20 = 8000$
 $22 \times 22 \times 22 = 10648$
 So, next term $24 \times 24 \times 22 = 13824$

13. (c): $120 \div 8 = 15$
 $15 \div 7 = 105$
 $105 \div 6 = 17.5$
 $17.5 \times 5 = 87.5$
 Next term $87.5 \div 4 = 21.875$

14. (e): So, missing term is 105

15. (e): $529 = 23 \times 23$
 $841 = 29 \times 29$
 $961 = 31 \times 31$
 $1369 = 37 \times 37$
 $1681 = 41 \times 41$
 $1849 = 43 \times 43$
 Next term $47 \times 47 = 2209$
 [The numbers are formed by squaring the prime numbers greater than or equal to 23]

16. (c): $3 \times 7 + 2 \times 7 = 21 + 14 = 35$
 $35 \times 6 + 3 \times 6 = 210 + 18 = 228$
 $228 \times 5 + 4 \times 5 = 1140 + 20 = 1160$
 $1160 \times 4 + 5 \times 4 = 4640 + 20 = 4660$
 $4660 \times 3 + 6 \times 3 = 13980 + 18 = 13998$
 Hence, wrong number is 226

17. (b): $18 \times 7 - 7 = 126 - 7 = 119$
 $119 \times 6 - 6 = 714 - 6 = 708$
 $708 \times 5 - 5 = 3540 - 5 = 3535$
 $3535 \times 4 - 4 = 14140 - 4 = 14136$
 Hence, 3534 is the wrong number

18. (c): $4 \times 1 + 2 = 4 + 2 = 6$
 $6 \times 2 + 3 = 12 + 3 = 1518$
 $15 \times 3 + 4 = 45 + 4 = 49$
 $49 \times 4 + 5 = 196 + 5 = 201$
 $201 \times 5 + 6 = 1005 + 6 = 1011$

19. (a): $2 \times 6 + 7 \times 6 = 12 + 42 = 54$
 $54 \times 5 + 6 \times 5 = 270 + 30 = 300$
 $300 \times 4 + 5 \times 4 = 1200 + 20 = 1220$
 $1220 \times 3 + 4 \times 3 = 3660 + 12 = 3672$
 $3672 \times 2 + 3 \times 2 = 7344 + 6 = 7350$

20. (e): $0 + 5 = 5$
 $5 + 13 = 18$
 $18 + 25 = 43$
 $43 + 41 = 84$
 $84 + 61 = 145$
 Next term = $145 + 85 = 230$

21. (d): $10 \times 1 + 1 \times 7 = 10 + 7 = 17$
 $17 \times 2 + 2 \times 7 = 34 + 14 = 48$
 $48 \times 3 + 3 \times 7 = 144 + 21 = 165$
 $165 \times 4 + 4 \times 7 = 660 + 28 = 688$
 $688 \times 5 + 5 \times 7 = 3440 + 35 = 3475$
 Next term $3475 \times 6 + 6 \times 7 = 20850 + 42 = 20892$

22. (c): $1 \times 3 = 3$
 $3 \times 8 = 24$
 $24 \times 15 = 360$
 $360 \times 24 = 8640$
 $8640 \times 35 = 302400$
 Next term $302400 \times 48 = 14515200$

23. (b): $12 \times 1 + 2 \times 1 = 12 + 2 = 14$
 $14 \times 2 + 2 \times 2 = 28 + 4 = 32$
 $32 \times 3 + 2 \times 3 = 96 + 6 = 102$
 $102 \times 4 + 2 \times 4 = 408 + 8 = 416$
 $416 \times 5 + 2 \times 5 = 2080 + 10 = 2090$
 Next term $2090 \times 6 + 2 \times 6 = 12540 + 12 = 12552$

24. (a): $10 \times \frac{3}{2} = 15$
 $15 \times \frac{4}{4} = 15$
 $15 \times \frac{5}{6} = 12.5$
 $12.5 \times \frac{6}{8} = 9.375$
 $9.375 \times \frac{7}{10} = 6.5625$
 Next term = $6.5625 \times \frac{8}{12} = 4.375$

25. (d): $3 \times 7 + 1 = 21 + 1 = 22$
 $22 \times 6 + 2 = 132 + 2 = 134$
 $134 \times 5 + 3 = 670 + 3 = 673$
 $673 \times 4 + 4 = 2692 + 4 = 2696$
 So, the missing term is 134

26. (a): $6 \times 1 + 1 \times 7 = 6 + 7 = 13$
 $13 \times 2 + 2 \times 6 = 26 + 12 = 38$
 $38 \times 3 + 3 \times 5 = 114 + 15 = 129$
 $129 \times 4 + 4 \times 4 = 516 + 16 = 532$

27. (c): $17 \times 0.5 + 0.5 = 9$
 $9 \times 1 + 1 = 10$
 $10 \times 1.5 + 1.5 = 16.5$
 $16.5 \times 2 + 2 = 35$
 So, the missing term is 10

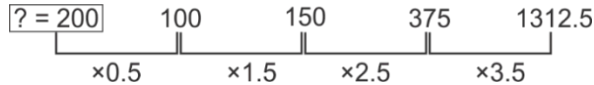
28. (a): $3 \times 1 + 1^2 = 3 + 1 = 4$
 $4 \times 2 + 2^2 = 8 + 4 = 12$
 $12 \times 3 + 3^2 = 36 + 9 = 45$
 $45 \times 4 + 4^2 = 180 + 16 = 196$
 So, missing term is 45

29. (b): $16 \times 0.5 = 8, 8 \times 1.5 = 12$
 $12 \times 2.5 = 30, 30 \times 3.5 = 105$

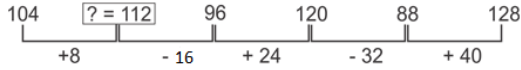
30. (a): $7 \times 1 + 1 \times 5 = 12$
 $12 \times 2 + 2 \times 4 = 32$
 $32 \times 3 + 3 \times 3 = 105$
 $105 \times 4 + 4 \times 2 = 428$
 So, the next term is 428.

Previous Year Question

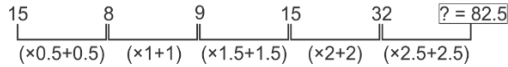
1. (b): Pattern of series -



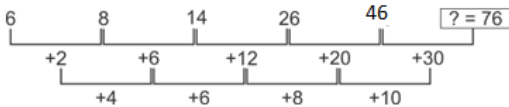
2. (a): Pattern of series -



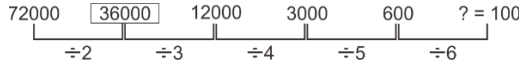
3. (d): Pattern of series -



4. (e): Pattern of series -



5. (e): Pattern of series -



6. (a): Pattern of series -

$? = 9.8 + 0.9 = 10.7$
 $10.7 - 1.8 = 8.9$
 $8.9 + 2.7 = 11.6$
 $11.6 - 3.6 = 8$
 $8 + 4.5 = 12.5$

7. (e): Pattern of series -

$400 - (5^3 + 1) = 274$
 $274 - (4^3 + 1) = 209$
 $209 - (3^3 + 1) = 181$
 $181 - (2^3 + 1) = 172$
 $? = 172 - (1^3 + 1) = 170$

8. (b): Pattern of series -

$1 \times 1 = 1$
 $? = 1 \times 3 = 3$
 $3 \times 5 = 15$
 $15 \times 7 = 105$
 $105 \times 9 = 945$

9. (c): Pattern of series -

$12 \times 0.5 = 6$
 $6 \times 1 = 6$
 $6 \times 1.5 = 9$
 $9 \times 2 = 18$
 $18 \times 2.5 = 45$

10. (b): Pattern of series -

$34 \div 2 + 1 = 18$
 $18 \div 2 + 1 = 10$
 $10 \div 2 + 1 = 6$
 $? = 6 \div 2 + 1 = 4$
 $4 \div 2 + 1 = 3$

11. (e): Missing number = 5760

Pattern of series -
 $1.5 \times 2 = 3$
 $3 \times 4 = 12$
 $12 \times 6 = 72$
 $72 \times 8 = 576$
 $576 \times 10 = 5760$

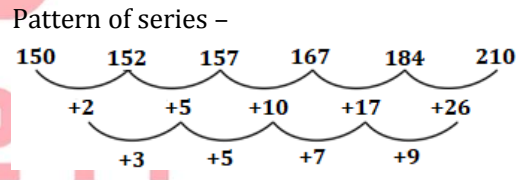
12. (b): Missing number = 56

Pattern of series -
 $80 - 14 = 66$
 $66 + 19 = 85$
 $85 - 24 = 61$
 $61 + 29 = 90$
 $90 - 34 = 56$

13. (b): Missing number = 83

Pattern of series -
 $163 - 80 = 83$
 $83 - 40 = 43$
 $43 - 20 = 23$
 $23 - 10 = 13$
 $13 - 5 = 8$

14. (d): Missing number = 210



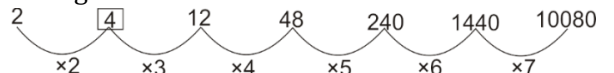
15. (a): Missing number = 95

Pattern of series -
 $3.5 \times 1 - 1 = 2.5$
 $2.5 \times 2 - 2 = 3$
 $3 \times 3 - 3 = 6$
 $6 \times 4 - 4 = 20$
 $20 \times 5 - 5 = 95$

16. (b): Missing number = 2100

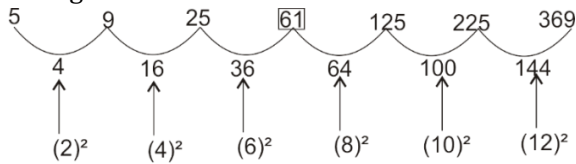
Pattern of series -
 $? = 6300 \div 3 = 2100$
 $2100 \div 4 = 525$
 $525 \div 5 = 105$
 $105 \div 6 = 17.5$
 $17.5 \div 7 = 2.5$

17. (b): Wrong number = 6



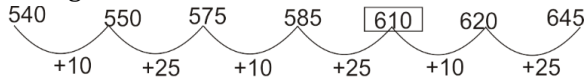
There should be 4 in place of 6.

18. (d): Wrong number = 59



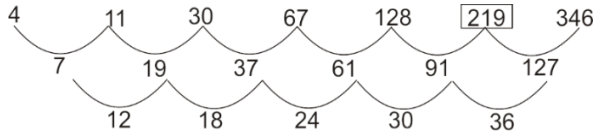
There should be 61 in place of 59.

19. (a): Wrong number = 608



There should be 610 in place of 608.

20. (c): Wrong number = 221



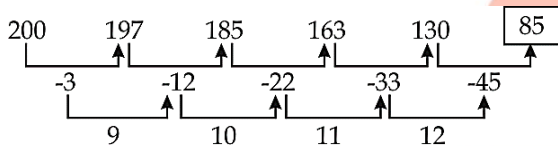
There should be 219 in place of 221

21. (d): Wrong number = 155



There should be 154 in place of 155.

22. (b):



23. (d): The pattern is $-15 \times 0.5 + 0.5 = 8$

$$8 \times 1 + 1 = 9$$

$$9 \times 1.5 + 1.5 = 15$$

$$15 \times 2 + 2 = 32$$

$$32 \times 2.5 + 2.5 = 82.5$$

24. (d): The pattern is $\times 6, \times 5, \times 4, \times 3, \times 2, \dots$

$$\therefore ? = 600 \times 3 = 1800$$

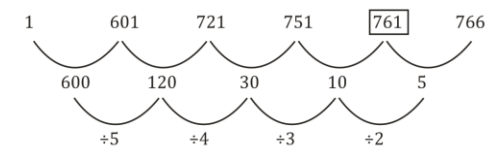
25. (b): The pattern is: $\times 0.5 - 1, \times 0.5 - 1, \times 0.5 - 1, \times 0.5 - 1, \dots$

$$? = 26 \times 0.5 - 1 = 12$$

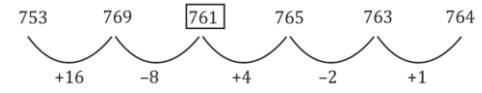
26. (a): The pattern is: $+ 8, - 16, + 24, - 32, + 40$

$$? = 104 + 8 = 112$$

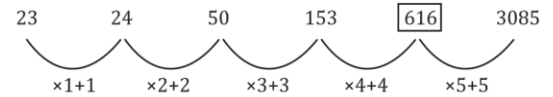
27. (d):



$$x = 761$$



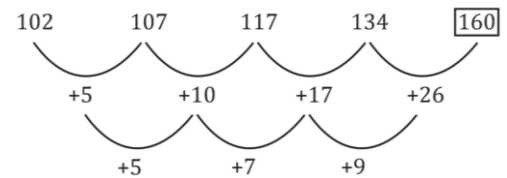
$$y = 761$$



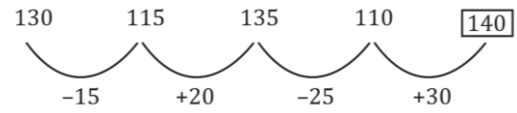
$$z = 616$$

$$\therefore x = y > z.$$

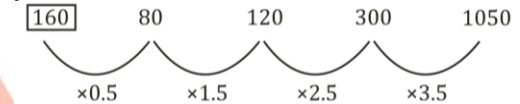
28. (b):



$$x = 160$$



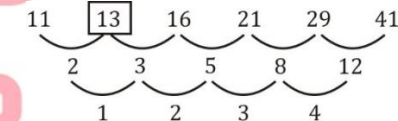
$$y = 140$$



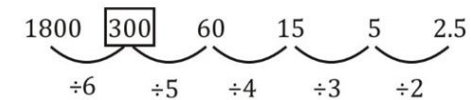
$$z = 160$$

$$\therefore x = z > y$$

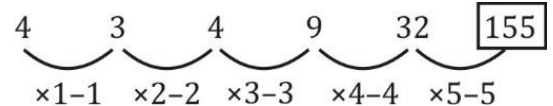
29. (d):



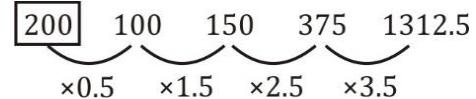
30. (a):



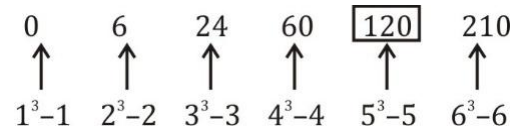
31. (b):



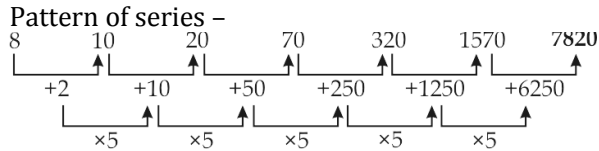
32. (e):



33. (d):



34. (a): Wrong number = 7830



So, there should be 7820 in place of 7830.

35. (b): Here, the pattern followed is

$$18 \times 1 + 2 = 20$$

$$20 \times 2 + 3 = 43$$

$$43 \times 3 + 4 = 133$$

$$133 \times 4 + 5 = 537$$

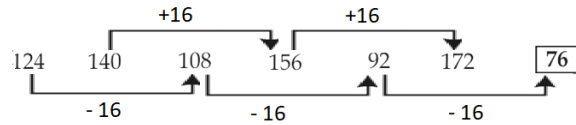
$$537 \times 5 + 6 = 2691$$

$$2691 \times 6 + 7 = 16153$$

So, wrong number is 16163 which should be replaced by 16153

36. (c): Wrong number = 78

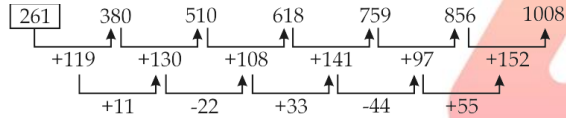
Pattern of series -



So, there should be 76 in place of 78.

37. (c): Wrong number = 260

Pattern of series -



So, there should be 261 in place of 260.

38. (e): Wrong number = 2515

Pattern of series -

$$267 + 343 = 610$$

$$343 + 610 = 953$$

$$610 + 953 = 1563$$

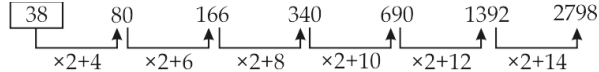
$$953 + 1563 = 2516$$

$$1563 + 2516 = 4079$$

So, there should be 2516 in place of 2515.

39. (b): Wrong number = 36

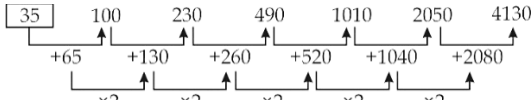
Pattern of series -



So, there should be 38 in place of 36.

40. (a): Wrong number = 30

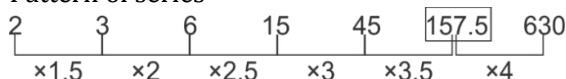
Pattern of series -



So, there should be 35 in place of 30.

41. (d): Wrong number = 156.5

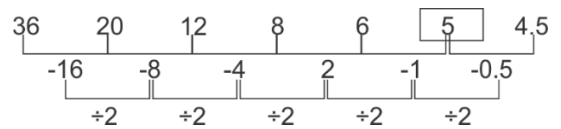
Pattern of series-



So, there should be 157.5 in place of 156.5.

42. (c): Wrong number = 5.5

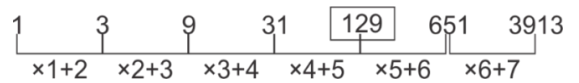
Pattern of series-



So, there should be 5 in place of 5.5

43. (e): Wrong number = 128

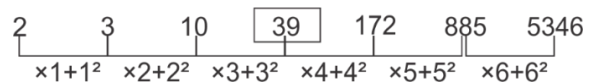
Pattern of series -



So, there should be 129 in place of 128

44. (a): Wrong number = 40

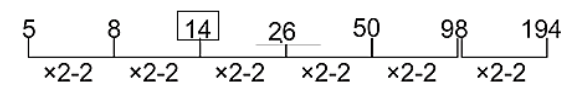
Pattern of series -



So, there should be 39 in place of 40.

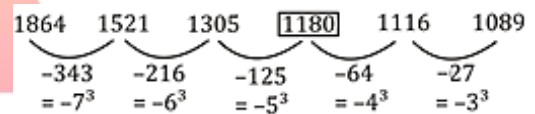
45. (d): Wrong number = 16

Pattern of series -



So, there should be 14 in place of 16.

46. (b):



47. (b): 18, ?, 9, 18, 72, 576

$$18 \times 0.5 = 9$$

$$9 \times 1 = 9$$

$$9 \times 2 = 18$$

$$18 \times 4 = 72$$

$$72 \times 8 = 576$$

48. (d): $12 \times 0.5 + 0.5 = 6.5$

$$6.5 \times 1 + 1 = 7.5$$

$$7.5 \times 1.5 + 1.5 = 12.75$$

$$12.75 \times 2 + 2 = 27.5$$

$$27.5 \times 2.5 + 2.5 = 71.25$$

49. (b): $5 \times 2 + 5 = 15$

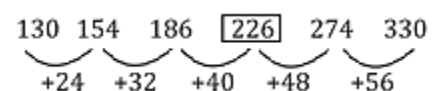
$$15 \times 3 + 5 = 50$$

$$50 \times 4 + 5 = 205$$

$$205 \times 5 + 5 = 1030$$

$$1030 \times 6 + 5 = 6185$$

50. (d):



51. (a): Here, the pattern followed is

$$\begin{aligned} 300 + (3^3 - 3) &= 324 \\ 324 + (4^3 - 4) &= 384 \\ 384 + (5^3 - 5) &= 504 \\ 504 + (6^3 - 6) &= 714 = P \\ 714 + (7^3 - 7) &= 1050 \end{aligned}$$

The next two series given follows the same pattern as above series

And according to that pattern, the value of Q and R are 534 and 614 respectively

Here, $P > Q < R$

52. (c): Here, the pattern followed is

$$\begin{aligned} 2700 \times 2 &= 5400 \\ 5400 \div 3 &= 1800 = P \\ 1800 \times 4 &= 7200 \\ 7200 \div 5 &= 1440 \\ 1440 \times 6 &= 8640 \end{aligned}$$

The given next two series follows the same pattern as above series

And according to that pattern, the value of Q and R are 4200 and 4000 respectively

Here, $P < Q < R$

53. (d): Here, the pattern followed is

$$\begin{aligned} 35 \times 2 &= 70 \\ 70 \times 3 &= 210 \\ 210 \times 4 &= 840 = P \\ 840 \times 5 &= 4200 \\ 4200 \times 6 &= 25200 \end{aligned}$$

The next two series follows the same pattern as above series

And according to that pattern, the value of Q and R are 840 and 960 respectively

Here, $P = Q < R$

54. (c): Here, the pattern followed is

$$\begin{aligned} (7 \times 2) + 1 &= 15 \\ (15 \times 3) + 2 &= 47 \\ (47 \times 4) + 3 &= 191 \\ (191 \times 5) + 4 &= 959 = Q \\ (959 \times 6) + 5 &= 5759 \end{aligned}$$

The next two series follows the same pattern as above series

And according to that pattern, the value of P and R are 239 and 1439 respectively

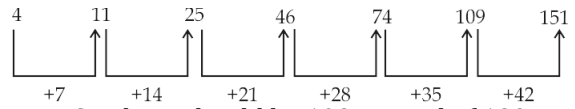
Here, $P < Q < R$

55. (b): The wrong no. is 328

$$\begin{aligned} 1 \times 1 + 1 &= 2 \\ 2 \times 2 + 1 &= 5 \\ 5 \times 3 + 1 &= 16 \\ 16 \times 4 + 1 &= 65 \\ 65 \times 5 + 1 &= 326 \\ 326 \times 6 + 1 &= 1957 \end{aligned}$$

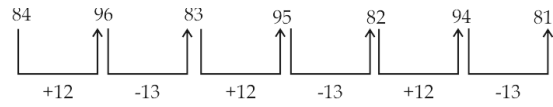
So, there should be 326 instead of 328

56. (a): The wrong no is 129



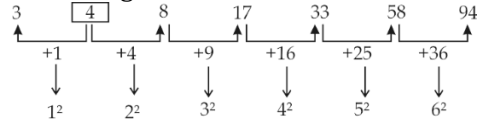
So, there should be 109 instead of 129

57. (d): The wrong no. is 80



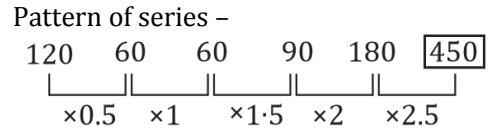
So, there should be 82 instead of 80

58. (e): The wrong no. is 5

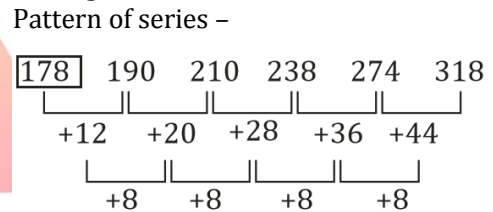


So, there should be 4 instead of 5.

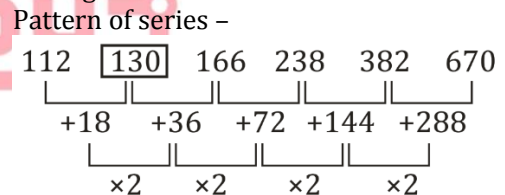
59. (b): Missing number = 450



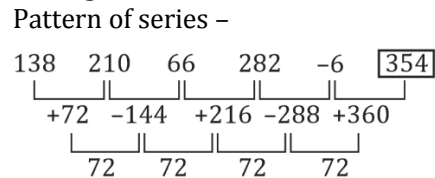
60. (d): Missing number = 178



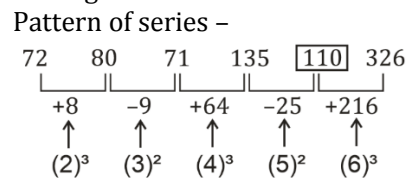
61. (e): Missing number = 130



62. (a): Missing number = 354



63. (b): Missing number = 110



As we know, if we use the short method, in these types of questions it takes very little time to solve in the examination. So let us understand the concept.

Quadratic equation: It is a second order polynomial equation with a single variable.

Example: $ax^2 + bx + c = 0$

There will be two values of x which satisfy the given equation.

Sign Method: Now from the exam's point of view, we can conclude the signs of the roots from the signs of the coefficients.

Case I: If $b = +ve$, $c = +ve$

Example: $ax^2 + bx + c = 0$, $x_1 = -ve$, $x_2 = -ve$

Case II: If $b = -ve$, $c = -ve$,

then one root will be positive(+) (bigger number) and other root will be negative(-) (smaller number)

Example: $ax^2 - bx - c = 0$, $x_1 = +ve$, $x_2 = -ve$

Case III: If $b = +ve$, $c = -ve$

then one root will be $-ve$ (bigger number)
and other root will be $+ve$ (smaller number)

Example: $ax^2 + bx - c = 0$, $x_1 = -ve$, $x_2 = +ve$

Case IV: If $b = -ve$, $c = +ve$

$ax^2 - bx + c = 0$

$x_1 = +ve$, $x_2 = +ve$

x's co-efficient (b)	Constant (c)	x_1	x_2
+	+	-	-
+	-	-	+
-	+	+	+
-	-	+	-

When we see the equation then we can conclude the signs of the roots, so we can find the relation between x and y . Now we have the signs of the roots of equation and if we remember the table then we can conclude it within 5 seconds. Now come to the second part:

Suppose we have the equation:

$$x^2 - 5x + 6 = 0$$

From the table we can conclude that both the roots of the equation will be $+ve$.

Now we have to break the constant (6) such that their sum will be 5.

$$6 = 3 \times 2 \quad \text{also, } (3 + 2 = 5)$$

$$\therefore x_1 = +3, x_2 = +2$$

Now if there is a value attached to the x 's co-efficient, then we have to divide the value to get the roots.

Sol.

$$2x^2 - 11x + 15 = 0$$

$$\begin{array}{ccc} \downarrow & & \downarrow \\ 2 & & 3 \times 5 \\ \downarrow & & \downarrow \\ \text{---} & & \downarrow \\ & & 6 + 5 = 11 \end{array}$$

$$\therefore x_1 = +\frac{6}{2} = +3, x_2 = +\frac{5}{2} = +2.5$$

Solved Example

Direction (1 - 14): Two equations (I) and (II) are given in each question. On the basis of these equations you have to decide the relation between x and y and give answer.

- (a) if $x > y$ (b) if $x < y$
 (c) if $x \geq y$ (d) if $x \leq y$
 (e) if $x = y$ or no relation can be established between 'x' and 'y'.

1. I. $x^2 - 3x + 6 = 0$ II. $3y^2 + 13y + 12 = 0$

Sol. (a): We even don't have to calculate the values.

Here signs of roots of first quadratic equation $(x_1, x_2) = +ve$
 and signs of roots of second quadratic equation $(y_1, y_2) = -ve$
 $\therefore x > y$ (Always)

2. I. $5x^2 + 3x - 14 = 0$ II. $10y^2 - 3y - 27 = 0$

Sol. (e): Here $x_1 = -ve$ $x_2 = +ve$

$y_1 = +ve, y_2 = -ve$

Now we can't establish the relation between x and y.

Note: Above two types of questions can be solved without calculation. So if in the exam we have any of these cases then we can simply conclude the relation by the sign method.

3. I. $x^2 + 5x + 6 = 0$ II. $y^2 + 3y + 2 = 0$

Sol. (d): $x^2 + 5x + 6 = 0$

$\hookrightarrow 3 \times 2$ and, $3 + 2 = 5$

$\therefore x_1 = -3, x_2 = -2$

$y^2 + 3y + 2$

$\hookrightarrow 2 \times 1$ and, $2 + 1 = 3$

$\therefore y_1 = -2, y_2 = -1$

$\therefore x \leq y$

4. I. $2x^2 + 3x + 1 = 0$ II. $12y^2 + 7y + 1 = 0$

Sol. (b): $2x^2 + 3x + 1 = 0$

$\hookrightarrow 2 \times 1$ and, $2 + 1 = 3$

$\therefore x_1 = -\frac{2}{2} = -1, x_2 = -\frac{1}{2} = -0.5$

Now, $12y^2 + 7y + 1 = 0$

$\hookrightarrow 12 = 4 \times 3$ and, $4 + 3 = 7$

$\therefore y_1 = -\frac{4}{12} = -\frac{1}{3} = -0.33, y_2 = -\frac{3}{12} = -\frac{1}{4} = -0.25$

$\therefore y > x$

5. I. $2x^2 + 23x + 63 = 0$ II. $4y^2 + 19y + 21 = 0$

Sol. (b): I. $2x^2 + 23x + 63 = 0$

$\begin{array}{l} \diagdown \quad \diagup \\ 2 \quad 63 \\ 2 \times 1 \quad 9 \times 7 \end{array}$

also, $14 + 9 = 23$

$\therefore x_1 = -\frac{14}{2} = -7, x_2 = -\frac{9}{2} = -4.5$

II. $4y^2 + 19y + 21 = 0$

$\begin{array}{l} \diagdown \quad \diagup \\ 4 \quad 21 \\ 2 \times 2 \quad 7 \times 3 \end{array}$

also, $12 + 7 = 19$

$\therefore y_1 = -\frac{12}{4} = -3, y_2 = -\frac{7}{4} = -1.75$

$\therefore x < y$

6. I. $4x^2 - 29x + 45 = 0$ II. $3y^2 - 19y + 28 = 0$

Sol. (e): I. $4x^2 - 29x + 45 = 0$

$\begin{array}{l} \diagdown \quad \diagup \\ 4 \quad 45 \\ 2 \times 2 \quad 9 \times 5 \end{array}$

also, $20 + 9 = 29$

$\therefore x_1 = +\frac{20}{4} = +5, x_2 = +\frac{9}{4} = +2.25$

II. $3y^2 - 19y + 28 = 0$

$\begin{array}{l} \diagdown \quad \diagup \\ 3 \quad 28 \\ 3 \times 1 \quad 7 \times 4 \end{array}$

also, $12 + 7 = 19$

$\therefore y_1 = +\frac{12}{3} = 4, y_2 = +\frac{7}{3} = 2.33$

\therefore No relationship can be established

7. I. $2x^2 - 13x + 21 = 0$ II. $5y^2 - 22y + 21 = 0$

Sol. (c): I. $2x^2 - 13x + 21 = 0$

$\begin{array}{l} \diagdown \quad \diagup \\ 2 \quad 21 \\ 2 \times 1 \quad 7 \times 3 \end{array}$

also, $6 + 7 = 13$

$x_1 = +\frac{6}{2} = 3, x_2 = +\frac{7}{2} = 3.5$

II. $5y^2 - 22y + 21 = 0$

$\begin{array}{l} \diagdown \quad \diagup \\ 5 \quad 21 \\ 5 \times 1 \quad 7 \times 3 \end{array}$

also, $15 + 7 = 22$

$\therefore y_1 = +\frac{15}{5} = 3, y_2 = +\frac{7}{5} = 1.4$

$x \geq y$

8. I. $12x^2 + 11x - 56 = 0$ II. $4y^2 - 15y + 14 = 0$

Sol. (d): I. $12x^2 + 11x - 56 = 0$

$$\begin{array}{cc} \diagdown & \diagup \\ 12 & 56 \\ 4 \times 3 & 8 \times 7 \end{array}$$

also, $32 - 21 = 11$

$\therefore x_1 = -\frac{32}{12} = -2.67, x_2 = +\frac{21}{12} = 1.75$

II. $4y^2 - 15y + 14 = 0$

$$\begin{array}{cc} \diagdown & \diagup \\ 4 & 14 \\ 2 \times 2 & 7 \times 2 \end{array}$$

also, $8 + 7 = 15$

$\therefore y_1 = +\frac{8}{4} = 2, y_2 = +\frac{7}{4} = 1.75; x \leq y$

9. I. $7x - 3y = 13$ II. $5x + 4y = 40$

Sol. (b): equation (I) $\times 4$ + equation (II) $\times 3$

$$28x - 12y = 52$$

$$15x + 12y = 120$$

$$\hline 43x = 172 \Rightarrow x = 4$$

\therefore put it in equation (I)

$$4 \times 7 - 3y = 13 \Rightarrow 3y = 15 \Rightarrow y = 5$$

$\therefore x < y$

10. I. $\sqrt{1225x} + \sqrt{4900} = 0$ II. $(81)^{\frac{1}{4}}y + (343)^{\frac{1}{3}} = 0$

Sol. (a): I. $35x + 70 = 0 \Rightarrow x = -\frac{70}{35} = -2$

II. $3y + 7 = 0 \Rightarrow y = -\frac{7}{3} = -2.33$

$\therefore x > y$

11. I. $\frac{18}{x^2} + \frac{6}{x} - \frac{12}{x^2} = \frac{8}{x^2}$

II. $y^3 + 9.68 + 5.64 = 16.95$

Sol. (b): I. $18 + 6x - 12 = 8$

$$6x = 2 \Rightarrow x = \frac{1}{3} \Rightarrow x = 0.33$$

II. $y^3 = 1.63 \Rightarrow y > 1$

$\therefore y > x$

12. I. $x = \sqrt[3]{2197}$

II. $y^2 = 169$

Sol. (c): I. $x = 13$

II. $y^2 = 169 \Rightarrow y = \pm 13$

$\therefore x \geq y$

13. I. $x = \sqrt{2304}$

II. $y^2 = 2304$

Sol. (c): I. $x = \sqrt{2304}$

$\therefore x = 48$ (don't consider -48 as value of x)

II. $y^2 = 2304 \Rightarrow y = \pm 48$

$\therefore x \geq y$

14. I. $\frac{15}{\sqrt{x}} - \frac{9}{\sqrt{x}} = (x)^{\frac{1}{2}}$

II. $y^{10} - (36)^5 = 0$

Sol. (e): I. $\frac{6}{\sqrt{x}} = \sqrt{x} \Rightarrow x = 6$

II. $y^{10} = (36)^5 \Rightarrow y^{10} = (6^2)^5 \Rightarrow y^{10} = 6^{10}$

$\therefore y = 6$

$\therefore x = y$

15. I. $7x^2 + 16x - 15 = 0$

II. $y^2 - 6y - 7 = 0$

Sol. (e): I. $x_1 = -ve, x_2 = +ve$ II. $y_1 = +ve, y_2 = -ve$

\therefore Relation can't be established

Basic Questions

Direction (1-15): In each of these questions, two equations (I) and (II) are given. You have to solve both the equations and give answer

(a) if $x > y$ (b) if $x < y$

(c) if $x \geq y$ (d) if $x \leq y$

(e) if $x = y$ or relationship between x and y cannot be established.

1. I. $x^2 + 5x + 6 = 0$ II. $y^2 + 7y + 12 = 0$

2. I. $x^2 + 20 = 9x$ II. $y^2 + 42 = 13y$

3. I. $12x + 3y = 14$ II. $4x + 2y = 16$

4. I. $x = \sqrt{625}$ II. $y = \sqrt{676}$

5. I. $x^2 + 4x + 4 = 0$ II. $y^2 - 8y + 16 = 0$

6. I. $x^2 - 19x + 84 = 0$ II. $y^2 - 25y + 156 = 0$

7. I. $x^3 - 468 = 1729$ II. $y^2 - 1733 + 1564 = 0$

8. I. $\frac{9}{\sqrt{x}} + \frac{19}{\sqrt{x}} = \sqrt{x}$ II. $y^5 - \frac{(2 \times 14)^{\frac{11}{2}}}{\sqrt{y}} = 0$

9. I. $\sqrt{784x} + 1234 = 1486$

II. $\sqrt{1089y} + 2081 = 2345$

10. I. $\frac{12}{\sqrt{x}} - \frac{23}{\sqrt{x}} = 5\sqrt{x}$ II. $\frac{\sqrt{y}}{12} - \frac{5\sqrt{y}}{12} = \frac{1}{\sqrt{y}}$

11. I. $6x^2 - 49x + 99 = 0$ II. $5y^2 + 17y + 14 = 0$

12. I. $x = (1331)^{\frac{1}{3}}$ II. $2y^2 - 17y + 36 = 0$

13. I. $2x^2 + 3x + 1 = 0$ II. $12y^2 + 7y + 1 = 0$

14. I. $7x - 3y = 13$ II. $5x + 4y = 40$

15. I. $2x + 5y = 6$ II. $5x + 11y = 9$

Prelims Questions

Level - 1

Directions (1-5):- In each of the following questions, two equations (I) and (II) are given. Solve the equations and mark the correct option:

- (a) if $x > y$ (b) if $x \geq y$
 (c) if $x < y$ (d) if $x \leq y$
 (e) if $x = y$ or no relation can be established between x and y .

1. I. $x^2 + 5x + 6 = 0$ II. $y^2 + 9y + 14 = 0$
 2. I. $x^2 - 18x + 45 = 0$ II. $y^2 + 12y - 45 = 0$
 3. I. $9x^2 + 11x + 2 = 0$ II. $8y^2 + 6y + 1 = 0$
 4. I. $6x^2 + 5x + 1 = 0$
 II. $4y^2 - 15y = 4$
 5. I. $x^2 + 3x = 0$ II. $x^2 + y = 10$

Directions (6-10):- In each of the following questions, two equations (I) and (II) are given. Solve the equations and mark the correct option:

- (a) if $x > y$ (b) if $x \geq y$
 (c) if $x < y$ (d) if $x \leq y$
 (e) if $x = y$ or no relation can be established between x and y .

6. I. $x^2 - 25x + 156 = 0$
 II. $y^2 - 29y + 210 = 0$
 7. I. $x^2 = 196$ II. $y = \sqrt{196}$
 8. I. $x^2 + 12x + 35 = 0$
 II. $y^2 + 14y + 48 = 0$
 9. I. $3x^2 + 23x + 30 = 0$
 II. $y^2 + 15y + 56 = 0$
 10. I. $x^2 + 17x + 72 = 0$
 II. $y^2 + 13y + 42 = 0$

Directions (11-15):- In each of the following questions, two equations (I) and (II) are given. Solve the equations and mark the correct option:

- (a) if $x > y$ (b) if $x \geq y$
 (c) if $x < y$ (d) if $x \leq y$
 (e) if $x = y$ or no relation can be established between x and y .

11. I. $x^2 + 17x + 72 = 0$
 II. $y^2 + 11y + 30 = 0$
 12. I. $3x^2 - 23x + 40 = 0$
 II. $5y^2 - 17y + 14 = 0$
 13. I. $x^2 - 26x + 168 = 0$
 II. $y^2 - 29y + 208 = 0$
 14. I. $x^3 + 340 = 2537$ II. $y^2 + 23 = 192$

15. I. $x^2 + 48x + 575 = 0$
 II. $y^2 + 44y + 483 = 0$

Directions (16-20):- In each of the following questions, two equations (I) and (II) are given. Solve the equations and mark the correct option:

- (a) if $x > y$ (b) if $x \geq y$
 (c) if $x < y$ (d) if $x \leq y$
 (e) if $x = y$ or no relation can be established between x and y .

16. I. $x^2 + 23x + 132 = 0$
 II. $y^2 + 21y + 110 = 0$
 17. I. $3x^2 + 20x + 32 = 0$
 II. $5y^2 + 23y + 24 = 0$
 18. I. $x^2 - 29x + 208 = 0$
 II. $y^2 - 21y + 108 = 0$
 19. I. $x^2 + 30x + 224 = 0$
 II. $y^2 + 35y + 306 = 0$
 20. I. $x = \sqrt[3]{4096}$ II. $y^2 = 256$

Directions (21-25): In each of these questions, two equations (I) and (II) are given. Solve the equations and mark the correct option:

21. I. $2x^2 + 10x + 12 = 0$ II. $y^2 + 10x + 25 = 0$
 (a) $x > y$ (b) $x \geq y$
 (c) $x < y$ (d) $x \leq y$
 (e) $x = y$ or relation can't be established.
 22. I. $x^2 - 5x + 6 = 0$ II. $y^2 + 7y + 6 = 0$
 (a) $x > y$ (b) $x \geq y$
 (c) $x < y$ (d) $x \leq y$
 (e) $x = y$ or relation can't be established.
 23. I. $x^2 = 625$ II. $y = \sqrt{625}$
 (a) $x > y$ (b) $x \geq y$
 (c) $x < y$ (d) $x \leq y$
 (e) $x = y$ or relation can't be established.
 24. I. $2x - 3y = 0$ II. $4x - 2y = 16$
 (a) $x > y$ (b) $x \geq y$
 (c) $x < y$ (d) $x \leq y$
 (e) $x = y$ or relation can't be established.

25. I. $x^3 = 1331$ II. $y = \sqrt[3]{1331}$
 (a) $x > y$ (b) $x \geq y$
 (c) $x < y$ (d) $x \leq y$
 (e) $x = y$ or relation can't be established.

Directions (26-30):- In each of the following questions, two equations (I) and (II) are given. Solve the equations and mark the correct option:

- (a) if $x > y$ (b) if $x \geq y$
 (c) if $x < y$ (d) if $x \leq y$
 (e) if $x = y$ or no relation can be established between x and y .

26. I. $x^2 + 21x + 108 = 0$
 II. $y^2 + 24y + 143 = 0$

27. I. $x^2 = 289$
 II. $y = \sqrt{289}$

28. I. $x^2 - 25x + 156 = 0$
 II. $y^2 - 32y + 255 = 0$

29. I. $x^2 + 23x + 130 = 0$
 II. $y^2 + 30y + 224 = 0$

30. I. $x^2 - 28x + 195 = 0$
 II. $y^2 - 22y + 117 = 0$

Directions (31-35):- In each of the following questions, two equations (I) and (II) are given. Solve the equations and mark the correct option:

- (a) if $x > y$ (b) if $x \geq y$
 (c) if $x < y$ (d) if $x \leq y$
 (e) if $x = y$ or no relation can be established between x and y .

31. I. $6x^2 + 5x + 1 = 0$
 II. $2y^2 + 5y + 3 = 0$

32. I. $x^2 = 4$
 II. $y^5 = 32$

33. I. $x^2 - 11x + 30 = 0$
 II. $y^2 - 15y + 56 = 0$

34. I. $3x^2 - 14x + 15 = 0$
 II. $5y^2 - 14y + 8 = 0$

35. I. $x^2 + 13x + 42 = 0$
 II. $y^2 + 16y + 63 = 0$

Directions (36-40):- In each of the following questions, two equations (I) and (II) are given. Solve the equations and mark the correct option:

- (a) if $x > y$ (b) if $x \geq y$
 (c) if $x < y$ (d) if $x \leq y$
 (e) if $x = y$ or no relation can be established between x and y .

36. I. $x^2 - 31x + 238 = 0$

II. $y^2 - 37y + 342 = 0$

37. I. $x^2 + 215 = 1176$

II. $y = \sqrt{961}$

38. I. $x^2 + 18x + 77 = 0$

II. $y^2 + 22y + 117 = 0$

39. I. $3x^2 + 25x + 50 = 0$

II. $4y^2 + 23y + 33 = 0$

40. I. $2x^2 + 17x + 36 = 0$

II. $3y^2 + 20y + 32 = 0$

Directions (41-45):- Each of the following questions is provided with 2 statements i.e. Statement I & Statement II. You have to solve them and mark the correct option.

- (a) $x > y$ (b) $x < y$
 (c) $x \leq y$ (d) $x \geq y$
 (e) $x = y$ or no relation can be established.

41. I. $x^2 + 8x + 12 = 0$

II. $2y^2 + 14y + 24 = 0$

42. I. $x^2 - x - 30 = 0$

II. $y^2 - 15y + 56 = 0$

43. I. $x^2 + 31x + 150 = 0$

II. $y^2 + 54y + 728 = 0$

44. I. $x^2 = 256$

II. $y = \sqrt{256}$

45. I. $x^2 - 45x + 506 = 0$

II. $y^2 - 9y - 360 = 0$

Directions (46-50):- In each of the following questions, two equations (I) and (II) are given. Solve the equations and mark the correct option:

- (a) if $x > y$ (b) if $x \geq y$
 (c) if $x < y$ (d) if $x \leq y$
 (e) if $x = y$ or no relation can be established between x and y .

46. I. $x^2 - 21x + 110 = 0$

II. $y^2 - 25y + 156 = 0$

47. I. $x^2 + 29x + 208 = 0$

II. $y^2 + 35y + 306 = 0$

48. I. $x = \sqrt[3]{4096}$

II. $y^2 + 121 = 377$

49. I. $3x^2 + 23x + 44 = 0$

II. $4y^2 + 33y + 65 = 0$

50. I. $x^2 + 41x + 418 = 0$

II. $y^2 + 47y + 550 = 0$

Level - 2

Directions (1-5): In each question two equations numbered I. and II. are given. You have to solve both the equations and mark appropriate answer.

- (a) If $x < y$ (b) If $x > y$
 (c) If $x \geq y$ (d) If $x \leq y$
 (e) If $x = y$ or no relation can be established.

1. I. $2x^2 - 17x + 36 = 0$ II. $3y^2 - 22y + 40 = 0$
 2. I. $x^2 + 21x + 108 = 0$ II. $y^2 + 14y + 48 = 0$
 3. I. $2x^2 + 7x - 60 = 0$ II. $3y^2 - 28y + 64 = 0$
 4. I. $x^2 - 2x - 24 = 0$ II. $y^2 + 3y - 40 = 0$
 5. I. $4x^2 + 27x + 45 = 0$ II. $5y^2 + 42y + 88 = 0$

Directions (6-10): In each of these questions, two equations I. and II. are given. You have to solve both the equations and answer the following questions.

6. I. $x^3 = 2744$ II. $y^2 = 324$
 (a) $x = y$ or no relation. (b) $x < y$
 (c) $x \leq y$ (d) $x > y$
 (e) $x \geq y$
 7. I. $(5x - 7)^2 = 4 - x(3x - 1)$
 II. $(4y - 3)^2 = y(4y - 1) - 1$
 (a) $x = y$ or no relation. (b) $x < y$
 (c) $x \leq y$ (d) $x > y$
 (e) $x \geq y$
 8. I. $10x^2 - 29x + 21 = 0$
 II. $2y^2 - 19y + 45 = 0$
 (a) $x = y$ or no relation. (b) $x < y$
 (c) $x \leq y$ (d) $x > y$
 (e) $x \geq y$
 9. I. $x^2 + 13x + 42 = 0$ II. $y^2 + 8y + 12 = 0$
 (a) $x = y$ or no relation. (b) $x < y$
 (c) $x \leq y$ (d) $x > y$
 (e) $x \geq y$
 10. I. $1 = \frac{1}{x} \left(2 - \frac{11}{36x} \right)$ II. $\left(\frac{14y}{3} + \frac{9}{y} \right) = 13$
 (a) $x = y$ or no relation.
 (b) $x < y$ (c) $x \leq y$
 (d) $x > y$ (e) $x \geq y$

Directions (11-15): In each of these questions, two equations are given. You have to solve both the equations and give answer.

- (a) If $x > y$ (b) If $x \geq y$
 (c) If $x < y$ (d) If $x \leq y$
 (e) If $x = y$ or relationship between x and y cannot be established.

11. I. $x^2 + 24x = -119$ II. $3y^2 + 7 = -10y$
 12. I. $(x + y)^2 = 361$ II. $92442 = y^2 + 92361$
 13. I. $\sqrt{x + 4} = \sqrt{225} - \sqrt{121}$ II. $y^2 + 329 = 473$
 14. I. $223x + 122y = 791$ II. $122x + 223y = 589$
 15. I. $7x^2 - 44x + 69 = 0$ II. $3y^2 - 40y + 133 = 0$

Directions (16-20): In each of these questions, two equations I. and II. are given. You have to solve both the equations and give answer.

- (a) if $x > y$ (b) if $x \geq y$
 (c) if $x < y$ (d) if $x \leq y$
 (e) if $x = y$ or no relation can be established between x and y .
 16. I. $8x^2 - 10x + 3 = 0$ II. $5y^2 + 14y - 3 = 0$
 17. I. $3x^2 + 13x + 12 = 0$ II. $y^2 + 9y + 20 = 0$
 18. I. $x^2 - 4x - 5 = 0$ II. $7y^2 - 25y - 12 = 0$
 19. I. $x^3 = 216$ II. $2y^2 - 25y + 78 = 0$
 20. I. $5x^2 + 31x + 48 = 0$ II. $3y^2 + 27y + 42 = 0$

Directions (21-25): In each of the following questions two equations are given. Solve these equations and give answer:

- (a) if $x \geq y$, i.e. x is greater than or equal to y
 (b) if $x > y$, i.e. x is greater than y
 (c) if $x \leq y$, i.e. x is less than or equal to y
 (d) if $x < y$, i.e. x is less than y
 (e) $x = y$ or no relation can be established between x and y
 21. I. $6x^2 + 17x + 5 = 0$ II. $2y^2 + 21y + 49 = 0$
 22. I. $x^2 - 8x + 15 = 0$ II. $2y^2 - 5y - 3 = 0$
 23. I. $5x^2 + 11x + 2 = 0$ II. $4y^2 + 13y + 3 = 0$
 24. I. $4x + 2y = 4$ II. $3x + 5y = 3$
 25. I. $6x^2 + x - 15 = 0$ II. $4y^2 - 24y + 35 = 0$

Directions (26-30): In each of these questions, two equations I. and II. are given. You have to solve both the equations and give answer.

26. I. $x^2 - 11x + 30 = 0$
 II. $56y^2 - 151y + 99 = 0$
 (a) $x > y$ (b) $x < y$
 (c) $x \geq y$ (d) $x \leq y$
 (e) $x = y$ or no relation.
 27. I. $x^2 - 4\sqrt{3}(\sqrt{3} + 1)x + 48\sqrt{3} = 0$
 II. $y^2 - 2\sqrt{5}(\sqrt{5} + 2)y + 40\sqrt{5} = 0$
 (a) $x > y$ (b) $x < y$
 (c) $x \geq y$ (d) $x \leq y$
 (e) $x = y$ or no relation.

28. I. $21 + \frac{1}{x}(43 + \frac{20}{x}) = 0$

II. $4(3y + \frac{7}{y}) + 37 = 0$

- (a) $x > y$ (b) $x < y$
 (c) $x \geq y$ (d) $x \leq y$
 (e) $x = y$ or no relation.

29. I. $(x + 15)^2 = (y + 19)^2$

II. $x^2 - y^2 = 112$

- (a) $x > y$ (b) $x < y$
 (c) $x \geq y$ (d) $x \leq y$
 (e) $x = y$ or no relation.

30. I. $\frac{1}{3} + \frac{5}{x^2} = \frac{8}{3x}$

II. $\frac{y}{2} + \frac{21}{2y} = 5$

- (a) $x > y$ (b) $x < y$
 (c) $x \geq y$ (d) $x \leq y$
 (e) $x = y$ or no relation.

Directions (31-35): In each of these questions, two equations I. and II. are given. You have to solve both the equations and give answer

- (a) if $x > y$ (b) if $x \geq y$
 (c) if $x < y$ (d) if $x \leq y$
 (e) if $x = y$ or no relation can be established between x and y .

31. I. $5x^2 - 31x + 30 = 0$

II. $8y^2 - 12y + 4 = 0$

32. I. $7x^2 - 17x + 6 = 0$

II. $5y^2 - 24y + 16 = 0$

33. I. $13x^2 + 9x - 4 = 0$

II. $2y^2 + y - 3 = 0$

34. I. $3x^2 - 60x + 288 = 0$

II. $4y^2 - 50y + 156 = 0$

35. I. $15x^2 + 10x - 5 = 0$

II. $6y^2 + 2y - 4 = 0$

Directions (36-40): In each of these questions, two equations I. and II. are given. You have to solve both the equations and give answer

- (a) if $x > y$
 (b) if $x \geq y$
 (c) if $x = y$ or no relation can be established between x and y .
 (d) if $y > x$
 (e) if $y \geq x$

36. I. $x^2 - 12x + 32 = 0$

II. $y^2 - 20y + 96 = 0$

37. I. $2x^2 - 3x - 20 = 0$

II. $2y^2 + 11y + 15 = 0$

38. I. $x^2 - x - 6 = 0$

II. $y^2 - 6y + 8 = 0$

39. I. $x^2 + 14x - 32 = 0$

II. $y^2 - y - 12 = 0$

40. I. $x^2 - 9x + 20 = 0$

II. $2y^2 - 12y + 18 = 0$

Directions (41-45): Solve the given quadratic equations and mark the correct option based on your answer—

41. I. $x^2 + 9x = 25x - 63$

II. $4y^2 - 34y + 72 = 0$

- (a) $x = y$ or no relation can be established between x and y .
 (b) $x \leq y$
 (c) $x < y$
 (d) $x > y$
 (e) $x \geq y$

42. I. $\frac{20\% \text{ of } 225}{x} = -x + 14$

II. $30\% \text{ of } 70y = y^2 + 90$

- (a) $x \geq y$
 (b) $x > y$
 (c) $x = y$ or no relation can be established between x and y . (d) $x \leq y$
 (e) $x < y$

43. I. $6x + 7y = 15$

II. $3x + 14y = 19.5$

- (a) $x > y$
 (b) $x = y$ or no relation can be established between x and y .
 (c) $x \leq y$
 (d) $x < y$
 (e) $x \geq y$

44. I. $7x^2 + 5x - 18 = 0$

II. $3y^2 + 4y - 20 = 0$

- (a) $x > y$
 (b) $x \leq y$
 (c) $x = y$ or no relation can be established between x and y .
 (d) $x \geq y$
 (e) $x < y$

45. I. $x^2 + 5x = 5(2x + 3x)$

II. $3y^2 + 2y = 2(y + 6)$

- (a) $x > y$
 (b) $x \geq y$
 (c) $x < y$
 (d) $x \leq y$
 (e) $x = y$ or no relation can be established between x and y .

Directions (46-50): In the following questions, two equations I. and II. are given. You have to solve both the equations and mark the appropriate option.

46. I. $12x^2 - 16x + 5 = 0$

II. $30y^2 - 61y + 30 = 0$

- (a) $x < y$ (b) $x > y$
 (c) $x \leq y$ (d) $x \geq y$
 (e) $x = y$ or no relation.

47. I. $x^2 - 16x + 63 = 0$

II. $y^2 - 12y + 35 = 0$

- (a) $x < y$ (b) $x > y$
 (c) $x \leq y$ (d) $x \geq y$
 (e) $x = y$ or no relation.

48. I. $32x^2 + 44x + 15 = 0$
 II. $42y^2 + 53y + 15 = 0$
 (a) $x < y$ (b) $x > y$
 (c) $x \leq y$ (d) $x \geq y$
 (e) $x = y$ or no relation.
49. I. $(x - 2)^2 = x - 2$
 II. $9y^2 - 36y + 35 = 0$
 (a) $x < y$ (b) $x > y$
 (c) $x \leq y$ (d) $x \geq y$
 (e) $x = y$ or no relation.
50. I. $18x^2 + 39x + 20 = 0$
 II. $10y^2 + 29y + 21 = 0$
 (a) $x < y$ (b) $x > y$
 (c) $x \leq y$ (d) $x \geq y$
 (e) $x = y$ or no relation.

Directions (51-55): Solve the given quadratic equations and mark the correct option based on your answer.

- (a) $x > y$ (b) $x \geq y$
 (c) $x < y$ (d) $x \leq y$
 (e) $x = y$ or no relation can be established between x and y .
51. I. $x^2 + x - 12 = 0$ II. $y^2 + 2y - 15 = 0$
 52. I. $6x^2 - 5x + 1 = 0$ II. $3y^2 + 8y = 3$
 53. I. $12x^2 - 7x + 1 = 0$ II. $6y^2 - 5y + 1 = 0$
 54. I. $x^2 + 7x + 10 = 0$ II. $2y^2 + 5y + 2 = 0$
 55. I. $x^2 - 2x = 15$ II. $y^2 + 5y + 4 = 0$

Mains Questions

Directions (1-20): In the given questions, two quantities are given, one as Quantity I and another as Quantity II. You have to determine relationship between two quantities and choose the appropriate option

1. In a two digit number, digit at unit place exceeds, the digit in its tens place by 2 and the product of the required number with the sum of its digit is equal to 144.
Quantity I: Value of two digit number
Quantity II: 26
 (a) Quantity I > Quantity II
 (b) Quantity I < Quantity II
 (c) Quantity I \geq Quantity II
 (d) Quantity I \leq Quantity II
 (e) Quantity I = Quantity II or No relation
2. **Quantity I:** Days after which A and B meet. A and B set out to meet each other from two places 165 km apart. A travels 15 km the first day, 14 km second day, 13 km the third day and so on, B travels 10 km the first, 12 km the second day, 14 km the third day and so on.
Quantity II: Number of days required to complete the whole work if A, B and C can complete a piece of work in 10, 12 and 15 days respectively. A left the work 5 days before the work was completed and B left 2 days after A had left.
 (a) Quantity I > Quantity II
 (b) Quantity I < Quantity II
 (c) Quantity I \geq Quantity II
 (d) Quantity I \leq Quantity II
 (e) Quantity I = Quantity II or No relation

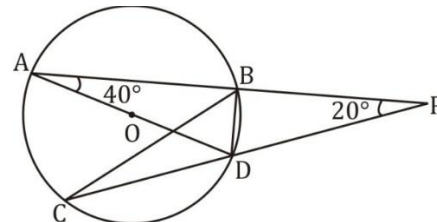
3. **Quantity I:** Present age of Randy, if 10 years are subtracted from the present age of Randy, then you would get twelve times of the present age of his grandson Sandy and Sandy is 19 years younger to Sundar whose age is 24.

Quantity II: Average age of the remaining persons in the group if average age of group of 14 persons is 27 years and 9 months. Two persons, each 42 years old, left the group.

- (a) Quantity I > Quantity II
 (b) Quantity I < Quantity II
 (c) Quantity I \geq Quantity II
 (d) Quantity I \leq Quantity II
 (e) Quantity I = Quantity II or No relation
4. **Quantity I:** Percentage profit earned by the shopkeeper if at the time of selling and purchasing he uses weights 10% less and 20% more per kilogram respectively and professes to all goods at 5% profit.
Quantity II: 'x'; A book was sold for a certain sum and there was a loss of 20%. Had it been sold for Rs 12 more, there would have been a gain of 30%. 'x' would be value of profit percent if the book were sold for Rs 4.8 more than what it was sold for.
 (a) Quantity I > Quantity II
 (b) Quantity I < Quantity II
 (c) Quantity I \geq Quantity II
 (d) Quantity I \leq Quantity II
 (e) Quantity I = Quantity II or No relation

5. A group consist of 4 couples in which each of the 4 persons have one wife
Quantity I : Number of ways in which they could be arranged in a straight line such that the men and women occupy alternate positions
Quantity II: Eight times the number of ways in which they be seated around circular table such that men and women occupy alternate position.
 (a) Quantity I > Quantity II
 (b) Quantity I < Quantity II
 (c) Quantity I \geq Quantity II
 (d) Quantity I \leq Quantity II
 (e) Quantity I = Quantity II or No relation
6. **Quantity I:** Overall profit percentage if the cost prices of two shirts are equal. One shirt is sold for 20% profit and the other is sold for 10% loss.
Quantity II: Profit % made in selling each meter if the profit made in selling 20 m of a cloth equals the cost price of 5 m of that cloth.
 (a) Quantity I > Quantity II
 (b) Quantity I < Quantity II
 (c) Quantity I \geq Quantity II
 (d) Quantity I \leq Quantity II
 (e) Quantity I = Quantity II or No relation
7. The largest possible right circular cylinder is cut out from a wooden cube of edge 7 cm.
Quantity I: volume of the cube left over after cutting out the cylinder
Quantity II: Surface area of cube remained after cutting out the cylinder.
Note: compare the magnitudes of both quantities.
 (a) Quantity I > Quantity II
 (b) Quantity I < Quantity II
 (c) Quantity I \geq Quantity II
 (d) Quantity I \leq Quantity II
 (e) Quantity I = Quantity II or No relation
8. **Quantity I:** Value of y. A vessel contains 2.5 liters of water and 10 liters of milk. 20% of the contents of the vessel are removed. To the remaining contents, x liters of water are added to reverse the ratio of water and milk. Then y liters of milk are added again to reverse the ratio of water and milk.
Quantity II: 120 ltr.
 (a) Quantity I > Quantity II
 (b) Quantity I < Quantity II
 (c) Quantity I \geq Quantity II
 (d) Quantity I \leq Quantity II
 (e) Quantity I = Quantity II or No relation

9. P can complete a piece of work in 16 days which Q can complete in 32 days. P and Q work on alternate days.
Quantity I: Time taken by them to complete the work if P starts on day 1.
Quantity II: time taken by them to complete the work if Q starts on day 1.
 (a) Quantity I > Quantity II
 (b) Quantity I < Quantity II
 (c) Quantity I \geq Quantity II
 (d) Quantity I \leq Quantity II
 (e) Quantity I = Quantity II or No relation
10. PBA and PDC are two secants. AD is the diameter of the circle with centre at O. $\angle A = 40^\circ$, $\angle P = 20^\circ$



Quantity 1: $\angle DBC$

Quantity 2: $\angle ADB$

- (a) Quantity I > Quantity II
 (b) Quantity I < Quantity II
 (c) Quantity I \geq Quantity II
 (d) Quantity I \leq Quantity II
 (e) Quantity I = Quantity II or No relation
11. **Quantity I:** Height of the tank if the volume of cylindrical tank is 12320 cubic cm. Its radius and height are in the ratio of 7 : 10 respectively.
Quantity II: Level kerosene in the jar. A conical vessel of base radius 2 cm and height 3 cm is filled with kerosene. This liquid leaks through a hole in the bottom and collects in a cylindrical jar of radius 2 cm.
 (a) Quantity I > Quantity II
 (b) Quantity I < Quantity II
 (c) Quantity I \geq Quantity II
 (d) Quantity I \leq Quantity II
 (e) Quantity I = Quantity II or No relation
12. I. $P^2 - 18p + 77 = 0$
 II. $3q^2 - 25q + 28 = 0$
Quantity I: Value of P
Quantity II: Value of q
 (a) Quantity I > Quantity II
 (b) Quantity I < Quantity II
 (c) Quantity I \geq Quantity II
 (d) Quantity I \leq Quantity II
 (e) Quantity I = Quantity II or No relation

13. A man who swim 48m/minute in still water, swims 200m against the current and 200m with the current. The difference between the time taken by him against the stream and with the stream is 10 minutes.

Quantity I: speed of current.

Quantity II: Speed of a man who completes 3 rounds of a circular path of radius 49 m in 14 minutes.

- (a) Quantity I > Quantity II
 (b) Quantity I < Quantity II
 (c) Quantity I \geq Quantity II
 (d) Quantity I \leq Quantity II
 (e) Quantity I = Quantity II or No relation
14. If 10 men and 15 women complete a piece of work in 8 days while 12 men and 8 women can complete the same piece of work in 10 days. If A boy who is 50% less efficient than the man, can do the same work in 50 days.

Quantity I : Time taken by 2 men, 4 women and 18 boys to complete the work.

Quantity II : Time taken by 9 men, 3 women and 6 boys to complete the same work.

- (a) Quantity I > Quantity II
 (b) Quantity I < Quantity II
 (c) Quantity I \geq Quantity II
 (d) Quantity I \leq Quantity II
 (e) Quantity I = Quantity II or No relation
15. Babu generally starts from his home at certain time with a certain speed to pick up his girlfriend from office at 5 : 00 PM. One day his girlfriend left the office at 3 : 00 PM and starts walking to home with a speed of 40 km/hr and meet Babu in the way who left his home at his usual time. They reached home 40 min. Earlier than their usual time.

Quantity I : Speed of boy.

Quantity II : $492\frac{1}{2}\%$ of speed of girl.

- (a) Quantity I > Quantity II
 (b) Quantity I < Quantity II
 (c) Quantity I \geq Quantity II
 (d) Quantity I \leq Quantity II
 (e) Quantity I = Quantity II or No relation

16. If the cost price of the article is $79\frac{2}{7}\%$ of the mark price and there is a discount of Rs. 68 on the marked price. There is a profit of 20% on selling the item.

Quantity I : CP of the article

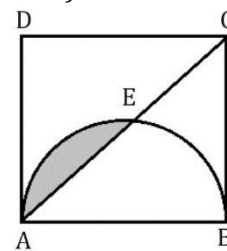
Quantity II : 1111 Rs.

- (a) Quantity I > Quantity II
 (b) Quantity I < Quantity II
 (c) Quantity I \geq Quantity II
 (d) Quantity I \leq Quantity II
 (e) Quantity I = Quantity II or No relation

17. **Quantity I:** Time taken by Manoj and Shubham to complete the work together. When Manoj works alone, he takes 4.8 hrs more than the time taken by Manoj and Shubham to complete the work together. When Shubham works alone, he takes 10.8 hrs more than the time taken by both of them to complete the work together.

Quantity II: 7.4 hrs.

- (a) Quantity I > Quantity II
 (b) Quantity I < Quantity II
 (c) Quantity I \geq Quantity II
 (d) Quantity I \leq Quantity II
 (e) Quantity I = Quantity II or No relation
18. The edge of the cube is 10 cm. Given E is the center of the semicircle and it is mid-point of the diagonal of the given cube. (2 marks)



Quantity I: Area of the shaded region

Quantity II: 10 cm^2 .

- (a) Quantity I > Quantity II
 (b) Quantity I < Quantity II
 (c) Quantity I \geq Quantity II
 (d) Quantity I \leq Quantity II
 (e) Quantity I = Quantity II or No relation
19. **Quantity I:** Original duration of flight. In a flight of 3000 km an aircraft was slowed down by bad weather. Its average speed for the trip was reduced by 100 km/hr. and the time increased by one hour.
- Quantity II:** Usual time of a man who, when walks at $\frac{3}{4}$ th of his usual pace, reaches his office 20 minutes late.
- (a) Quantity I > Quantity II
 (b) Quantity I < Quantity II
 (c) Quantity I \geq Quantity II
 (d) Quantity I \leq Quantity II
 (e) Quantity I = Quantity II or No relation
20. Wheels of diameters 7 cm and 14 cm start rolling simultaneously from X and Y, which are 1990.50 cm apart, towards each other. Both of them make same no. of revolutions per second. Both of them meet after 10s.
- Quantity I:** speed of smaller wheel.
- Quantity II:** $21\pi\text{ cm/s}$
- (a) Quantity I > Quantity II
 (b) Quantity I < Quantity II
 (c) Quantity I \geq Quantity II
 (d) Quantity I \leq Quantity II
 (e) Quantity I = Quantity II or No relation

Direction (21-26): Three equations (I), (II) and (III) are given in each question. On the basis of these equations you have to decide the relation between 'x', 'y' and 'z' and give answer

- (a) if $x < y = z$ (b) if $x \leq y < z$
 (c) if $x < y > z$ (d) if $x = y > z$
 (e) if $x = y = z$ or if none of the above relationships is established.

21. I. $7x + 6y + 4z = 122$ II. $4x + 5y + 3z = 88$

III. $9x + 2y + z = 78$

22. I. $7x + 6y = 110$ II. $4x + 3y = 59$

III. $x + z = 15$

23. I. $x = \sqrt{(36)^{\frac{1}{2}} \times (1296)^{\frac{1}{4}}}$

II. $2y + 3z = 33$

III. $6y + 5z = 71$

24. I. $8x + 7y = 135$ II. $5x + 6y = 99$

III. $9y + 8z = 121$

25. I. $(x + y)^3 = 1331$ II. $x - y + z = 0$

III. $xy = 28$

26. I. $x + 3y + 4z = 96$ II. $2x + 8z = 80$

III. $2x + 6y = 120$

Direction (27-29): Two equations (I) and (II) are given in each question. On the basis of these equations you have to decide the relation between 'x' and 'y' and give answer

- (a) if $x > y$ (b) if $x \geq y$
 (c) if $x < y$ (d) if $x \leq y$
 (e) if $x = y$ or Relation cannot be established.

27. I. $\frac{3x}{3x+7} - \frac{3x+7}{3x} = 14$ II. $\frac{y}{(18y-5)} - \frac{18y-5}{y} = 2$

28. I. $\frac{x}{x+7} + \frac{x+7}{x} = 12$ II. $\frac{y}{y+8} + \frac{y+8}{y} = 16$

29. I. $\frac{x}{x-11} + \frac{x-11}{x} = 7$ II. $\frac{4y}{4y-13} + \frac{4y-13}{4y} = 9$

Direction (30-35): Two equations (I) and (II) are given in each question. On the basis of these equations you have to decide the relation between 'x' and 'y' and give answer

- (a) if $x > y$ (b) if $x \geq y$
 (c) if $x < y$ (d) if $x \leq y$
 (e) if $x = y$ or Relation cannot be established.

30. I. $99x^2 + 149x + 56 = 0$

II. $156y^2 + 287y + 132 = 0$

31. I. $77x^2 + 58x + 8 = 0$

II. $42y^2 + 59y + 20 = 0$

32. I. $63x^2 + 172x + 117 = 0$

II. $30y^2 + 162y + 216 = 0$

33. I. $36x^4 + 369x^2 + 900 = 0$

II. $144y^4 + 337y^2 + 144 = 0$

34. I. $18x^2 - 13\sqrt{7}x + 14 = 0$

II. $32y^2 - 19\sqrt{6}y + 9 = 0$

35. I. $x^2 - 82x + 781 = 0$ II. $y^2 - 5041 = 0$

Direction (36-40): Two equations (I) and (II) are given in each question. On the basis of these equations you have to decide the relation between 'x' and 'y' and give answer

- (a) if $x > y$ (b) if $x \geq y$
 (c) if $x < y$ (d) if $x \leq y$
 (e) if $x = y$ or relation cannot be established.

36. I. $36x^2 + 47\sqrt{7}x + 105 = 0$

II. $35y^2 + 20\sqrt{3}y + 63\sqrt{2}y + 36\sqrt{6} = 0$

37. I. $91x^2 + 298x + 187 = 0$

II. $247y^2 + 216y - 391 = 0$

38. I. $81x^2 - 9x - 2 = 0$ II. $56y^2 - 13y - 3 = 0$

39. I. $391x^2 + 1344x + 1073 = 0$

II. $437y^2 + 1074y + 589 = 0$

40. I. $3216x^2 + 3859x + 481 = 0$

II. $8132y^2 - 4839y + 978 = 0$

Previous Year Question

Direction (1 - 6): In each question two equations numbered (I) and (II) are given. You should solve both the equations and mark appropriate answer.

- (a) If $x=y$ or no relation can be established
 (b) If $x > y$
 (c) If $x < y$
 (d) If $x \geq y$
 (e) If $x \leq y$

1. I. $x^2 = 256$ II. $y^2 - 17y + 16 = 0$

2. I. $x^2 + 20x + 100 = 0$ II. $y^2 + 13y + 30 = 0$

3. I. $4x^2 - 8x - 5 = 0$ II. $2y^2 - 11y + 14 = 0$

4. I. $6x^2 + 5x + 1 = 0$ II. $20y^2 + 9y + 1 = 0$

5. I. $2x^2 - 9x + 9 = 0$

II. $6y^2 - 17y + 12 = 0$

6. I. $4x^2 - 17x + 15 = 0$

II. $2y^2 - 17y + 35 = 0$

SBI PO Prelims 2020

Direction (7-11): In each question two equations numbered (I) and (II) are given. You have to solve both the equations and mark appropriate answer.

- (a) If $x = y$ or no relation can be established
 (b) If $x > y$
 (c) If $x < y$
 (d) If $x \geq y$
 (e) If $x \leq y$

7. I. $x = \sqrt{25}$ II. $y^3 = 125$
 8. I. $x^2 + 2x - 35 = 0$ II. $y^2 + 15y + 56 = 0$
 9. I. $x^2 = 81$ II. $y^2 = 64$
 10. I. $17x^2 - 14x - 83 = -80$ II. $y^2 = 2y + 35$
 11. I. $x^2 + 4x - 45 = 0$ II. $y^2 - 13y + 40 = 0$

SBI Clerk Prelims 2020

Directions (12-16): In the following two equations questions numbered (I) and (II) are given. You have to solve both equations and Give answer

- (a) If $x > y$
 (b) If $x \geq y$
 (c) If $y > x$
 (d) If $y \geq x$
 (e) If $x = y$ or no relation can be established
 12. I. $x^2 - 8x + 15 = 0$ II. $2y^2 - 7y + 5 = 0$
 13. I. $2x^2 + x - 28 = 0$ II. $2y^2 - 23y + 56 = 0$
 14. I. $2x^2 - 7x - 60 = 0$ II. $3y^2 + 13y + 4 = 0$
 15. I. $x^2 - 17x - 84 = 0$ II. $y^2 + 4y - 117 = 0$
 16. I. $x^2 = 9^2$ II. $(y - 8)^2 = 9$

IBPS PO Prelims 2020

Directions (17-21): In the following questions, there are two equations in x and y . You have to solve both the equations and give answer

- (a) if $x > y$
 (b) if $x < y$
 (c) if $x \geq y$
 (d) if $x \leq y$
 (e) if $x = y$ or there is no relation between x and y
 17. I. $2x^2 - 3x + 1 = 0$ II. $2y^2 - 5y + 3 = 0$
 18. I. $x^2 + 21x + 110 = 0$ II. $y^2 + 17y + 72 = 0$
 19. I. $x^2 = 4$ II. $y^2 - 6y + 8 = 0$
 20. I. $x^2 + 9x - 22 = 0$ II. $2y^2 - 7y + 6 = 0$
 21. I. $6x^2 + 5x + 1 = 0$ II. $15y^2 + 11y + 2 = 0$

IBPS Clerk Pre 2020

Directions (22-26): In the given questions, two equations (I) & (II) are given. You have to solve both the equations and mark the answer accordingly.

22. I. $x^2 + 9x + 20 = 0$ II. $8y^2 - 15y + 7 = 0$
 (a) $x < y$ (b) $x > y$ (c) $x \leq y$
 (d) $x \geq y$ (e) $x = y$ or no relation.
 23. I. $x^2 - 11x + 30 = 0$ II. $y^2 + 12y + 36 = 0$
 (a) $x < y$ (b) $x > y$ (c) $x \leq y$
 (d) $x \geq y$ (e) $x = y$ or no relation.
 24. I. $x^2 + 13x + 40 = 0$ II. $y^2 + 7y + 10 = 0$
 (a) $x < y$ (b) $x > y$ (c) $x \leq y$
 (d) $x \geq y$ (e) $x = y$ or no relation.

25. I. $x^2 - 20x + 91 = 0$ II. $y^2 + 16y + 63 = 0$
 (a) $x < y$ (b) $x > y$ (c) $x \leq y$
 (d) $x \geq y$ (e) $x = y$ or no relation.

26. I. $x^2 - x - 12 = 0$ II. $y^2 + 5y + 6 = 0$
 (a) $x < y$ (b) $x > y$ (c) $x \leq y$
 (d) $x \geq y$ (e) $x = y$ or no relation.

RRB PO Prelims 2020

Directions (27-31): In the following questions, calculate quantity I and quantity II, compare them and answer according to the following options.

- (a) If Quantity I > Quantity II
 (b) If Quantity I < Quantity II
 (c) If Quantity I \geq Quantity II
 (d) if Quantity I \leq Quantity II
 (e) if Quantity I = Quantity II or no relation can be established

27. **Quantity I.** Profit earned on selling an article at Rs. 450 at 20% profit
Quantity II. Cost price of the article which is sold at Rs.84 on 20% profit

28. In a village there are 60% males and rest are females. 30% of total male are illiterate and 25% of total female are illiterate. Number of illiterate males is 1152.

- Quantity I.** Literate females in the village.
Quantity II. 1940

29. A man invested Rs. P at 12% p.a. on simple interest for two years.

- Quantity I.** If at the end of second year he gets Rs.1200 as interest, then find Rs.P.
Quantity II. Rs.6000

30. Ploughing cost of a rectangular field is Rs.288 at the rate of Rs.3 per square meter. Length of the field is 4 meters more than the width of field.

- Quantity I.** Length of rectangular field.
Quantity II. 12 meters.

31. **Quantity I.** Sum of present ages of Shivam and Prashant is 32 years and Shivam is 8 years older than Prashant. Find present age of Prashant.

- Quantity II.** 15 years.

RRB PO Prelims 2020

Direction (32 - 36): Solve the given quadratic equations and mark the correct option based on your answer.

- (a) if $x > y$
 (b) if $x \geq y$
 (c) if $x < y$
 (d) if $x \leq y$
 (e) if $x = y$ or no relation can be established between x and y .

32. I. $x^2 - 14x + 45 = 0$ II. $y^2 - 18y + 72 = 0$

33. I. $x^2 + 7x + 12 = 0$ II. $y^2 + 9y + 20 = 0$

34. I. $4x^2 - 7x + 3 = 0$ II. $7y^2 - 17y + 6 = 0$

35. I. $2x^2 - 19x + 45 = 0$ II. $2y^2 - 9y + 4 = 0$

36. I. $x^2 = 144$ II. $(y + 12)^2 = 0$

SBI PO Prelims 2019

Directions (37-41): In each of these questions, two equations (I) and (II) are given. You have to solve both the equations and give answer

- (a) if $x > y$
 (b) if $x \geq y$
 (c) if $x < y$
 (d) if $x \leq y$
 (e) if $x = y$ or no relation can be established between x and y .

37. I. $x^2 - 13x + 40 = 0$ II. $2y^2 - y - 15 = 0$

38. I. $5x^2 + 17x + 6 = 0$ II. $2y^2 + 11y + 12 = 0$

39. I. $7x^2 - 19x + 10 = 0$ II. $8y^2 + 2y - 3 = 0$

40. I. $x^2 - 8x + 15 = 0$ II. $y^2 - 3y + 2 = 0$

41. I. $3x^2 - 7x + 4 = 0$ II. $2y^2 - 9y + 10 = 0$

SBI Clerk Prelims 2019

Directions (42-46): In the following questions, two quantities (I) and (II) are given. You have to solve both the quantities and mark the appropriate answer.

42. Quantity I: In how many ways a committee of 4 members with at least 2 women can be formed from 8 men and 4 women?

Quantity II: How many 3-digit numbers which are divisible by 3 can be formed from 0,1,2,3,4,5,6,7,8,9, such that 3-digit number always ends with an even number?

- (a) Quantity I < Quantity II
 (b) Quantity I \leq Quantity II
 (c) Quantity I > Quantity II
 (d) Quantity I \geq Quantity II
 (e) Quantity I = Quantity II or no relation.

43. Quantity I: A man invested Rs.5900 for 3 years in a scheme offering R% p.a. at SI and received Rs.3186 as interest after 3 years. If the man invested Rs.7900 at (R+5)% p.a. at SI for 3 years, then find interest received by man (in Rs.).

Quantity II: A man invested Rs.X at 13% p.a. at CI for 2 years and interest received by him after 2 years is Rs.2325.96. Find X (in Rs.).

- (a) Quantity I < Quantity II
 (b) Quantity I \leq Quantity II
 (c) Quantity I > Quantity II
 (d) Quantity I \geq Quantity II
 (e) Quantity I = Quantity II or no relation.

44. Quantity I: Ratio of CP to MP of an article is 19 : 30. Shopkeeper allowed 24% discount and earned 20% profit on selling the article. If SP of the article is Rs.912, then find difference between amount of profit earned and amount of discount allowed (in Rs.).

Quantity II: Shopkeeper marked an article 70% above its cost price and he allowed 40% discount on it. If shopkeeper sold the article at Rs.183.6, then find sum of amount of profit earned and amount of discount allowed (in Rs.).

- (a) Quantity I < Quantity II
 (b) Quantity I \leq Quantity II
 (c) Quantity I > Quantity II
 (d) Quantity I \geq Quantity II
 (e) Quantity I = Quantity II or no relation.

45. Quantity I: A boat can cover distance of 480 km each in downstream and in upstream in total 11 hours. If ratio of speed of boat in still water to that of stream is 11 : 1, then find speed of boat in still water (in km/hr.).

Quantity II: A boat can cover a distance of 350 km in downstream in 3.5 hours and can cover a distance of 380 km in upstream in 5 hours. Find speed of boat in still water (in km/hr.).

- (a) Quantity I < Quantity II
 (b) Quantity I \leq Quantity II
 (c) Quantity I > Quantity II
 (d) Quantity I \geq Quantity II
 (e) Quantity I = Quantity II or no relation.

46. Quantity I: B's present age is 60% more than A's present age and ratio of present age of B to that of C is 5 : 2. D is 8 years younger than B and D's present age is twice of that of C. Find average of present age of A, B, C & D (in years).

Quantity II: Present age of R is equal to average of present age of P & Q. 4 years hence, age of P is twice of age of Q at that time. If R is 15 years younger than P, then find age of younger person among P, Q & R.

- (a) Quantity I < Quantity II
- (b) Quantity I ≤ Quantity II
- (c) Quantity I > Quantity II
- (d) Quantity I ≥ Quantity II
- (e) Quantity I = Quantity II or no relation.

SBI Clerk Mains 2019

Directions (47-51): In the following two equations questions numbered (I) and (II) are given. You have to solve both equations and Give answer

- (a) If $x > y$
- (b) If $x \geq y$
- (c) If $y > x$
- (d) If $y \geq x$
- (e) If $x = y$ or no relation can be established

- 47. I. $x^2 - 7x + 12 = 0$ II. $y^2 - 8y + 12 = 0$
- 48. I. $2x^2 + x - 28 = 0$ II. $2y^2 - 23y + 56 = 0$
- 49. I. $2x^2 - 7x - 60 = 0$ II. $3y^2 + 13y + 4 = 0$
- 50. I. $x^2 - 17x - 84 = 0$ II. $y^2 + 4y - 117 = 0$
- 51. I. $x^2 = 81$ II. $(y-9)^2 = 0$

IBPS PO Prelims 2019

Directions (52-56): Solve the following quadratic equation and mark the answer as per instructions.

- 52. I. $x^2 - 2x - 143 = 0$ II. $y^2 - 169 = 0$
- (a) $x > y$
- (b) $x < y$
- (c) $x \leq y$
- (d) $x \geq y$
- (e) $x = y$ or no relation can be established
- 53. I. $x^2 - 7x - 18 = 0$ II. $y^2 - 19y + 90 = 0$
- (a) $x \leq y$
- (b) $x = y$ or no relation can be established
- (c) $x > y$
- (d) $x \geq y$
- (e) $x < y$

- 54. I. $2x^2 + 5x + 3 = 0$ II. $y^2 + 4y - 12 = 0$
- (a) $x \leq y$
- (b) $x > y$
- (c) $x = y$ or no relation can be established
- (d) $x < y$
- (e) $x \geq y$

- 55. I. $9x + 3y = 15$ II. $4x + 5y = 14$
- (a) $x = y$ or no relation can be established
- (b) $x > y$
- (c) $x \leq y$
- (d) $x < y$
- (e) $x \geq y$

- 56. I. $2x^2 - x - 1 = 0$ II. $3y^2 - 5y + 2 = 0$
- (a) $x \leq y$
- (b) $x < y$
- (c) $x = y$ or no relation can be established
- (d) $x \geq y$
- (e) $x > y$

IBPS Clerk Prelims 2019

Directions (57-61): Solve the given quadratic equations and mark the correct option based on your answer—

- (a) $x > y$
- (b) $x < y$
- (c) $x \geq y$
- (d) $x \leq y$
- (e) $x = y$ or there is no relationship

- 57. I. $x^2 = 81$ II. $y^2 - 18y + 81 = 0$
- 58. I. $4x^2 - 24x + 32 = 0$ II. $y^2 - 8y + 15 = 0$
- 59. I. $x^2 - 21x + 108 = 0$ II. $y^2 - 17y + 72 = 0$
- 60. I. $x^2 - 11x + 30 = 0$ II. $y^2 - 15y + 56 = 0$
- 61. I. $x^3 = 512$ II. $y^2 = 64$

RRB PO Prelims 2019

Directions (62-65): In each of the following questions, two equations (I) and (II) are given. Solve the equations and mark the correct option:

- (a) if $x > y$
- (b) if $x \geq y$
- (c) if $x < y$
- (d) if $x \leq y$
- (e) if $x = y$ or no relation can be established between x and y .

- 62. I. $2x^2 + 11x + 12 = 0$ II. $8y^2 - 22y - 21 = 0$
- 63. I. $x^2 - 17x - 60 = 0$ II. $y^2 + 42y + 185 = 0$
- 64. I. $x^2 + 41x + 420 = 0$ II. $6y^2 - 11y - 10 = 0$
- 65. I. $x^2 - 8x - 273 = 0$ II. $y^2 + 6y - 432 = 0$

RRB PO Mains 2019

Directions (66-70): Given below are two equations in each question, which you have to solve and give answer

- (a) $ifx > y$
 (b) $ifx \geq y$
 (c) $ify > x$
 (d) $ify \geq x$
 (e) $ifx = y$ or no relation can be established

66. I. $2x^2 - 5x + 2 = 0$ II. $2y^2 - 9y + 7 = 0$
 67. I. $3x^2 + 7x + 4 = 0$ II. $y^2 + 9y + 20 = 0$
 68. I. $x^2 - 7x + 10 = 0$ II. $y^2 - 14y + 45 = 0$
 69. I. $x^2 - 3x = 4$ II. $y^2 + 6y + 8 = 0$
 70. I. $x^2 - 3x = 10$ II. $y^2 + 7y + 10 = 0$

RRB Clerk Prelims 2019

Directions (71-75): In the given questions, two quantities are given one as 'Quantity I' and another as 'Quantity II'. You have to determine relationship between two quantities and choose the appropriate option.

71. **Quantity I:** A train can cross a pole in 24 sec with a speed of 75 km/h. Length of train.
Quantity II: A train can cross a pole in 12 sec and a tunnel in 55.2 sec. If length of tunnel is 1800 m. length of train.
 (a) Quantity I > Quantity II
 (b) Quantity I < Quantity II
 (c) Quantity I \geq Quantity II
 (d) Quantity I = Quantity II or no relation
 (e) Quantity I \leq Quantity II
72. **Quantity I:** Marked price of article, if article is marked at 50% above cost price and on selling the article, profit earned is 20% and S. P is Rs 1020.
Quantity II: Total cost of fencing a square of side 37.5 meter and cost of wire is Rs 0.17 per centimeter.
 (a) Quantity I > Quantity II
 (b) Quantity I < Quantity II
 (c) Quantity I \geq Quantity II

- (d) Quantity I = Quantity II or no relation
 (e) Quantity I \leq Quantity II

73. **Quantity I:** value of x
 $(x + 3)^2 = (x - 3)^2 + x^2$
Quantity II: value of y
 $y^2 - 29y + 204 = 0$
 (a) Quantity I > Quantity II
 (b) Quantity I < Quantity II
 (c) Quantity I \geq Quantity II
 (d) Quantity I = Quantity II or no relation
 (e) Quantity I \leq Quantity II
74. **Quantity I:** Amount obtained after two years on Rs. 2450 at $14\frac{2}{7}\%$ simple interest per annum.
Quantity II: Amount obtained after two years on investment of Rs 2450 at $12\frac{1}{2}\%$ p. a. compounded yearly.
 (a) Quantity I > Quantity II
 (b) Quantity I < Quantity II
 (c) Quantity I \geq Quantity II
 (d) Quantity I = Quantity II or no relation
 (e) Quantity I \leq Quantity II
75. **Quantity I:** Actual discount percent. If a shopkeeper gives 1 article free at every purchase of 4 articles and also give 20% discount.
Quantity II: Final new profit percent. If selling price is increased by $14\frac{2}{7}\%$ then profit percent becomes $\frac{36}{19}$ of initial profit percent.
 (a) Quantity I > Quantity II
 (b) Quantity I < Quantity II
 (c) Quantity I \geq Quantity II
 (d) Quantity I = Quantity II or no relation
 (e) Quantity I \leq Quantity II

RRB Clerk Mains 2019

Solutions

Basic Questions

1. (c): $x^2 + 5x + 6 = 0$
 $\quad \quad \quad /$
 $6 \rightarrow 3 \times 2 \rightarrow 3 + 2 = 5 \therefore x_1 = -3, x_2 = -2$
 $y^2 + 7y + 12 = 0$
 $\quad \quad \quad |$
 $12 \rightarrow 4 \times 3 \rightarrow 4 + 3 = 7$
 $\therefore y = -4, y_2 = -3; \therefore x \geq y$

2. (b): $x^2 - 9x + 20 = 0$
 $\quad \quad \quad |$
 5×4 and, $5 + 4 = 9$
 $\therefore x_1 = +5, x_2 = +4;$
 $y^2 + 42 = 13y$
 $y^2 - 13y + 42 = 0$
 $\quad \quad \quad |$
 $42 \rightarrow 7 \times 6$ and, $7 + 6 = 13;$
 $\therefore y_1 = +7, y_2 = +6; \therefore y > x$

3. (b): $eq^n(1) - (eq^n(2) \times 3)$

$$12x + 3y = 14$$

$$12x + 6y = 48$$

$$\begin{array}{r} - \quad - \quad - \\ -3y = -34 \end{array}$$

$$y = \frac{34}{3} = 11.33$$

Put it in equation 1,

$$12x + 34 = 14 \Rightarrow 12x = -20 \Rightarrow x = -\frac{5}{3}; \therefore x < y$$

4. (b): $x = \sqrt{625} = 25$

$$y = \sqrt{676} = 26; \therefore x < y$$

5. (b): $x^2 + 4x + 4 = 0$

$$\begin{array}{c} | \\ 2 \times 2 \text{ and, } 2 + 2 = 4 \end{array}$$

$$x_1 = -2, x_2 = -2$$

$$y^2 - 8y + 16 = 0 \Rightarrow y_1, y_2 = +ve; \therefore y > x$$

6. (d): $x^2 - 19x + 84 = 0$

$$\begin{array}{c} / \\ 12 \times 7 \text{ and, } 12 + 7 = 19 \end{array}$$

$$\therefore x_1 = +12, x_2 = +7$$

$$y^2 - 25y + 156 = 0$$

$$\begin{array}{c} / \\ 13 \times 12 \text{ and, } 13 + 12 = 25 \end{array}$$

$$\therefore y_1 = 13, y_2 = 12 \therefore y \geq x$$

7. (c): $x^3 = 1729 + 468$

$$x^3 = 2197 \Rightarrow x = 13$$

$$y^2 = 169 \Rightarrow y = \pm 13 \therefore x \geq y$$

8. (e): $9 + 19 = x \Rightarrow x = 28$

$$(y)^{5+\frac{1}{2}} = (2 \times 14)^{\frac{11}{2}} \Rightarrow (y)^{\frac{11}{2}} = (2 \times 14)^{11/2}$$

$$\therefore y = 28 \therefore x = y$$

9. (a): $\sqrt{784}x + 1234 = 1486$

$$28x = 252 \Rightarrow x = 9$$

$$33y = 264 \Rightarrow y = 8 \therefore x > y$$

10. (a): $5x = -11$

$$x = \frac{-11}{5} = -2.2$$

$$y - 5y = 12 \Rightarrow y = -3 \therefore x > y$$

11. (a): $6x^2 - 49x + 99 = 0$

$$\begin{array}{c} \backslash \quad / \\ 2 \times 3 \quad 11 \times 9 \end{array}$$

$$\text{and, } 22 + 27 = 49$$

$$\therefore x_1 = \frac{22}{6} = \frac{11}{3} = 3.67, x_2 = \frac{27}{6} = \frac{9}{2} = 4.5$$

$$5y^2 + 17y + 14 = 0$$

$$\begin{array}{c} / \quad \backslash \\ 5 \quad 7 \times 2 \end{array}$$

$$\text{and, } 10 + 7 = 17$$

$$\therefore y_1 = \frac{-10}{5} = -2, y_2 = \frac{-7}{5} = -1.4 \therefore x > y$$

12. (a): $x = (1331)^{\frac{1}{3}} = 11$

$$2y^2 - 17y + 36 = 0$$

$$\begin{array}{c} / \quad \backslash \\ 2 \times 1 \quad 9 \times 4 \end{array}$$

$$\text{and, } 9 + 8 = 17$$

$$\therefore y_1 = \frac{9}{2} = 4.5, y_2 = \frac{8}{2} = 4 \therefore x > y$$

13. (b): I. $x_1 = \frac{-2}{2} = -1, x_2 = \frac{-1}{2} = -0.5$

II. $y_1 = \frac{-4}{12} = -0.33, y_2 = \frac{-1}{4} = -0.25 \therefore y > x$

14. (b): $eq(i) \times 4 + eq(ii) \times 3.$

$$28x - 12y = 52$$

$$15x + 12y = 120$$

$$43x = 172$$

$$x = 4, \text{ Put it in equation (i)}$$

$$3y = 28 - 13 \Rightarrow y = 5 \therefore x < y$$

15. (b): $eq^1(1) \times 5 - eq(2) \times 2$

$$10x + 25y = 30$$

$$10x + 22y = 18$$

$$\begin{array}{r} - \quad - \quad - \\ 3y = 12 \end{array}$$

$$y = 4$$

$$\therefore 5x = 9 - 44, x = -7; x < y$$

Prelims Solutions

Level - 1

1. (e): I. $x^2 + 5x + 6 = 0$

$$x^2 + 3x + 2x + 6 = 0$$

$$(x + 3)(x + 2) = 0$$

$$x = -2, -3$$

II. $y^2 + 9y + 14 = 0$

$$y^2 + 7y + 2y + 14 = 0$$

$$(y + 2)(y + 7) = 0$$

$$y = -2, -7$$

Clearly, no relation can be established

2. (b): I. $x^2 - 18x + 45 = 0$
 $x^2 - 15x - 3x + 45 = 0$
 $(x - 3)(x - 15) = 0$
 $x = 3, 15$

II. $y^2 + 12y - 45 = 0$
 $y^2 + 15y - 3y - 45 = 0$
 $(y - 3)(y + 15) = 0$
 $y = 3, -15$
 Clearly, $x \geq y$

3. (e): I. $9x^2 + 11x + 2 = 0$
 $9x^2 + 9x + 2x + 2 = 0$
 $(9x + 2)(x + 1) = 0$
 $x = -\frac{2}{9}, -1$

II. $8y^2 + 6y + 1 = 0$
 $8y^2 + 4y + 2y + 1 = 0$
 $(4y + 1)(2y + 1) = 0$
 $y = -\frac{1}{2}, -\frac{1}{4}$
 Clearly, no relation can be established

4. (c): I. $6x^2 + 5x + 1 = 0$
 $6x^2 + 3x + 2x + 1 = 0$
 $(3x + 1)(2x + 1) = 0$
 $x = -\frac{1}{3}, -\frac{1}{2}$

II. $4y^2 - 15y = 4$
 $4y^2 - 16y + y - 4 = 0$
 $(4y + 1)(y - 4) = 0$
 $y = -\frac{1}{4}, 4$
 Clearly, $x < y$

5. (c): I. $x^2 + 3x = 0$
 $x(x + 3) = 0$
 $x = 0, -3$

II. $x^2 + y = 10$
 $y = 10 - x^2$
 if $x = 0, y = 10$
 if $x = -3, y = 10 - (-3)^2 = 1$
 Clearly, $x < y$

6. (c): I. $x^2 - 25x + 156 = 0$
 $x^2 - 12x - 13x + 156 = 0$
 $x(x - 12) - 13(x - 12) = 0$
 $(x - 12)(x - 13) = 0$
 $x = 12, 13$

II. $y^2 - 29y + 210 = 0$
 $y^2 - 14y - 15y + 210 = 0$
 $y(y - 14) - 15(y - 14) = 0$
 $(y - 14)(y - 15) = 0$
 $y = 14, 15$
 So, $x < y$

7. (d): I. $x^2 = 196$
 $x = \sqrt{196}$
 $x = \pm 14$

II. $y = \sqrt{196}$
 $y = 14$
 So, $x \leq y$

8. (e): I. $x^2 + 12x + 35 = 0$
 $x^2 + 5x + 7x + 35 = 0$
 $x(x + 5) + 7(x + 5) = 0$
 $(x + 5)(x + 7) = 0$
 $x = -5, -7$

II. $y^2 + 14y + 48 = 0$
 $y^2 + 6y + 8y + 48 = 0$
 $y(y + 6) + 8(y + 6) = 0$
 $(y + 8)(y + 6) = 0$
 $y = -8, -6$
 So, no relation.

9. (a): I. $3x^2 + 23x + 30 = 0$
 $3x^2 + 18x + 5x + 30 = 0$
 $3x(x + 6) + 5(x + 6) = 0$
 $(3x + 5)(x + 6) = 0$
 $x = -6, -\frac{5}{3}$

II. $y^2 + 15y + 56 = 0$
 $y^2 + 8y + 7y + 56 = 0$
 $y(y + 8) + 7(y + 8) = 0$
 $(y + 7)(y + 8) = 0$
 $y = -7, -8$
 So, $x > y$

10. (c): I. $x^2 + 17x + 72 = 0$
 $x^2 + 8x + 9x + 72 = 0$
 $x(x + 8) + 9(x + 8) = 0$
 $(x + 9)(x + 8) = 0$
 $x = -8, -9$

II. $y^2 + 13y + 42 = 0$
 $y^2 + 6y + 7y + 42 = 0$
 $y(y + 6) + 7(y + 6) = 0$
 $(y + 6)(y + 7) = 0$
 $y = -6, -7$
 So, $x < y$

11. (c): I. $x^2 + 17x + 72 = 0$
 $x^2 + 8x + 9x + 72 = 0$
 $x(x + 8) + 9(x + 8) = 0$
 $(x + 8)(x + 9) = 0$
 $x = -8, -9$

II. $y^2 + 11y + 30 = 0$
 $y^2 + 5y + 6y + 30 = 0$
 $y(y + 5) + 6(y + 5) = 0$
 $(y + 5)(y + 6) = 0$
 $y = -5, -6$
 So, $x < y$

12. (a): I. $3x^2 - 23x + 40 = 0$
 $3x^2 - 15x - 8x + 40 = 0$
 $3x(x-5) - 8(x-5) = 0$
 $(x-5)(3x-8) = 0$
 $x = 5, \frac{8}{3}$

II. $5y^2 - 17y + 14 = 0$
 $5y^2 - 10y - 7y + 14 = 0$
 $5y(y-2) - 7(y-2) = 0$
 $(y-2)(5y-7) = 0$
 $y = 2, \frac{7}{5}$
 So, $x > y$

13. (e): I. $x^2 - 26x + 168 = 0$
 $x^2 - 12x - 14x + 168 = 0$
 $x(x-12) - 14(x-12) = 0$
 $(x-12)(x-14) = 0$
 $x = 12, 14$

II. $y^2 - 29y + 208 = 0$
 $y^2 - 13y - 16y + 208 = 0$
 $y(y-13) - 16(y-13) = 0$
 $(y-13)(y-16) = 0$
 $y = 13, 16$
 So, no relation.

14. (b): I. $x^3 + 340 = 2537$
 $x^3 = 2537 - 340$
 $= 2197$
 $x = \sqrt[3]{2197}$
 $= 13$

II. $y^2 + 23 = 192$
 $y^2 = 192 - 23$
 $= 169$
 $y = \pm 13$
 So, $x \geq y$

15. (c): I. $x^2 + 48x + 575 = 0$
 $x^2 + 23x + 25x + 575 = 0$
 $x(x+23) + 25(x+23) = 0$
 $(x+23)(x+25) = 0$
 $x = -23, -25$

II. $y^2 + 44y + 483 = 0$
 $y^2 + 21y + 23y + 483 = 0$
 $y(y+21) + 23(y+21) = 0$
 $(y+21)(y+23) = 0$
 $y = -21, -23$
 So, $x \leq y$

16. (d): I. $x^2 + 23x + 132 = 0$
 $x^2 + 12x + 11x + 132 = 0$
 $x(x+12) + 11(x+12) = 0$
 $(x+11)(x+12) = 0$
 $x = -11, -12$

II. $y^2 + 21y + 110 = 0$
 $y^2 + 11y + 10y + 110 = 0$
 $y(y+11) + 10(y+11) = 0$
 $(y+10)(y+11) = 0$
 $y = -10, -11$
 So, $x \leq y$

17. (e): I. $3x^2 + 20x + 32 = 0$
 $3x^2 + 12x + 8x + 32 = 0$
 $3x(x+4) + 8(x+4) = 0$
 $(3x+8)(x+4) = 0$
 $x = -4, -\frac{8}{3}$

II. $5y^2 + 23y + 24 = 0$
 $5y^2 + 15y + 8y + 24 = 0$
 $5y(y+3) + 8(y+3) = 0$
 $(y+3)(5y+8) = 0$
 $y = -3, -\frac{8}{5}$
 So, No relation exists

18. (a): I. $x^2 - 29x + 208 = 0$
 $x^2 - 13x - 16x + 208 = 0$
 $x(x-13) - 16(x-13) = 0$
 $(x-13)(x-16) = 0$
 $x = 13, 16$

II. $y^2 - 21y + 108 = 0$
 $y^2 - 9y - 12y + 108 = 0$
 $y(y-9) - 12(y-9) = 0$
 $(y-9)(y-12) = 0$
 $y = 9, 12$
 So, $x > y$

19. (a): I. $x^2 + 30x + 224 = 0$
 $x^2 + 14x + 16x + 224 = 0$
 $x(x+14) + 16(x+14) = 0$
 $(x+16)(x+14) = 0$
 $x = -16, -14$

II. $y^2 + 35y + 306 = 0$
 $y^2 + 18y + 17y + 306 = 0$
 $y(y+18) + 17(y+18) = 0$
 $(y+18)(y+17) = 0$
 $y = -18, -17$
 So, $x > y$

20. (b): I. $x = \sqrt[3]{4096}$

$x = 16$

II. $y^2 = 256$

$y = \sqrt{256}$

$= \pm 16$

So, $x \geq y$

21. (a): I. $2x^2 + 10x + 12 = 0$

$2x^2 + 6x + 4x + 12 = 0$

$(2x + 4)(x + 3) = 0$

$x = -3, -2$

II. $y^2 + 10y + 25 = 0$

$y^2 + 5y + 5y + 25 = 0$

$(y + 5)(y + 5) = 0$

$y = -5$

$\therefore x > y$

22. (a): I. $x^2 - 3x - 2x + 6 = 0$

$(x - 3)(x - 2) = 0$

$x = +3, +2$

II. $y^2 + 6y + y + 6 = 0$

$(y + 1)(y + 6) = 0$

$y = -1, -6$

$\therefore x > y$

23. (d): I. $x = \pm 25$

II. $y = +25$

$\therefore x \leq y$

24. (a): (I) $\times 2 -$ (II)

$-6y + 2y = -16$

$y = 4$

$x = 6$

$x > y$.

25. (e): I. $x = +11$

$y = +11$

$\therefore x = y$

26. (e): I. $x^2 + 21x + 108 = 0$

$x^2 + 9x + 12x + 108 = 0$

$x(x+9) + 12(x+9) = 0$

$(x+9)(x+12) = 0$

$x = -9, -12$

II. $y^2 + 24y + 143 = 0$

$y^2 + 11y + 13y + 143 = 0$

$y(y+11) + 13(y+11) = 0$

$(y+13)(y+11) = 0$

$y = -13, -11$

So, No relation

27. (d): I. $x^2 = 289$

$x = \pm 17$

II. $y = \sqrt{289}$

$y = 17$

So, $x \leq y$

28. (c): I. $x^2 - 25x + 156 = 0$

$x^2 - 12x - 13x + 156 = 0$

$x(x-12) - 13(x-12) = 0$

$(x-13)(x-12) = 0$

$x = 12, 13$

II. $y^2 - 32y + 255 = 0$

$y^2 - 15y - 17y + 255 = 0$

$y(y-15) - 17(y-15) = 0$

$(y-15)(y-17) = 0$

$y = 15, 17$

So, $x < y$

29. (a): I. $x^2 + 23x + 130 = 0$

$x^2 + 13x + 10x + 130 = 0$

$x(x+13) + 10(x+13) = 0$

$(x+13)(x+10) = 0$

$x = -13, -10$

II. $y^2 + 30y + 224 = 0$

$y^2 + 16y + 14y + 224 = 0$

$y(y+16) + 14(y+16) = 0$

$(y+16)(y+14) = 0$

$y = -16, -14$

So, $x > y$

30. (b): I. $x^2 - 28x + 195 = 0$

$x^2 - 13x - 15x + 195 = 0$

$x(x-13) - 15(x-13) = 0$

$(x-13)(x-15) = 0$

$x = 13, 15$

II. $y^2 - 22y + 117 = 0$

$y^2 - 13y - 9y + 117 = 0$

$y(y-13) - 9(y-13) = 0$

$(y-13)(y-9) = 0$

$y = 13, 9$

So, $x \geq y$

31. (a): I. $6x^2 + 5x + 1 = 0$

$6x^2 + 3x + 2x + 1 = 0$

$3x(2x+1) + 1(2x+1) = 0$

$(3x+1)(2x+1) = 0$

$x = \frac{1}{3}, \frac{1}{2}$

II. $2y^2 + 5y + 3 = 0$

$2y^2 + 2y + 3y + 3 = 0$

$2y(y+1) + 3(y+1) = 0$

$(2y+3)(y+1) = 0$

$y = -\frac{3}{2}, -1$

So, $x > y$

- 32. (d): I.** $x^2=4$
 $x = \pm 2$
II. $y^5 = 32$
 $y = 2$
 So, $x \leq y$
- 33. (c): I.** $x^2 - 11x + 30 = 0$
 $x^2 - 5x - 6x + 30 = 0$
 $x(x-5) - 6(x-5) = 0$
 $(x-5)(x-6) = 0$
 $x = 5, 6$
II. $y^2 - 15y + 56 = 0$
 $y^2 - 7y - 8y + 56 = 0$
 $y(y-7) - 8(y-7) = 0$
 $(y-7)(y-8) = 0$
 $y = 7, 8$
 So, $x < y$
- 34. (e): I.** $3x^2 - 14x + 15 = 0$
 $3x^2 - 9x - 5x + 15 = 0$
 $3x(x-3) - 5(x-3) = 0$
 $(x-3)(3x-5) = 0$
 $x = 3, \frac{5}{3}$
II. $5y^2 - 14y + 8 = 0$
 $5y^2 - 10y - 4y + 8 = 0$
 $5y(y-2) - 4(y-2) = 0$
 $(y-2)(5y-4) = 0$
 $y = 2, \frac{4}{5}$
 So, No relation
- 35. (b): I.** $x^2 + 13x + 42 = 0$
 $x^2 + 6x + 7x + 42 = 0$
 $x(x+6) + 7(x+6) = 0$
 $(x+6)(x+7) = 0$
 $x = -6, -7$
II. $y^2 + 16y + 63 = 0$
 $y^2 + 9y + 7y + 63 = 0$
 $y(y+9) + 7(y+9) = 0$
 $(y+9)(y+7) = 0$
 $y = -7, -9$
 So, $x \geq y$
- 36. (c): I.** $x^2 - 31x + 238 = 0$
 $x^2 - 17x - 14x + 238 = 0$
 $x(x-17) - 14(x-17) = 0$
 $(x-14)(x-17) = 0$
 $x = 14, 17$
II. $y^2 - 37y + 342 = 0$
 $y^2 - 18y - 19y + 342 = 0$
 $y(y-18) - 19(y-18) = 0$
 $(y-18)(y-19) = 0$
 $y = 18, 19$
 So, $x < y$

- 37. (d): I.** $x^2 + 215 = 1176$
 $x^2 = 961$
 $x = \pm 31$
II. $y = \sqrt{961}$
 $= 31$
 So, $x \leq y$
- 38. (e): I.** $x^2 + 18x + 77 = 0$
 $x^2 + 11x + 7x + 77 = 0$
 $x(x+11) + 7(x+11) = 0$
 $(x+11)(x+7) = 0$
 $x = -11, -7$
II. $y^2 + 22y + 117 = 0$
 $y^2 + 9y + 13y + 117 = 0$
 $y(y+9) + 13(y+9) = 0$
 $(y+9)(y+13) = 0$
 $y = -9, -13$
 So, No relation
- 39. (c): I.** $3x^2 + 25x + 50 = 0$
 $3x^2 + 15x + 10x + 50 = 0$
 $3x(x+5) + 10(x+5) = 0$
 $(3x+10)(x+5) = 0$
 $x = -5, -\frac{10}{3}$
II. $4y^2 + 23y + 33 = 0$
 $4y^2 + 12y + 11y + 33 = 0$
 $4y(y+3) + 11(y+3) = 0$
 $(y+3)(4y+11) = 0$
 $y = -3, -\frac{11}{4}$
 So, $x < y$
- 40. (d): I.** $2x^2 + 17x + 36 = 0$
 $2x^2 + 8x + 9x + 36 = 0$
 $2x(x+4) + 9(x+4) = 0$
 $(x+4)(2x+9) = 0$
 $x = -4, -4.5$
II. $3y^2 + 20y + 32 = 0$
 $3y^2 + 12y + 8y + 32 = 0$
 $3y(y+4) + 8(y+4) = 0$
 $(y+4)(3y+8) = 0$
 $y = -4, -2.67$
 So, $x \leq y$
- 41. (e): I.** $x^2 + 6x + 2x + 12 = 0$
 $(x+6)(x+2) = 0$
 $x = -2, -6$
II. $2y^2 + 8y + 6y + 24 = 0$
 $(y+4)(2y+6) = 0$
 $y = -3, -4$
 Hence, no relation can be established.

42. (b): I. $x^2 - 6x + 5x - 30 = 0$

$$(x - 6)(x + 5) = 0$$

$$x = 6, -5$$

II. $y^2 - 8y - 7y + 56 = 0$

$$(y - 8)(y - 7) = 0$$

$$y = 7, 8$$

Hence, $y > x$

43. (a): I. $x^2 + 25x + 6x + 150 = 0$

$$(x + 25)(x + 6) = 0$$

$$x = -6, -25$$

II. $y^2 + 26y + 28y + 728 = 0$

$$(y + 26)(y + 28) = 0$$

$$y = -26, -28$$

Hence, $x > y$

44. (c): I. $x^2 = 256$

$$x = \pm \sqrt{256}$$

$$x = +16, -16$$

II. $y = \sqrt{256}$

$$y = 16$$

Hence $y \geq x$

45. (e): I. $x^2 - 45x + 506 = 0$

$$x^2 - 23x - 22x + 506 = 0$$

$$(x - 23)(x - 22) = 0$$

$$x = 22, 23$$

II. $y^2 - 9y - 360 = 0$

$$y^2 - 24y + 15y - 360 = 0$$

$$(y - 24)(y + 15) = 0$$

$$y = -15, 24$$

Hence, no relation.

46. (c): I. $x^2 - 21x + 110 = 0$

$$x^2 - 11x - 10x + 110 = 0$$

$$x(x - 11) - 10(x - 11) = 0$$

$$(x - 11)(x - 10) = 0$$

$$x = 11, 10$$

II. $y^2 - 25y + 156 = 0$

$$y^2 - 13y - 12y + 156 = 0$$

$$y(y - 13) - 12(y - 13) = 0$$

$$(y - 13)(y - 12) = 0$$

$$y = 13, 12$$

So, $x < y$

47. (a): I. $x^2 + 29x + 208 = 0$

$$x^2 + 16x + 13x + 208 = 0$$

$$x(x + 16) + 13(x + 16) = 0$$

$$(x + 16)(x + 13) = 0$$

$$x = -16, -13$$

II. $y^2 + 35y + 306 = 0$

$$y^2 + 17y + 18y + 306 = 0$$

$$y(y + 17) + 18(y + 17) = 0$$

$$(y + 18)(y + 17) = 0$$

$$y = -17, -18$$

So, $x > y$

48. (b): I. $x = \sqrt[3]{4096}$

$$x = 16$$

II. $y^2 + 121 = 377$

$$y^2 = 256$$

$$y = \pm 16$$

So, $x \geq y$

49. (e): I. $3x^2 + 23x + 44 = 0$

$$3x^2 + 12x + 11x + 44 = 0$$

$$3x(x + 4) + 11(x + 4) = 0$$

$$(3x + 11)(x + 4) = 0$$

$$x = -4, -\frac{11}{3}$$

II. $4y^2 + 33y + 65 = 0$

$$4y^2 + 20y + 13y + 65 = 0$$

$$4y(y + 5) + 13(y + 5) = 0$$

$$(y + 5)(4y + 13) = 0$$

$$y = -5, -\frac{13}{4}$$

So, No relation

50. (b): I. $x^2 + 41x + 418 = 0$

$$x^2 + 19x + 22x + 418 = 0$$

$$x(x + 19) + 22(x + 19) = 0$$

$$(x + 19)(x + 22) = 0$$

$$x = -19, -22$$

II. $y^2 + 47y + 550 = 0$

$$y^2 + 22y + 25y + 550 = 0$$

$$y(y + 22) + 25(y + 22) = 0$$

$$(y + 22)(y + 25) = 0$$

$$y = -22, -25$$

So, $x \geq y$

Level - 2

1. (c): I. $2x^2 - 17x + 36 = 0$
 $2x^2 - 8x - 9x + 36 = 0$
 $2x(x - 4) - 9(x - 4) = 0$
 $(2x - 9)(x - 4) = 0$
 $x = \frac{9}{2}, 4$
- II. $3y^2 - 22y + 40 = 0$
 $3y^2 - 12y - 10y + 40 = 0$
 $3y(y - 4) - 10(y - 4) = 0$
 $(y - 4)(3y - 10) = 0$
 $y = 4, \frac{10}{3}$
 $x \geq y$
2. (a): I. $x^2 + 21x + 108 = 0$
 $x^2 + 9x + 12x + 108 = 0$
 $x(x + 9) + 12(x + 9) = 0$
 $(x + 12)(x + 9) = 0$
 $x = -12, -9$
- II. $y^2 + 14y + 48 = 0$
 $y^2 + 6y + 8y + 48 = 0$
 $y(y + 6) + 8(y + 6) = 0$
 $(y + 8)(y + 6) = 0$
 $y = -8, -6$
 $y > x$
3. (d): I. $2x^2 + 7x - 60 = 0$
 $2x^2 + 15x - 8x - 60 = 0$
 $x(2x + 15) - 4(2x + 15) = 0$
 $(x - 4)(2x + 15) = 0$
 $x = 4, \frac{-15}{2}$
- II. $3y^2 - 28y + 64 = 0$
 $3y^2 - 12y - 16y + 64 = 0$
 $3y(y - 4) - 16(y - 4) = 0$
 $(3y - 16)(y - 4) = 0$
 $y = \frac{16}{3}, 4$
 $y \geq x$
4. (e): I. $x^2 - 2x - 24 = 0$
 $x^2 - 6x + 4x - 24 = 0$
 $x(x - 6) + 4(x - 6) = 0$
 $(x + 4)(x - 6) = 0$
 $x = 6, -4$
- II. $y^2 + 3y - 40 = 0$
 $y^2 + 8y - 5y - 40 = 0$
 $y(y + 8) - 5(y + 8) = 0$
 $(y - 5)(y + 8) = 0$
 $y = 5, -8$
 No relation can be established

5. (b): I. $4x^2 + 27x + 45 = 0$
 $4x^2 + 12x + 15x + 45 = 0$
 $4x(x + 3) + 15(x + 3) = 0$
 $(4x + 15)(x + 3) = 0$
 $x = \frac{-15}{4}, -3$
- II. $5y^2 + 42y + 88 = 0$
 $5y^2 + 20y + 22y + 88 = 0$
 $5y(y + 4) + 22(y + 4) = 0$
 $(5y + 22)(y + 4) = 0$
 $y = -4, \frac{-22}{5}$
 $x > y$
6. (a): I. $x^3 = 2744$
 $x = 14$
- II. $y^2 = 324$
 $y = \pm 18$
 So, no relation can be established between x & y.
7. (e): I. $(5x - 7)^2 = 4 - x(3x - 1)$
 $25x^2 + 49 - 70x = 4 - 3x^2 + x$
 $\Rightarrow 28x^2 - 71x + 45 = 0$
 $28x^2 - 36x - 35x + 45 = 0$
 $4x(7x - 9) - 5(7x - 9) = 0$
 $(7x - 9)(4x - 5) = 0$
 $\Rightarrow x = \frac{9}{7}, \frac{5}{4}$
- II. $(4y - 3)^2 = y(4y - 1) - 1$
 $16y^2 + 9 - 24y = 4y^2 - y - 1$
 $\Rightarrow 12y^2 - 23y + 10 = 0$
 $12y^2 - 15y - 8y + 10 = 0$
 $3y(4y - 5) - 2(4y - 5) = 0$
 $(4y - 5)(3y - 2) = 0$
 $\Rightarrow y = \frac{5}{4}, \frac{2}{3}$
 So, $x \geq y$.
8. (b): I. $10x^2 - 29x + 21 = 0$
 $10x^2 - 15x - 14x + 21 = 0$
 $5x(2x - 3) - 7(2x - 3) = 0$
 $(2x - 3)(5x - 7) = 0$
 $\Rightarrow x = \frac{3}{2}, \frac{7}{5}$
- II. $2y^2 - 19y + 45 = 0$
 $2y^2 - 10y - 9y + 45 = 0$
 $2y(y - 5) - 9(y - 5) = 0$
 $(y - 5)(2y - 9) = 0$
 $\Rightarrow y = 5, \frac{9}{2}$
 So, $y > x$.

9. (c): I. $x^2 + 13x + 42 = 0$

$$x^2 + 7x + 6x + 42 = 0$$

$$x(x + 7) + 6(x + 7) = 0$$

$$(x + 7)(x + 6) = 0$$

$$\Rightarrow x = -7, -6$$

II. $y^2 + 8y + 12 = 0$

$$y^2 + 6y + 2y + 12 = 0$$

$$y(y + 6) + 2(y + 6) = 0$$

$$(y + 6)(y + 2) = 0$$

$$\Rightarrow y = -6, -2$$

So, $y \geq x$.

10. (a): I. $1 = \frac{1}{x} \left(2 - \frac{11}{36x} \right)$

$$1 = \frac{2}{x} - \frac{11}{36x^2}$$

$$1 = \frac{72x - 11}{36x^2}$$

$$36x^2 = 72x - 11$$

$$36x^2 - 72x + 11 = 0$$

$$36x^2 - 66x - 6x + 11 = 0$$

$$6x(6x - 11) - 1(6x - 11) = 0$$

$$(6x - 11)(6x - 1) = 0$$

$$\Rightarrow x = \frac{11}{6}, \frac{1}{6}$$

II. $\left(\frac{14y}{3} + \frac{9}{y} \right) = 13$

$$\frac{14y^2 + 27}{3y} = 13$$

$$14y^2 + 27 = 39y$$

$$14y^2 - 39y + 27 = 0$$

$$14y^2 - 21y - 18y + 27 = 0$$

$$7y(2y - 3) - 9(2y - 3) = 0$$

$$(2y - 3)(7y - 9) = 0$$

$$\Rightarrow y = \frac{3}{2}, \frac{9}{7}$$

So, no relation can be established between x and y .

11. (c): $x^2 + 24x + 119 = 0$

$$\Rightarrow x^2 + 7x + 17x + 119 = 0$$

$$\Rightarrow (x + 7)(x + 17) = 0$$

$$\Rightarrow x = -7, -17$$

And $3y^2 + 10y + 7 = 0$

$$\Rightarrow 3y^2 + 3y + 7y + 7 = 0$$

$$\Rightarrow (y + 1)(3y + 7) = 0$$

$$\Rightarrow y = -1, -\frac{7}{3}$$

So, $x < y$

12. (e): $(x + y)^2 = 361$

$$\Rightarrow x + y = \pm 19 \dots \dots (i)$$

$$\Rightarrow 92442 = y^2 + 92361$$

$$\Rightarrow y^2 = 81$$

$$\Rightarrow y = \pm 9 \dots \dots (ii)$$

Using (i) and (ii)

When $y = 9$

$$\Rightarrow x + y = \pm 19$$

$$\Rightarrow x = 10, -28$$

When $y = -9$

$$\Rightarrow x + y = \pm 19$$

$$\Rightarrow x = -10, 28$$

So, no relation can be obtained.

13. (b): $\sqrt{x + 4} = \sqrt{225} - \sqrt{121}$

$$\Rightarrow \sqrt{x + 4} = 4$$

$$\Rightarrow x + 4 = 16$$

$$\Rightarrow x = 12$$

And $y^2 = 473 - 329$

$$\Rightarrow y = \pm 12$$

So, $x \geq y$

14. (a): $223x + 122y = 791 \dots \dots (i)$

$$122x + 223y = 589 \dots \dots (ii)$$

Adding equation (i) and (ii)

$$345(x + y) = 1380$$

$$x + y = 4 \dots \dots (iii)$$

Subtract equation (ii) from (i)

$$101(x - y) = 202$$

$$x - y = 2 \dots \dots (iv)$$

From (iii) and (iv)

$$x = 3, y = 1$$

So, $x > y$

15. (c): $7x^2 - 21x - 23x + 69 = 0$

$$\Rightarrow (7x - 23)(x - 3) = 0$$

$$\Rightarrow x = 3, \frac{23}{7}$$

And $3y^2 - 21y - 19y + 133 = 0$

$$\Rightarrow (3y - 19)(y - 7) = 0$$

$$\Rightarrow y = 7, \frac{19}{3}$$

So, $x < y$

16. (a): I. $8x^2 - 10x + 3 = 0$

$$8x^2 - 6x - 4x + 3 = 0$$

$$2x(4x - 3) - 1(4x - 3) = 0$$

$$(2x - 1)(4x - 3) = 0$$

$$x = \frac{1}{2} \text{ or } \frac{3}{4}$$

II. $5y^2 + 14y - 3 = 0$

$$5y^2 + 15y - y - 3 = 0$$

$$5y(y + 3) - 1(y + 3) = 0$$

$$(5y - 1)(y + 3) = 0$$

$$y = \frac{1}{5} \text{ or } -3.$$

$\therefore x > y$

17. (a): I. $3x^2 + 13x + 12 = 0$
 $3x^2 + 9x + 4x + 12 = 0$
 $3x(x+3) + 4(x+3) = 0$
 $x = -3, -\frac{4}{3}$

II. $y^2 + 9y + 20 = 0$
 $y^2 + 5y + 4y + 20 = 0$
 $y(y+5) + 4(y+5) = 0$
 $y = -5, -4$
 $\therefore x > y$

18. (e): I. $x^2 - 4x - 5 = 0$
 $x^2 - 5x + x - 5 = 0$
 $x(x-5) + 1(x-5) = 0$
 $x = 5, -1$

II. $7y^2 - 25y - 12 = 0$
 $7y^2 - 28y + 3y - 12 = 0$
 $7y(y-4) + 3(y-4) = 0$
 $(y-4)(7y+3) = 0$
 $y = 4, -3/7$
 \therefore No relation.

19. (d): I. $x^3 = 216$
 $x = (216)^{1/3}$
 $x = 6$

II. $2y^2 - 25y + 78 = 0$
 $2y^2 - 12y - 13y + 78 = 0$
 $2y(y-6) - 13(y-6) = 0$
 $y = \frac{13}{2}, 6$
 $\therefore y \geq x$

20. (e): I. $5x^2 + 31x + 48 = 0$
 $5x^2 + 15x + 16x + 48 = 0$
 $5x(x+3) + 16(x+3) = 0$
 $x = -3, -16/5$

II. $3y^2 + 27y + 42 = 0$
 $3y^2 + 21y + 6y + 42 = 0$
 $3y(y+7) + 6(y+7) = 0$
 $y = -7, -2$

So, Relation cannot be established

21. (b): I. $6x^2 + 17x + 5 = 0$
 $6x^2 + 2x + 15x + 5 = 0$
 $2x(3x+1) + 5(3x+1) = 0$
 $\therefore x = -\frac{5}{2} \text{ or } -\frac{1}{3}$

II. $2y^2 + 21y + 49 = 0$
 $2y^2 + 14y + 7y + 49 = 0$
 $2y(y+7) + 7(y+7) = 0$
 $y = -7, -\frac{7}{2}$
 $\Rightarrow x > y$

22. (a): I. $x^2 - 8x + 15 = 0$
 $x^2 - 5x - 3x + 15 = 0$
 $x(x-5) - 3(x-5) = 0$
 $\therefore x = 3 \text{ or } 5$

II. $2y^2 - 5y - 3 = 0$
 $2y^2 - 6y + y - 3 = 0$
 $2y(y-3) + 1(y-3) = 0$
 $y = 3 \text{ or } -\frac{1}{2}$
 $\therefore x \geq y$

23. (e): I. $5x^2 + 11x + 2 = 0$
 $5x^2 + 10x + x + 2 = 0$
 $5x(x+2) + 1(x+2) = 0$
 $x = -2 \text{ or } -\frac{1}{5}$

II. $4y^2 + 13y + 3 = 0$
 $4y^2 + 12y + y + 3 = 0$
 $4y(y+3) + 1(y+3) = 0$
 $\therefore y = -3 \text{ or } -\frac{1}{4}$
 \therefore no relation

24. (b): I. $4x + 2y = 4$... (i)

II. $3x + 5y = 3$... (ii)

Multiplying (i) by 5 & (ii) by 2 and on solving
 $x = 1, y = 0$
 $\therefore x > y$

25. (d): I. $6x^2 + x - 15 = 0$
 $6x^2 - 9x + 10x - 15 = 0$
 $3x(2x-3) + 5(2x-3) = 0$
 $\therefore x = \frac{3}{2} \text{ or } -\frac{5}{3}$

II. $4y^2 - 24y + 35 = 0$
 $4y^2 - 14y - 10y + 35 = 0$
 $2y(2y-7) - 5(2y-7) = 0$
 $\therefore y = \frac{7}{2} \text{ or } \frac{5}{2}$
 $\therefore y > x$

26. (a): I. $x^2 - 11x + 30 = 0$
 $x^2 - 6x - 5x + 30 = 0$
 $x(x-6) - 5(x-6) = 0$
 $(x-6)(x-5) = 0$
 $x = 6, 5$

II. $56y^2 - 151y + 99 = 0$
 $56y^2 - 88y - 63y + 99 = 0$
 $8y(7y-11) - 9(7y-11) = 0$
 $(7y-11)(8y-9) = 0$
 $y = \frac{11}{7}, \frac{9}{8}$
 So, $x > y$.

27. (e): I. $x^2 - 4\sqrt{3}(\sqrt{3} + 1)x + 48\sqrt{3} = 0$

$$x^2 - 12x - 4\sqrt{3}x + 48\sqrt{3} = 0$$

$$x(x - 12) - 4\sqrt{3}(x - 12) = 0$$

$$(x - 12)(x - 4\sqrt{3}) = 0$$

$$x = 12, 4\sqrt{3}$$

II. $y^2 - 2\sqrt{5}(\sqrt{5} + 2)y + 40\sqrt{5} = 0$

$$y^2 - 10y - 4\sqrt{5}y + 40\sqrt{5} = 0$$

$$y(y - 10) - 4\sqrt{5}(y - 10) = 0$$

$$(y - 10)(y - 4\sqrt{5}) = 0$$

$$y = 10, 4\sqrt{5}$$

So, no relation can be established between x and y.

28. (c): I. $21 + \frac{1}{x} \left(43 + \frac{20}{x} \right) = 0$

$$21 + \frac{43}{x} + \frac{20}{x^2} = 0$$

$$\frac{21x^2 + 43x + 20}{x^2} = 0$$

$$21x^2 + 43x + 20 = 0$$

$$21x^2 + 28x + 15x + 20 = 0$$

$$7x(3x + 4) + 5(3x + 4) = 0$$

$$(3x + 4)(7x + 5) = 0$$

$$x = \frac{-4}{3}, \frac{-5}{7}$$

II. $4\left(3y + \frac{7}{y}\right) + 37 = 0$

$$12y + \frac{28}{y} + 37 = 0$$

$$\frac{12y^2 + 28 + 37y}{y} = 0$$

$$12y^2 + 37y + 28 = 0$$

$$12y^2 + 21y + 16y + 28 = 0$$

$$3y(4y + 7) + 4(4y + 7) = 0$$

$$(4y + 7)(3y + 4) = 0$$

$$y = \frac{-7}{4}, \frac{-4}{3}$$

$$\text{So, } x \geq y$$

29. (a): I. $(x + 15)^2 = (y + 19)^2$

$$x + 15 = y + 19$$

$$x - y = 4 \quad \dots \text{(i)}$$

II. $x^2 - y^2 = 112$

$$(x + y)(x - y) = 112 \quad \dots \text{(ii)}$$

From (i) and (ii), we get:

$$x + y = 28 \quad \dots \text{(iii)}$$

Now, from (i) and (iii), we get:

$$x = 16, y = 12$$

$$\text{So, } x > y$$

30. (e): I. $\frac{1}{3} + \frac{5}{x^2} = \frac{8}{3x}$

$$\frac{x^2 + 15}{3x^2} = \frac{8}{3x}$$

$$x^2 + 15 = 8x$$

$$x^2 - 8x + 15 = 0$$

$$x^2 - 5x - 3x + 15 = 0$$

$$x(x - 5) - 3(x - 5) = 0$$

$$(x - 5)(x - 3) = 0$$

$$x = 3, 5$$

II. $\frac{y}{2} + \frac{21}{2y} = 5$

$$\frac{y^2 + 21}{2y} = 5$$

$$y^2 + 21 = 10y$$

$$y^2 - 10y + 21 = 0$$

$$y^2 - 7y - 3y + 21 = 0$$

$$y(y - 7) - 3(y - 7) = 0$$

$$(y - 7)(y - 3) = 0$$

$$y = 3, 7$$

So, no relation between x and y can be established.

31. (a): I. $5x^2 - 25x - 6x + 30 = 0$

$$5x(x - 5) - 6(x - 5) = 0$$

$$(x - 5)(5x - 6) = 0$$

$$x = 5, \frac{6}{5}$$

II. $8y^2 - 8y - 4y + 4 = 0$

$$8y(y - 1) - 4(y - 1) = 0$$

$$y = 1, \frac{1}{2}$$

$$x > y$$

32. (e): I. $7x^2 - 14x - 3x + 6 = 0$

$$7x(x - 2) - 3(x - 2) = 0$$

$$(7x - 3)(x - 2) = 0$$

$$x = 2, \frac{3}{7}$$

II. $5y^2 - 20y - 4y + 16 = 0$

$$5y(y - 4) - 4(y - 4) = 0$$

$$y = 4, \frac{4}{5}$$

No relation

33. (e): I. $13x^2 + 13x - 4x - 4 = 0$

$$13x(x + 1) - 4(x + 1) = 0$$

$$(13x - 4)(x + 1) = 0$$

$$x = -1, \frac{4}{13}$$

II. $2y^2 + 3y - 2y - 3 = 0$

$$y(2y + 3) - 1(2y + 3) = 0$$

$$(y - 1)(2y + 3) = 0$$

$$y = 1, \frac{-3}{2}$$

No relation

34. (a): I. $3x^2 - 36x - 24x + 288 = 0$
 $3x(x - 12) - 24(x - 12) = 0$
 $(x - 12)(3x - 24) = 0$
 $x = 12, 8$

II. $4y^2 - 24y - 26y + 156 = 0$
 $4y(y - 6) - 26(y - 6) = 0$
 $(y - 6)(4y - 26) = 0$
 $y = 6, \frac{13}{2}$
 $x > y$

35. (e): I. $15x^2 + 15x - 5x - 5 = 0$
 $15x(x + 1) - 5(x + 1) = 0$
 $(x + 1)(15x - 5) = 0$
 $x = -1, \frac{1}{3}$

II. $6y^2 + 6y - 4y - 4 = 0$
 $6y(y + 1) - 4(y + 1) = 0$
 $(y + 1)(6y - 4) = 0$
 $y = -1, \frac{2}{3}$
 No relation

36. (e): I. $x^2 - 12x + 32 = 0$
 $x^2 - 8x - 4x + 32 = 0$
 $x(x - 8) - 4(x - 8) = 0$
 $(x - 8)(x - 4) = 0$
 $x = 8, 4$

II. $y^2 - 20y + 96 = 0$
 $y^2 - 12y - 8y + 96 = 0$
 $y(y - 12) - 8(y - 12) = 0$
 $(y - 8)(y - 12) = 0$
 $y = 8, 12$
 $y \geq x$

37. (b): I. $2x^2 - 3x - 20 = 0$
 $2x^2 - 8x + 5x - 20 = 0$
 $2x(x - 4) + 5(x - 4) = 0$
 $(x - 4)(2x + 5) = 0$
 $x = 4, -5/2$

II. $2y^2 + 11y + 15 = 0$
 $2y^2 + 6y + 5y + 15 = 0$
 $2y(y + 3) + 5(y + 3) = 0$
 $(2y + 5)(y + 3) = 0$
 $y = -\frac{5}{2}, -3$
 $x \geq y$

38. (c): I. $x^2 - x - 6 = 0$
 $x^2 - 3x + 2x - 6 = 0$
 $x(x - 3) + 2(x - 3) = 0$
 $(x - 3)(x + 2) = 0$
 $x = 3, -2$

II. $y^2 - 6y + 8 = 0$
 $y^2 - 2y - 4y + 8 = 0$
 $y(y - 2) - 4(y - 2) = 0$
 $(y - 2)(y - 4) = 0$
 $y = 2, 4$

No relation can be established between x and y

39. (c): I. $x^2 + 14x - 32 = 0$
 $x^2 + 16x - 2x - 32 = 0$
 $x(x + 16) - 2(x + 16) = 0$
 $(x - 2)(x + 16) = 0$
 $x = -16, 2$

II. $y^2 - y - 12 = 0$
 $y^2 - 4y + 3y - 12 = 0$
 $y(y - 4) + 3(y - 4) = 0$
 $(y + 3)(y - 4) = 0$
 $y = -3, 4$
 No relation

40. (a): I. $x^2 - 9x + 20 = 0$
 $x^2 - 5x - 4x + 20 = 0$
 $x(x - 5) - 4(x - 5) = 0$
 $(x - 4)(x - 5) = 0$
 $x = 4, 5$

II. $2y^2 - 12y + 18 = 0$
 $2y^2 - 6y - 6y + 18 = 0$
 $2y(y - 3) - 6(y - 3) = 0$
 $(2y - 6)(y - 3) = 0$
 $y = 3, 3$
 $x > y$

41. (d): I. $x^2 + 9x = 25x - 63$
 $x^2 - 16x + 63 = 0$
 $x = 9, 7$

II. $4y^2 - 34y + 72 = 0$
 $4y^2 - 18y - 16y + 72 = 0$
 $y = \frac{9}{2}, 4$
 $\therefore x > y$

42. (c): I. $\frac{1}{5} \times \frac{225}{x} = -x + 14$
 $-45 = x^2 - 14x$
 $x^2 - 14x + 45 = 0$
 $x^2 - 9x - 5x + 45 = 0$
 $x = 9, 5$

II. $21y = y^2 + 90$
 $y^2 - 21y + 90 = 0$
 $y^2 - 15y - 6y + 90 = 0$
 $y = 15, 6$
 \therefore No relation

43. (a): I. $6x + 7y = 15$

II. $3x + 14y = 19.5$

Solving (i) and (ii)

$$x = \frac{7}{6}, y = \frac{8}{7}$$

$$x > y$$

44. (c): I. $7x^2 + 5x - 18 = 0$

$$7x^2 - 9x + 14x - 18 = 0$$

$$x(7x - 9) + 2(7x - 9) = 0$$

$$x = \frac{9}{7}, -2$$

II. $3y^2 + 4y - 20 = 0$

$$3y^2 + 10y - 6y - 20 = 0$$

$$y(3y + 10) - 2(3y + 10) = 0$$

$$y = 2, -\frac{10}{3}$$

∴ No relation

45. (e): I. $x^2 + 5x = 25x$

$$x^2 - 20x = 0$$

$$x(x - 20) = 0$$

$$x = 0, 20$$

II. $3y^2 + 2y = 2y + 12$

$$3y^2 = 12$$

$$y^2 = 4$$

$$y = \pm 2$$

∴ No relation.

46. (c): I. $12x^2 - 16x + 5 = 0$

$$12x^2 - 10x - 6x + 5 = 0$$

$$2x(6x - 5) - 1(6x - 5) = 0$$

$$(6x - 5)(2x - 1) = 0$$

$$x = \frac{5}{6}, \frac{1}{2}$$

II. $30y^2 - 61y + 30 = 0$

$$30y^2 - 36y - 25y + 30 = 0$$

$$6y(5y - 6) - 5(5y - 6) = 0$$

$$(5y - 6)(6y - 5) = 0$$

$$y = \frac{6}{5}, \frac{5}{6}$$

$$\text{So, } x \leq y$$

47. (d): I. $x^2 - 16x + 63 = 0$

$$x^2 - 9x - 7x + 63 = 0$$

$$x(x - 9) - 7(x - 9) = 0$$

$$(x - 9)(x - 7) = 0$$

$$x = 7, 9$$

II. $y^2 - 12y + 35 = 0$

$$y^2 - 7y - 5y + 35 = 0$$

$$y(y - 7) - 5(y - 7) = 0$$

$$(y - 7)(y - 5) = 0$$

$$y = 5, 7$$

$$\text{So, } x \geq y$$

48. (e): I. $32x^2 + 44x + 15 = 0$

$$32x^2 + 24x + 20x + 15 = 0$$

$$8x(4x + 3) + 5(4x + 3) = 0$$

$$(4x + 3)(8x + 5) = 0$$

$$x = \frac{-3}{4}, \frac{-5}{8}$$

II. $42y^2 + 53y + 15 = 0$

$$42y^2 + 35y + 18y + 15 = 0$$

$$7y(6y + 5) + 3(6y + 5) = 0$$

$$(6y + 5)(7y + 3) = 0$$

$$y = \frac{-5}{6}, \frac{-3}{7}$$

So, no relation

49. (e): I. $(x - 2)^2 = x - 2$

$$x^2 + 4 - 4x = x - 2$$

$$x^2 - 5x + 6 = 0$$

$$x^2 - 3x - 2x + 6 = 0$$

$$x(x - 3) - 2(x - 3) = 0$$

$$(x - 3)(x - 2) = 0$$

$$x = 2, 3$$

II. $9y^2 - 36y + 35 = 0$

$$9y^2 - 21y - 15y + 35 = 0$$

$$3y(3y - 7) - 5(3y - 7) = 0$$

$$(3y - 7)(3y - 5) = 0$$

$$y = \frac{7}{3}, \frac{5}{3}$$

So, no relation

50. (b): I. $18x^2 + 39x + 20 = 0$

$$18x^2 + 24x + 15x + 20 = 0$$

$$6x(3x + 4) + 5(3x + 4) = 0$$

$$(3x + 4)(6x + 5) = 0$$

$$x = \frac{-4}{3}, \frac{-5}{6}$$

II. $10y^2 + 29y + 21 = 0$

$$10y^2 + 15y + 14y + 21 = 0$$

$$5y(2y + 3) + 7(2y + 3) = 0$$

$$(2y + 3)(5y + 7) = 0$$

$$y = \frac{-3}{2}, \frac{-7}{5}$$

So, $x > y$

51. (e): I. $x^2 + 4x - 3x - 12 = 0$

$$(x + 4)(x - 3) = 0$$

$$x = 3, -4$$

II. $y^2 + 5y - 3y - 15 = 0$

$$(y + 5)(y - 3) = 0$$

$$y = -5, 3$$

⇒ no relation can be established

52. (b): I. $6x^2 - 2x - 3x + 1 = 0$

$(2x - 1)(3x - 1) = 0$

$x = \frac{1}{2}, \frac{1}{3}$

II. $3y^2 + 9y - y - 3 = 0$

$3y(y + 3) - 1(y + 3) = 0$

$(3y - 1)(y + 3) = 0$

$y = -3, \frac{1}{3}$

$\Rightarrow x \geq y$

53. (d): I. $12x^2 - 3x - 4x + 1 = 0$

$(3x - 1)(4x - 1) = 0$

$x = \frac{1}{3}, \frac{1}{4}$

II. $6y^2 - 2y - 3y + 1 = 0$

$(2y - 1)(3y - 1) = 0$

$y = \frac{1}{2}, \frac{1}{3}$

$\Rightarrow y \geq x$

54. (d): I. $x^2 + 2x + 5x + 10 = 0$

$(x + 2)(x + 5) = 0$

$x = -2, -5$

II. $2y^2 + 4y + y + 2 = 0$

$(y + 2)(2y + 1) = 0$

$y = -\frac{1}{2}, -2$

$\Rightarrow x \leq y$

55. (e): I. $x^2 - 5x + 3x - 15 = 0$

$(x - 5)(x + 3) = 0$

$x = 5, -3$

II. $y^2 + 4y + y + 4 = 0$

$(y + 4)(y + 1) = 0$

$y = -1, -4$

\Rightarrow No relation can be established between x & y.

Mains Solutions

1. (b): Quantity I

Let the number be $10x + y$

Acc. to question

$y = x + 2$

and

$(10x + y)(x + y) = 144$

$(10x + x + 2)(x + x + 2) = 144$

$(11x + 2)(x + 1) = 72$

$11x^2 + 13x + 2 = 72$

$11x^2 + 13x - 70 = 0$

$11x^2 + 35x - 22x - 70 = 0$

On solving $x = 2$

Number is 24

Quantity II > Quantity I

2. (b): Quantity I

Let they meet after 'n' days

Applying Arithmetic progression

$\frac{n}{2}[2 \times 15 + (n - 1)(-1)] + \frac{n}{2}[2 \times 10 + (n - 1)2] = 165$

$\frac{n}{2}[30 - n + 1 + 20 + 2n - 2] = 165$

$\frac{n}{2}[30 - n + 1 + 20 + 2n - 2] = 165$

$n^2 + 49n - 330 = 0$

$n = -55, +6$

so, they will meet in 6 days

Quantity II

Let required no. of days = x

$\frac{(x-5)}{10} + \frac{(x-3)}{12} + \frac{x}{15} = 1$

$\frac{6x-30+5x-15+4x}{60} = 1$

$15x - 45 = 60$

$15x = 105$

$x = 7$ Days

Quantity II > Quantity I

3. (a): Quantity I:

Let present age of Randy = x

$\frac{x-10}{12} = 24 - 19$

$x - 10 = 5 \times 12$

$x = 70$ years

Quantity II:

Required average

$= \frac{14 \times \frac{111}{4} - 2 \times 42}{12} = \frac{777 - 84}{12}$

$= \frac{609}{12} = \frac{203}{4} = 25.375$ year

Quantity I > Quantity II

4. (a): Quantity I:

Let C.P of 100 gm = 100 Rs

So, he purchases 120 gm in 100 Rs

And sell 90 gm in = $\frac{105}{100} \times 100$ RS

So, % profit

$= \frac{\text{S.P.} - \text{C.P.}}{\text{C.P.}} \times 100 = \frac{\frac{105}{100} \times 100 - 100}{100} \times 100$

$= \frac{21}{10} \times 100 = \frac{21 \times 10}{1} = 210\%$

$= \frac{36}{90} \times 100 = 40\%$ profit

Quantity II:

50% \rightarrow 12 Rs

So, 100 \rightarrow 24 Rs

So, 80% \rightarrow 19.2

There will be 0% profit if the book were sold for Rs.4.8 more
Quantity I > Quantity II

5. (e): **Quantity I:**

Let first we arrange all 4 men in 4! Ways then we arrange 4 women in 4P_4 ways at 4 places either left of the man or right of the man.
 $= 4! \times {}^4P_4 + 4! \times {}^4P_4 = 2 \times 576 = 1152$

Quantity II:

Let first we arrange 4 men in 3! Ways, then 4 women can be arranged in 4 places in 4P_4 ways
 $= 3! \times {}^4P_4 = 144 = 144 \times 8 = 1152$

6. (b): **Quantity I:** Let C.P. of both shirts be Rs. 100

Total C.P. = Rs. 200
Total S.P. of both shirts = $1.2 \times 100 + 0.9 \times 100 =$
Rs. 210
Overall profit = $\frac{(210-200)}{200} \times 100 = 5\%$

Quantity II: Let C.P. of one-metre cloth be Rs. x
And S.P. of one-metre cloth be Rs. y
Then,

$$20y - 20x = 5x$$

$$\Rightarrow 20y = 25x$$

$$\Rightarrow \frac{y}{x} = \frac{5}{4}$$

$$\text{Profit}\% = \frac{(5-4)}{4} \times 100 = 25\%$$

Quantity II > Quantity I

7. (b): **Quantity I:** Volume of cube left = $7^3 - \pi \left(\frac{7}{2}\right)^2 \times 7$

$$= 343 - \frac{22}{7} \times \frac{49 \times 7}{4}$$

$$= 343 - 269.5 = 73.5 \text{ cm}^3$$

Quantity II: Surface area of cube left

$$= 6 \times 7^2 - 2 \cdot \pi \left(\frac{7}{2}\right)^2 + 2\pi \left(\frac{7}{2}\right) 7$$

$$= 294 - 77 + 154 = 371 \text{ cm}^2$$

Quantity II > Quantity I

8. (e): **Quantity I:** Liters of milk removed = $\frac{1}{5} \times 10 = 2$ ltr.

Remaining milk = 8 ltr

$$\text{Liters of water removed} = \frac{1}{5} \times 2.5 = 0.5 \text{ ltr.}$$

Remaining water = 2 ltr

So milk : water = 4:1

$$\frac{2+x}{8} = \frac{4}{1}$$

$$\Rightarrow x = 30$$

$$\frac{32}{8+y} = \frac{1}{4} \Rightarrow y = 128 - 8 = 120 \text{ ltr.}$$

Quantity II : 120 ltr

Quantity I = Quantity II.

9. (b): Let, total units of work be 32 units

Then P does 2 units per day.

& Q does 1 unit per day.

Quantity I:

3 units are done in 2 days.

30 units are done in 20 days.

On 21st day P does 2 units and work gets completed.

Quantity II:

3 units are done in 2 days

30 units are done in 20 days.

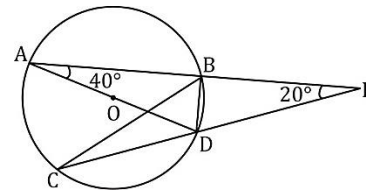
On 21st day Q does 1 unit work.

P completes the remaining one unit in another $\frac{1}{2}$ day

$$\text{Total days} = 21 \frac{1}{2}$$

Quantity II > quantity I

10. (b):



$\angle ABD = 90^\circ$ (angle in semicircle)

$\angle DBP = 90^\circ$

$\angle BCD = \angle DAB = 40^\circ$ (angle subtended by same arc in same segment)

$$\angle BCD + \angle CPB + \angle CBD + \angle DBP = 180^\circ$$

$$\Rightarrow 40^\circ + 20^\circ + \angle DBC + 90^\circ = 180^\circ$$

$$\Rightarrow \angle DBC = 30^\circ$$

$$\angle ADB = 180^\circ - \angle DAB - \angle ABD = 180^\circ - 40^\circ - 90^\circ = 50^\circ$$

Quantity II > Quantity I

11. (a): **Quantity I:** $12320 = \pi(7x)^2 \times 10x$

$$\Rightarrow 12320 = \frac{22}{7} \times 49x^3 \times 10$$

$$\Rightarrow x^3 = 8 \Rightarrow x = 2$$

Height = $10x = 20$ cm.

Quantity II: $\frac{1}{3} \pi \times 2^2 \times 3 = \pi \times 2^2 \times h$

$$\Rightarrow h = 1 \text{ cm.}$$

Level of kerosene in jar = 1 cm.

Quantity I > Quantity 2

12. (c): **Quantity I:** $p^2 - 18p + 77 = 0$

$$\Rightarrow p^2 - 11p - 7p + 77 = 0$$

$$\Rightarrow (p - 11)(p - 7) = 0$$

$$\Rightarrow p = 11, 7$$

Quantity II: $3q^2 - 25q + 28 = 0$

$$\Rightarrow 3q^2 - 21q - 4q + 28 = 0$$

$$\Rightarrow (3q - 4)(q - 7) = 0$$

$$\Rightarrow q = 7, \frac{4}{3}$$

Quantity I \geq Quantity II

13. (b): **Quantity I:** Let, speed of current be x m/minute

$$\frac{200}{48-x} = \frac{200}{48+x} + 10$$

$$\Rightarrow x = 32 \text{ m/min.}$$

Quantity II: $\frac{3 \times 2 \times \frac{22}{7} \times 49}{14} = 66 \text{ m/min}$

Quantity II > Quantity I.

14. (e): Let $m \rightarrow$ men

$w \rightarrow$ women

$b \rightarrow$ boy

$$(10m + 15w) 8 = (12m + 8w) 10$$

$$80m + 120w = 120m + 80w$$

$$40m = 40w$$

$$\text{And, } m = w = 2B$$

Quantity I

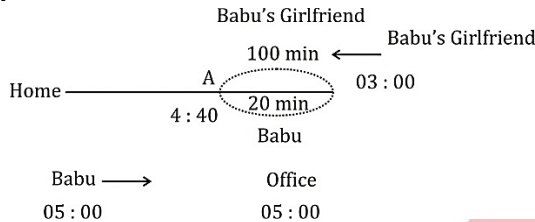
$$\rightarrow 2m + 4w + 18b \rightarrow 2m + 4m + 9m \rightarrow 15m$$

Quantity II

$$\rightarrow 9m + 3w + 6b \Rightarrow 9m + 3m + 3m \rightarrow 15m$$

\therefore Quantity I = Quantity II

15. (a):



Babu returns home 40 minute earlier so he saves 20 min on going and 20 min in returning

So girlfriend travels 100 min before meeting point

Because babu does not go G to A to A and A to O.

	Time	Speed	
Babu	20	5	$\times 40 \rightarrow 200 \text{ km/hr}$
:	:	:	

Girlfriend	100	5	$\times 40 \rightarrow 40 \text{ km/hr}$
------------	-----	---	--

Quantity I $\rightarrow 200 \text{ km/h}$

Quantity II $\rightarrow 197 \text{ km/h}$

\therefore Quantity I > Quantity II

16. (b): CP MP SP
555x 700x (700x - 68)

$$\therefore \frac{120}{100} \times 555x = 700x - 68$$

$$666x = 700x - 68$$

$$34x = 68$$

$$x = 2$$

\therefore Quantity I $\rightarrow CP = 2 \times 555 = 1110 \text{ Rs.}$

\therefore Quantity I < Quantity II

17. (b): Let, Manoj and Shubham take ' x ' hrs. to complete the work working together.

Let, Manoj does ' m ' units per hour.

And Shubham does ' n ' units per hour.

$$\text{ATQ, } m(x + 4.8) = (m + n)x$$

$$\text{or, } 4.8m = nx \text{(i)}$$

also,

$$n(x + 10.8) = (m + n)x$$

$$\text{or, } 10.8n = mx$$

$$\text{or, } mx = 10.8 \text{(ii)}$$

Dividing (i) by (ii),

$$\frac{m}{n} = \frac{3}{2}$$

Putting this in equation (i)

$$\frac{4.8}{x} = \frac{x}{10.8}$$

or,

$$x^2 = 4.8 \times$$

10.8 $\left[\begin{array}{l} \text{This step can be directly applied} \\ \text{to these type of questions} \\ \text{(Short - cut approach)} \end{array} \right]$

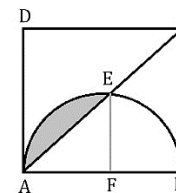
$$x^2 = \frac{48 \times 108}{100}$$

$$\text{or, } x^2 = \frac{12 \times 4 \times 12 \times 9}{10 \times 10}$$

$$\text{or, } x = \frac{12 \times 3 \times 2}{10} = 7.2 \text{ hrs.}$$

Quantity I < Quantity II

18. (b): **Quantity I:**



Draw $EF \parallel BC$

Now, E and F are mid-points of AC and AB respectively.

$$AF = 5 \text{ cm, } EF = 5 \text{ cm}$$

$$\text{Radius of semi-circle} = 5 \text{ cm}$$

$$\text{Area of shaded region} = \frac{1}{4} \text{ Area of circle} - \text{Area of } \Delta AFE$$

$$= \frac{1}{4} \times \frac{22}{7} \times 5 \times 5 - \frac{1}{2} \times 5 \times 5 \approx 7.14 \text{ cm}^2$$

Quantity I < Quantity II

19. (a): **Quantity 1:**

Let original duration and speed be ' t ' hr. and ' s ' km/hr. respectively.

$$\text{ATQ, } st = 3000 \text{(i)}$$

$$\text{Also, } (s - 1000)(t + 1) = 3000 \text{(ii)}$$

$$\Rightarrow st + s - 100t - 100 = 3000$$

$$\Rightarrow 3000 + s - 100t - 100 = 3000$$

$$\Rightarrow s - 100t = 100$$

Putting ' s ' from (i),

$$\frac{3000}{t} - 100t = 100$$

$$\Rightarrow 100t^2 + 100t - 3000 = 0$$

$$\Rightarrow t^2 + t - 30 = 0$$

$$\Rightarrow (t + 6)(t - 5) = 0$$

$$\Rightarrow t = 5 \text{ hr.}$$

Quantity 2:

New speed = $\frac{3}{4}$ th of original

Hence, new time = $\frac{4}{3}$ th of original

i.e., $\frac{1}{3}$ th of original time = $\frac{20}{60} = \frac{1}{3}$

or, Original time = 1 hr.

Quantity I > Quantity II

20. (e): Perimeter of smaller wheel = $2\pi \cdot \frac{7}{2} = 7\pi$ cm

Perimeter of larger wheel = $2\pi \cdot \frac{14}{2} = 14\pi$ cm

Let, both take 'x' revolutions per second,

Then, $(7\pi + 14\pi)10x = 1990.50 - 10.5$

or, $x = \frac{198}{21\pi} = \frac{198 \times 7}{21 \times 22} = 3$

speed of smaller wheel = $7\pi \times 3 = 21\pi$ cm./s.

Quantity I = Quantity II

21. (a): $7x + 6y + 4z = 122$... (i)

$4x + 5y + 3z = 88$... (ii)

$9x + 2y + z = 78$... (iii)

By equation (iii) $\times 3$ - equation (ii)

$27x + 6y + 3z = 234$

$4x + 5y + 3z = 88$

$23x + y = 146$... (iv)

By equation (iii) $\times 4$ - equation (i)

$36x + 8y + 4z = 312$

$7x + 6y + 4z = 122$

$29x + 2y = 190$... (v)

By equation (iv) $\times 2$ - equation (v)

$46x + 2y = 292$

$29x + 2y = 190$

$17x = 102$

$x = 6$

from eqn. (iv)

$23 \times 6 + y = 146 \Rightarrow y = 146 - 138 = 8$

From equation (iii)

$9 \times 6 + 2 \times 8 + z = 78$

$\Rightarrow 54 + 16 + z = 78$

$z = 78 - 70 = 8; \Rightarrow x = 6, y = 8, z = 8$

Hence, $x < y = z$

22. (c): By equation (ii) $\times 2$ - equation (i)

$8x + 6y = 118$

$7x + 6y = 110$

$x = 8$

from equation (i), $7 \times 8 + 6y = 110$

$\Rightarrow 6y = 110 - 56 = 54 \Rightarrow y = 9$

from equation (iii)

$8 + z = 15 \Rightarrow z = 7$; clearly, $x < y > z$

23. (e): I. $x = \sqrt{(36)^{\frac{1}{2}} \times (1296)^{\frac{1}{4}}} = \sqrt{6 \times 6} = 6$

By equation (ii) $\times 3$ - equation (iii)

$6y + 9z = 99$

$6y + 5z = 71$

$4z = 28 \Rightarrow z = 7$

from equation (ii)

$2y + 3 \times 7 = 33 \Rightarrow y = 6$

Hence, none of the above relationships is established.

24. (d): by equation (i) $\times 5$ - (ii) $\times 8$

$40x + 35y = 675$

$40x + 48y = 792$

$-13y = -117$

$\Rightarrow y = 9$

from equation (i)

$8x + 7 \times 9 = 135 \Rightarrow 8x = 135 - 63 = 72 \Rightarrow x = 9$

from equation (iii)

$9 \times 9 + 8z = 121 \Rightarrow 8z = 121 - 81 = 40 \Rightarrow z = 5$

Clearly $x = y > z$

25. (e): I. $(x + y)^3 = 1331 \Rightarrow x + y = 11 \Rightarrow y = 11 - x$

put it in equation (iii)

$x(11 - x) = 28 \Rightarrow 11x - x^2 = 28$

$x^2 - 11x + 28 = 0 \Rightarrow x^2 - 7x - 4x + 28 = 0$

$x(x - 7) - 4(x - 7) = 0 \Rightarrow (x - 7)(x - 4) = 0$

So, $x = 7, 4$

from equation (i)

$y = 4, 7$

from equation (ii)

$7 - 4 + z = 0, z = -3$

or, $4 - 7 + z = 0, z = 3$

Hence, no relation can be established.

26. (c): By equation (i) $\times 2$ - (ii)

$2x + 6y + 8z = 96 \times 2$

$2x + 8z = 80$

$6y = 112$

$y = \frac{112}{6}$

By equation (iii)

$2x + 6 \times \frac{112}{6} = 120 \Rightarrow 2x = 8 \Rightarrow x = 4$

By equation (ii)

$8z = 80 - 8 \Rightarrow 8z = 72 \Rightarrow z = 9$

Hence $x < y > z$

27. (c):I. $\frac{3x}{3x+7} - \frac{3x+7}{3x} = 14$
 $-49 - 42x = 14 \times 9x^2 + 14 \times 21x$
 $-49 - 42x = 126x^2 + 294x$
 $126x^2 + 336x + 49 = 0$
Hence $x = -a, -b$
both roots of x are -ve

II. $\frac{y}{18y-5} - \frac{18y-5}{y} = 2$
 $\frac{y^2 - 324y^2 - 25 + 180y}{18y^2 - 5y} = 2$
 $y^2 - 324y^2 - 25 + 180y = 36y^2 - 10y$
 $359y^2 - 190y + 25 = 0$
Hence $y = +c, +d$
both roots of y are +ve
 $\Rightarrow y > x$

28. (e):I. $\frac{x^2+x^2+49+14x}{x^2+7x} = 12$
 $2x^2 + 49 + 14x = 12x^2 + 84x$
 $10x^2 + 70x - 49 = 0 \Rightarrow x = -a, +b$

II. $\frac{y^2+y^2+64+16y}{y^2+8y} = 16$
 $2y^2 + 64 + 16y = 16y^2 + 128y$
 $14y^2 + 112y - 64 = 0 \Rightarrow y = +c, -d$
It is clear that relation cannot be established.

29. (e):I. $\frac{x}{x-11} + \frac{x-11}{x} = \frac{x^2+x^2+121-22x}{x^2-11x} = 7$
 $2x^2 + 121 - 22x = 7x^2 - 77x$
 $5x^2 - 55x - 121 = 0$

Hence $x = -a, +b$
II. $\frac{4y}{4y-13} + \frac{4y-13}{4y} = 9$
 $16y^2 + 16y^2 + 169 - 104y = (16y^2 - 52y) \times 9$
 $32y^2 + 169 - 104y = 144y^2 - 468y$
 $112y^2 - 364y - 169 = 0$
Hence $y = +c, -d$
Hence Relation cannot be established.

30. (a):I. $99x^2 + 149x + 56 = 0$
 $99x^2 + 77x + 72x + 56 = 0$
 $11x(9x+7) + 8(9x+7) = 0$
 $(9x+7)(11x+8) = 0$

$$9x+7=0 \quad | \quad 11x+8=0$$

$$x = \frac{-7}{9} \quad | \quad x = \frac{-8}{11}$$

II. $156y^2 + 287y + 132 = 0$
 $156y^2 + 143y + 144y + 132 = 0$
 $13y(12y+11) + 12(12y+11) = 0$
 $(12y+11)(13y+12) = 0$

$$12y+11=0 \quad | \quad 13y+12=0$$

$$y = \frac{-11}{12} \quad | \quad y = \frac{-12}{13}$$

Hence $x > y$

31. (b):I. $77x^2 + 58x + 8 = 0$

$$\frac{11 \times 7}{4 \times 2}$$

and, $44 + 14 = 58$
 $\therefore x = -\frac{44}{77}, -\frac{14}{77} \Rightarrow x = -\frac{4}{7}, -\frac{2}{11}$

II. $42y^2 + 59y + 20 = 0$

$$\frac{7 \times 6}{5 \times 4}$$

also, $35 + 24 = 59$
 $\therefore y = -\frac{35}{42}, -\frac{24}{42} \Rightarrow y = -\frac{5}{6}, -\frac{4}{7}$
Hence, $x \geq y$

32. (a):I. $63x^2 + 172x + 117 = 0$

$$\frac{9 \times 7}{13 \times 9}$$

also, $91 + 81 = 172$
 $x = -\frac{13}{9}, -\frac{9}{7} \Rightarrow x = -\frac{91}{63}, -\frac{81}{63}$

II. $30y^2 + 162y + 216 = 0$

$$\frac{6 \times 5}{36 \times 3 \times 2}$$

also, $90 + 72 = 162$
 $y = -\frac{90}{30}, -\frac{72}{30} \Rightarrow y = -3, -2.4$
Hence $x > y$

33. (e):I. $36x^4 + 369x^2 + 900 = 0$

let $x^2 = p$
 $36p^2 + 369p + 900 = 0$
 $\frac{12 \times 3}{75 \times 12}$
also, $144 + 225 = 369$

$$p = \frac{-144 - 225}{36}, \frac{-225}{36}$$

so, $x^2 = \frac{-144}{36}, x^2 = \frac{-225}{36}$

imaginary roots \Rightarrow relation cannot be established.

34. (e):I. $18x^2 - 13\sqrt{7}x + 14 = 0$

$$\frac{9 \times 2}{2 \times 7}$$

also, $-9\sqrt{7} - 4\sqrt{7} = -13\sqrt{7} \Rightarrow x = \frac{9\sqrt{7}}{18}, \frac{4\sqrt{7}}{18}$

II. $32y^2 - 19\sqrt{6}y + 9 = 0$

$$\frac{16 \times 2}{3 \times 3}$$

also, $-16\sqrt{6} - 3\sqrt{6} = -19\sqrt{6} \Rightarrow y = \frac{16\sqrt{6}}{32}, \frac{3\sqrt{6}}{32}$
Relation cannot be established.

35. (e):I. $x^2 - 82x + 781 = 0$

$$\frac{1}{71 \times 11}$$

also, $-71 - 11 = -82$
 $x = 71, 11$

II. $y^2 - 5041 = 0 \Rightarrow y^2 = 5041 \Rightarrow y = +71, -71$
Hence, relation cannot be established.

36. (e): I. $36x^2 + 47\sqrt{7}x + 105 = 0$

$$\frac{-47\sqrt{7} \pm \sqrt{(47\sqrt{7})^2 - 4 \times 36 \times 105}}{2 \times 36}$$

also, $27\sqrt{7} + 20\sqrt{7} = 47\sqrt{7}$

$$x = \frac{-27\sqrt{7}}{36}, \frac{-20\sqrt{7}}{36}$$

II. $35y^2 + 20\sqrt{3}y + 63\sqrt{2}y + 36\sqrt{6} = 0$

$$5y(7y + 4\sqrt{3}) + 9\sqrt{2}(7y + 4\sqrt{3}) = 0$$

$$(5y + 9\sqrt{2})(7y + 4\sqrt{3}) = 0$$

$$y = \frac{-9\sqrt{2}}{5}, y = \frac{-4\sqrt{3}}{7}$$

Hence, relation cannot be established.

37. (e): I. $91x^2 + 298x + 187 = 0$

$$\frac{-298 \pm \sqrt{(298)^2 - 4 \times 91 \times 187}}{2 \times 91}$$

also, $77 + 221 = 298$

$$x = \frac{-77}{91}, \frac{-221}{91}$$

II. $247y^2 + 216y - 391 = 0$

$$\frac{-216 \pm \sqrt{(216)^2 - 4 \times 247 \times (-391)}}{2 \times 247}$$

also, $-221 + 437 = 216$

$$y = \frac{221}{247}, \frac{437}{247}$$

Hence, relation cannot be established.

38. (e): According to sign method.

Relation cannot be established.

39. (e): I. $391x^2 + 1344x + 1073 = 0$

$$\frac{-1344 \pm \sqrt{(1344)^2 - 4 \times 391 \times 1073}}{2 \times 391}$$

also, $493 + 851 = 1344$

$$x = \frac{-493}{391}, \frac{-851}{391}$$

II. $437y^2 + 1074y + 589 = 0$

$$\frac{-1074 \pm \sqrt{(1074)^2 - 4 \times 437 \times 589}}{2 \times 437}$$

also, $361 + 713 = 1074$

$$y = \frac{-361}{437}, \frac{-713}{437}$$

Hence relation cannot be established,

40. (c): $y > x$ (according to sign method).

Previous Year Question

1. (a): I. $x = \pm 16$

II. $y^2 - 16y - y + 16 = 0$

$$y(y - 16) - 1(y - 16) = 0$$

$$(y - 1)(y - 16) = 0$$

$$y = 1 \text{ \& } 16$$

So, no relation can be established

2. (e): I. $x^2 + 10x + 10x + 100 = 0$

$$x(x + 10) + 10(x + 10) = 0$$

$$(x + 10)(x + 10) = 0$$

$$x = -10$$

II. $y^2 + 10y + 3y + 30 = 0$

$$y(y + 10) + 3(y + 10) = 0$$

$$(y + 10)(y + 3) = 0$$

$$y = -10 \text{ \& } -3$$

So, $x \leq y$

3. (a): I. $4x^2 - 8x - 5 = 0$

$$4x^2 - 10x + 2x - 5 = 0$$

$$2x(2x - 5) + 1(2x - 5) = 0$$

$$(2x + 1)(2x - 5) = 0$$

$$x = -\frac{1}{2}, \frac{5}{2}$$

II. $2y^2 - 4y - 7y + 14 = 0$

$$2y(y - 2) - 7(y - 2) = 0$$

$$(2y - 7)(y - 2) = 0$$

$$y = 2, \frac{7}{2}$$

So, no relation can be established between x & y .

4. (c): I. $6x^2 + 3x + 2x + 1 = 0$

$$(3x + 1)(2x + 1) = 0$$

$$x = -\frac{1}{2}, -\frac{1}{3}$$

II. $20y^2 + 5y + 4y + 1 = 0$

$$(4y + 1)(5y + 1) = 0$$

$$y = -\frac{1}{4}, -\frac{1}{5}$$

So, $y > x$

5. (d): I. $2x^2 - 9x + 9 = 0$

$$2x^2 - 6x - 3x + 9 = 0$$

$$(2x - 3)(x - 3) = 0$$

$$x = \frac{3}{2}, 3$$

II. $6y^2 - 17y + 12 = 0$

$$6y^2 - 8y - 9y + 12 = 0$$

$$(2y - 3)(3y - 4) = 0$$

$$y = \frac{3}{2}, \frac{4}{3}$$

So, $x \geq y$

6. (c): I. $4x^2 - 17x + 15 = 0$

$$4x^2 - 12x - 5x + 15 = 0$$

$$4x(x - 3) - 5(x - 3) = 0$$

$$(x - 3)(4x - 5) = 0$$

$$x = 3, \frac{5}{4}$$

II. $2y^2 - 17y + 35 = 0$
 $2y^2 - 10y - 7y + 35 = 0$
 $2y(y - 5) - 7(y - 5) = 0$
 $(y - 5)(2y - 7) = 0$
 $y = 5, \frac{7}{2}$
 So, $y > x$

7. (a): I. $x = 5$
II. $y = 5$
 So, $x = y$

8. (d): I. $x^2 + 7x - 5x - 35 = 0$
 $x(x + 7) - 5(x + 7) = 0$
 $(x + 7)(x - 5) = 0$
 $x = -7, 5$

II. $y^2 + 7y + 8y + 56 = 0$
 $y(y + 7) + 8(y + 7) = 0$
 $(y + 7)(y + 8) = 0$
 $y = -8, -7$
 So, $x \geq y$

9. (a): I. $x = \pm 9$
II. $y = \pm 8$
 So, no relation can be established

10. (a): I. $17x^2 - 14x - 3 = 0$
 $17x^2 - 17x + 3x - 3 = 0$
 $17x(x - 1) + 3(x - 1) = 0$
 $(17x + 3)(x - 1) = 0$
 $x = -\frac{3}{17}, 1$

II. $y^2 - 2y - 35 = 0$
 $y^2 - 7y + 5y - 35 = 0$
 $y(y - 7) + 5(y - 7) = 0$
 $y = 7, -5$
 So, no relation can be established

11. (e): I. $x^2 + 9x - 5x - 45 = 0$
 $x(x + 9) - 5(x + 9) = 0$
 $(x - 5)(x + 9) = 0$
 $x = 5, -9$

II. $y^2 - 5y - 8y + 40 = 0$
 $y(y - 5) - 8(y - 5) = 0$
 $(y - 5)(y - 8) = 0$
 $y = 5, 8$
 So, $x \leq y$

12. (a): I. $x^2 - 8x + 15 = 0$
 $x^2 - 3x - 5x + 15 = 0$
 $(x - 3)(x - 5) = 0$
 $x = 3, 5$

II. $2y^2 - 7y + 5 = 0$
 $2y^2 - 2y - 5y + 5 = 0$
 $(y - 1)(2y - 5) = 0$
 $y = 1, \frac{5}{2}$
 $x > y$

13. (d): I. $2x^2 + x - 28 = 0$
 $2x^2 + 8x - 7x - 28 = 0$
 $2x(x + 4) - 7(x + 4) = 0$
 $(2x - 7)(x + 4) = 0$
 $x = -4, \frac{7}{2}$

II. $2y^2 - 23y + 56 = 0$
 $2y^2 - 16y - 7y + 56 = 0$
 $2y(y - 8) - 7(y - 8) = 0$
 $(2y - 7)(y - 8) = 0$
 $y = \frac{7}{2}, 8$
 $y \geq x$

14. (e): I. $2x^2 - 7x - 60 = 0$
 $2x^2 - 15x + 8x - 60 = 0$
 $x(2x - 15) + 4(2x - 15) = 0$
 $(x + 4)(2x - 15) = 0$
 $x = -4, \frac{15}{2}$

II. $3y^2 + 13y + 4 = 0$
 $3y^2 + 12y + y + 4 = 0$
 $3y(y + 4) + 1(y + 4) = 0$
 $(3y + 1)(y + 4) = 0$
 $y = -\frac{1}{3}, -4$
 No relation between x and y

15. (e): I. $x^2 - 17x - 84 = 0$
 $x^2 + 4x - 21x - 84 = 0$
 $(x + 4)(x - 21) = 0$
 $x = -4, 21$

II. $y^2 + 4y - 117 = 0$
 $y^2 - 9y + 13y - 117 = 0$
 $(y - 9)(y + 13) = 0$
 $y = 9, -13$
 No relation between x and y

16. (c): I. $x^2 = 9^2$
 $x = 9$

II. $(y - 8)^2 = 3^2$
 $y = 11$
 $y > x$

17. (d): I. $2x^2 - 2x - x + 1 = 0$
 $2x(x - 1) - 1(x - 1) = 0$
 $x = \frac{1}{2}, 1$

II. $2y^2 - 2y - 3y + 3 = 0$
 $2y(y - 1) - 3(y - 1) = 0$
 $y = \frac{3}{2}, 1$
 $x \leq y$

18. (b): I. $x^2 + 10x + 11x + 110 = 0$
 $x(x + 10) + 11(x + 10) = 0$
 $x = -10, -11$

II. $y^2 + 9y + 8y + 72 = 0$
 $y(y + 9) + 8(y + 9)$
 $y = -9, -8$
 $x < y$

19. (d): I. $x = \pm 2$

II. $y^2 - 2y - 4y + 8 = 0$
 $y(y - 2) - 4(y - 2) = 0$
 $y = 2, 4$
 $x \leq y$

20. (e): I. $x^2 + 9x - 22 = 0$
 $\Rightarrow x^2 + 11x - 2x - 22 = 0$
 $\Rightarrow (x + 11)(x - 2) = 0$
 $\Rightarrow x = -11, 2$

II. $2y^2 - 7y + 6 = 0$
 $\Rightarrow 2y^2 - 4y - 3y + 6 = 0$
 $\Rightarrow 2y(y - 2) - 3(y - 2) = 0$
 $\Rightarrow (y - 2)(2y - 3) = 0$
 $\Rightarrow y = 2, \frac{3}{2}$
 No relation

21. (e): I. $6x^2 + 5x + 1 = 0$
 $6x^2 + 3x + 2x + 1 = 0$
 $3x(2x + 1) + 1(2x + 1) = 0$
 $x = \frac{1}{2} \text{ or } -\frac{1}{3}$

II. $15y^2 + 11y + 2 = 0$
 $15y^2 + 6y + 5y + 2 = 0$
 $3y(5y + 2) + 1(5y + 2) = 0$
 $\therefore y = \frac{2}{5} \text{ or } -\frac{1}{3}$
 \therefore no relation can be established

22. (a): I. $x^2 + 9x + 20 = 0$
 $x^2 + 5x + 4x + 20 = 0$
 $x(x + 5) + 4(x + 5) = 0$
 $(x + 5)(x + 4) = 0$
 $x = -4, -5$

II. $8y^2 - 15y + 7 = 0$
 $8y^2 - 8y - 7y + 7 = 0$
 $8y(y - 1) - 7(y - 1) = 0$
 $(y - 1)(8y - 7) = 0$
 $y = 1, \frac{7}{8}$
 So, $x < y$.

23. (b): I. $x^2 - 11x + 30 = 0$
 $x^2 - 6x - 5x + 30 = 0$
 $x(x - 6) - 5(x - 6) = 0$
 $(x - 6)(x - 5) = 0$
 $x = 5, 6$

II. $y^2 + 12y + 36 = 0$
 $y^2 + 6y + 6y + 36 = 0$
 $y(y + 6) + 6(y + 6) = 0$
 $(y + 6)(y + 6) = 0$
 $y = -6$
 So, $x > y$.

24. (c): I. $x^2 + 13x + 40 = 0$
 $x^2 + 8x + 5x + 40 = 0$
 $x(x + 8) + 5(x + 8) = 0$
 $(x + 8)(x + 5) = 0$
 $x = -8, -5$

II. $y^2 + 7y + 10 = 0$
 $y^2 + 5y + 2y + 10 = 0$
 $y(y + 5) + 2(y + 5) = 0$
 $(y + 5)(y + 2) = 0$
 $y = -2, -5$
 So, $x \leq y$.

25. (b): I. $x^2 - 20x + 91 = 0$
 $x^2 - 13x - 7x + 91 = 0$
 $x(x - 13) - 7(x - 13) = 0$
 $(x - 13)(x - 7) = 0$
 $x = 7, 13$

II. $y^2 + 16y + 63 = 0$
 $y^2 + 9y + 7y + 63 = 0$
 $y(y + 9) + 7(y + 9) = 0$
 $(y + 9)(y + 7) = 0$
 $y = -7, -9$
 So, $x > y$.

26. (e): I. $x^2 - x - 12 = 0$
 $x^2 - 4x + 3x - 12 = 0$
 $x(x - 4) + 3(x - 4) = 0$
 $(x - 4)(x + 3) = 0$
 $x = 4, -3$

II. $y^2 + 5y + 6 = 0$
 $y^2 + 3y + 2y + 6 = 0$
 $y(y + 3) + 2(y + 3) = 0$
 $(y + 3)(y + 2) = 0$
 $y = -2, -3$
 So, no relation.

27. (a): Quantity I:

Required profit = $450 \times \frac{20}{120} = \text{Rs.}75$

Quantity II:

Required cost price = $84 \times \frac{100}{120} = \text{Rs.}70$

So, Quantity I > Quantity II.

28. (b): Quantity I:

Required female = $1152 \times \frac{100}{30} \times \frac{40}{60} \times \frac{100-25}{100} = 1920$

Quantity II:

1940

So, Quantity I < Quantity II.

29. (b): Quantity I:

$$\frac{P \times 12 \times 2}{100} = 1200$$

$$P = 5,000 \text{ Rs.}$$

Quantity II:

$$\text{Rs.}6,000$$

So, Quantity I < Quantity II.

30. (e): Let breadth of the field be x m.

So, length of the field = $(x + 4)$ m

$$\text{Area of a rectangular field} = \frac{288}{3} = 96 \text{ m}^2$$

$$\text{ATQ, } x(x + 4) = 96$$

$$x^2 + 4x - 96 = 0$$

$$x^2 + 12x - 8x - 96 = 0$$

$$x(x + 12) - 8(x + 12) = 0$$

$$(x + 12)(x - 8) = 0$$

$$x = 8, -12$$

Quantity I:

Length of rectangular field = 12m

Quantity II: 12 m

So, Quantity I = Quantity II.

31. (b): Quantity I:

Let present age of Prashant be x years.

So, present age of Shivam = $(x + 8)$ years

$$x + 8 + x = 32$$

$$x = 12 \text{ years}$$

Quantity II:

$$15 \text{ years}$$

So, Quantity I < Quantity II.

32. (e): I. $x^2 - 14x + 45 = 0$

$$x^2 - 9x - 5x + 45 = 0$$

$$x(x - 9) - 5(x - 9) = 0$$

$$x = 9, 5$$

II. $y^2 - 12y - 6y + 72 = 0$

$$y(y - 12) - 6(y - 12) = 0$$

$$y = 12, 6$$

no relation can be established between x and y .

33. (b): I. $x^2 + 7x + 12 = 0$

$$x^2 + 4x + 3x + 12 = 0$$

$$x(x + 4) + 3(x + 4) = 0$$

$$(x + 4)(x + 3) = 0$$

$$x = -3, -4$$

II. $y^2 + 5y + 4y + 20 = 0$

$$y(y + 5) + 4(y + 5) = 0$$

$$y = -5, -4$$

So, $x \geq y$

34. (e): I. $4x^2 - 4x - 3x + 3 = 0$

$$4x(x - 1) - 3(x - 1) = 0$$

$$x = 1, 3/4$$

II. $7y^2 - 17y + 6 = 0$

$$7y^2 - 14y - 3y + 6 = 0$$

$$7y(y - 2) - 3(y - 2) = 0$$

$$y = 2, 3/7$$

So, no relation can be established between x and y .

35. (a): I. $2x^2 - 10x - 9x + 45 = 0$

$$2x(x - 5) - 9(x - 5) = 0$$

$$x = 5, 9/2$$

II. $2y^2 - 8y - y + 4 = 0$

$$2y(y - 4) - 1(y - 4) = 0$$

$$y = 4, 1/2$$

So, $x > y$

36. (b): I. $x^2 = 144$

$$x = -12, +12$$

II. $y = -12$

So, $x \geq y$

37. (a): I. $x^2 - 13x + 40 = 0$

$$x^2 - 5x - 8x + 40 = 0$$

$$x(x - 5) - 8(x - 5) = 0$$

$$x = 5, 8$$

II. $2y^2 - y - 15 = 0$

$$2y^2 - 6y + 5y - 15 = 0$$

$$2y(y - 3) + 5(y - 3) = 0$$

$$y = 3, -5/2$$

$x > y$

38. (e): I. $5x^2 + 17x + 6 = 0$

$$5x^2 + 15x + 2x + 6 = 0$$

$$5x(x + 3) + 2(x + 3) = 0$$

$$x = -3, -\frac{2}{5}$$

II. $2y^2 + 11y + 12 = 0$

$$2y^2 + 8y + 3y + 12 = 0$$

$$2y(y + 4) + 3(y + 4) = 0$$

$$y = -4, -\frac{3}{2}$$

No relation

39. (a): I. $7x^2 - 19x + 10 = 0$

$$7x^2 - 14x - 5x + 10 = 0$$

$$7x(x - 2) - 5(x - 2) = 0$$

$$x = 2, \frac{5}{7}$$

II. $8y^2 + 2y - 3 = 0$

$$8y^2 + 6y - 4y - 3 = 0$$

$$2y(4y + 3) - 1(4y + 3) = 0$$

$$y = \frac{-3}{4}, \frac{1}{2}$$

$x > y$

40. (a): I. $x^2 - 8x + 15 = 0$
 $\Rightarrow x^2 - 5x - 3x + 15 = 0$
 $\Rightarrow x(x - 5) - 3(x - 5) = 0$
 $\Rightarrow (x - 3)(x - 5) = 0$
 $\therefore x = 3$ or 5

II. $y^2 - 3y + 2 = 0$
 $\Rightarrow y^2 - 2y - y + 2 = 0$
 $\Rightarrow y(y - 2) - 1(y - 2) = 0$
 $\Rightarrow (y - 1)(y - 2) = 0$
 $\therefore y = 1$ or 2
 $\therefore x > y$

41. (c): I. $3x^2 - 7x + 4 = 0$
 $\Rightarrow 3x^2 - 4x - 3x + 4 = 0$
 $\Rightarrow (3x - 4)(x - 1) = 0$
 $x = \frac{4}{3}$ or 1

II. $2y^2 - 9y + 10 = 0$
 $\Rightarrow 2y^2 - 4y - 5y + 10 = 0$
 $\Rightarrow (2y - 5)(y - 2) = 0$
 $\Rightarrow y = \frac{5}{2}$ or 2
 $y > x$

42. (c): Quantity I:
 Total number of ways = $({}^8C_2 \times {}^4C_2) + ({}^8C_1 \times {}^4C_3) + ({}^4C_4)$
 $= 168 + 32 + 1 = 201$

Quantity II:
 3-digit numbers which are divisible by 3 and ends with an even number = $(102, 108, 114, \dots, 996)$
 Required number of 3 - digit numbers = $\frac{996 - 102}{6} + 1$
 $= 150$
 So, Quantity I > Quantity II.

43. (a): Quantity I:
ATQ,
 $\frac{5900 \times R \times 3}{100} = 3186$
 $\Rightarrow R = 18\%$
 Required interest = $\frac{7900 \times (18 + 5) \times 3}{100} = \text{Rs.} 5451$

Quantity II:
 Equivalent rate of interest of 13% p.a. for 2 years at CI = $13 + 13 + \frac{13 \times 13}{100} = 27.69\%$

ATQ,
 $\frac{X \times 27.69}{100} = 2325.96$
 $\Rightarrow X = \text{Rs.} 8400$
 So, Quantity I < Quantity II.

44. (c): Quantity I:
 Let CP & MP of an article be Rs.19x and Rs.30x respectively.

ATQ,
 $19x \times \frac{120}{100} = 912$
 $\Rightarrow x = 40$

Required difference = $30x \times \frac{24}{100} - 19x \times \frac{20}{100}$
 $= 7.2x - 3.8x = \text{Rs.} 136$

Quantity II:
 Let cost price of the article be Rs.100x
 So, marked price of the article = $100x \times \frac{170}{100}$
 $= \text{Rs.} 170x$
 And, selling price of the article = $170x \times \frac{60}{100}$
 $= \text{Rs.} 102x$

ATQ,
 $102x = 183.6$
 $\Rightarrow x = 1.8$
 Required sum = $170x \times \frac{40}{100} + (102x - 100x)$
 $= 68x + 2x = \text{Rs.} 126$
 So, Quantity I > Quantity II.

45. (e): Quantity I:
 Let speed of boat in still water & speed of stream be '11x km/hr.' and 'x km/hr.' respectively.

ATQ,
 $\frac{480}{11x - x} + \frac{480}{11x + x} = 11$
 $\Rightarrow x = 8$

So, speed of boat in still water = $11x = 88$ km/hr.

Quantity II:
 Let speed of boat in still water & speed of stream be 'a km/hr.' and 'b km/hr.' respectively.

ATQ,
 $\frac{350}{3.5} = (a + b)$
 $\Rightarrow (a + b) = 100 \dots(i)$
 And, $\frac{380}{5} = (a - b)$
 $\Rightarrow (a - b) = 76 \dots(ii)$

On solving (i) & (ii), we get:
 $a = 88$ km/hr.
 So, Quantity I = Quantity II.

46. (c): Quantity I:
 Let A's present age be 10x years.
 So, B's present age = $10x \times \frac{160}{100}$
 $= 16x$ years
 And, C's present age = $16x \times \frac{2}{5} = 6.4x$ years
 And, D's present age = $2 \times 6.4x$
 $= 12.8x$ years

ATQ,
 $16x - 12.8x = 8$
 $\Rightarrow x = 2.5$
 Hence, required average = $\frac{10x + 16x + 6.4x + 12.8x}{4}$
 $= 11.3x = 28.25$ years

Quantity II:

Let present age of P be p years.

So, present age of R = $(p - 15)$ years

ATQ,

Present age of Q = $(2 \times (p - 15)) - p$
 = $(p - 30)$ years

Now, $(p + 4) = 2 \times (p - 30 + 4)$

$\Rightarrow p = 56$

Hence, present age of R = $(p - 15)$ years
 = 41 years

And, present age of Q = $(p - 30)$ years
 = 26 years

So, required age = 26 years

So, Quantity I > Quantity II.

47. (e): I. $x^2 - 7x + 12 = 0$

$$x^2 - 4x - 3x + 12 = 0$$

$$(x - 4)(x - 3) = 0$$

$$x = 3, 4$$

II. $y^2 - 8y + 12 = 0$

$$y^2 - 6y - 2y + 12 = 0$$

$$(y - 6)(y - 2) = 0$$

$$y = 2, 6$$

No relation can be established

48. (d): I. $2x^2 + x - 28 = 0$

$$2x^2 + 8x - 7x - 28 = 0$$

$$2x(x + 4) - 7(x + 4) = 0$$

$$(2x - 7)(x + 4) = 0$$

$$x = -4, \frac{7}{2}$$

II. $2y^2 - 23y + 56 = 0$

$$2y^2 - 16y - 7y + 56 = 0$$

$$2y(y - 8) - 7(y - 8) = 0$$

$$(2y - 7)(y - 8) = 0$$

$$y = \frac{7}{2}, 8$$

$$y \geq x$$

49. (e): I. $2x^2 - 7x - 60 = 0$

$$2x^2 - 15x + 8x - 60 = 0$$

$$x(2x - 15) + 4(2x - 15) = 0$$

$$(x + 4)(2x - 15) = 0$$

$$x = -4, \frac{15}{2}$$

II. $3y^2 + 13y + 4 = 0$

$$3y^2 + 12y + y + 4 = 0$$

$$3y(y + 4) + 1(y + 4) = 0$$

$$(3y + 1)(y + 4) = 0$$

$$y = -\frac{1}{3}, -4$$

No relation between x and y

50. (e): I. $x^2 - 17x - 84 = 0$

$$x^2 + 4x - 21x - 84 = 0$$

$$(x + 4)(x - 21) = 0$$

$$x = -4, 21$$

II. $y^2 + 4y - 117 = 0$

$$y^2 - 9y + 13y - 117 = 0$$

$$(y - 9)(y + 13) = 0$$

$$y = 9, -13$$

No relation between x and y

51. (d): I. $x^2 = 81$

$$x = \pm 9$$

II. $(y - 9)^2 = 0$

$$y = 9$$

Clearly, $x \leq y$

52. (e): I. $x^2 - 13x + 11x - 143 = 0$

$$(x - 13)(x + 11) = 0$$

$$x = -11, 13$$

II. $y^2 = 169$

$$y = \pm 13$$

clearly, no relation can be established

53. (a): I. $x^2 - 9x + 2x - 18 = 0$

$$(x - 9)(x + 2) = 0$$

$$x = -2, 9$$

II. $y^2 - 10y - 9y + 90 = 0$

$$(y - 10)(y - 9) = 0$$

$$y = 9, 10$$

clearly, $x \leq y$

54. (c): I. $2x^2 + 3x + 2x + 3 = 0$

$$(x + 1)(2x + 3) = 0$$

$$x = -1, -\frac{3}{2}$$

II. $y^2 + 6y - 2y - 12 = 0$

$$(y - 2)(y + 6) = 0$$

$$y = 2, -6$$

clearly, no relation can be established

55. (d): (II) $\times 9 -$ (I) $\times 4$

On solving,

$$x = 1, y = 2$$

clearly, $x < y$

56. (c): I. $2x^2 - 2x + x - 1 = 0$

$$(2x + 1)(x - 1) = 0$$

$$x = -\frac{1}{2}, 1$$

II. $3y^2 - 3y - 2y + 2 = 0$

$$(3y - 2)(y - 1) = 0$$

$$y = \frac{2}{3}, 1$$

clearly, no relation

57. (d): $x^2 = 81$

$$x = \pm 9$$

$$y^2 - 18y + 81 = 0$$

$$(y - 9)^2 = 0$$

$$\therefore y = 9, 9$$

$$\therefore x \leq y$$

58. (e): $4x^2 - 24x + 30 = 0$
 $4x^2 - 16x - 8x + 32 = 0$
 $4x(x - 4) - 8(x - 4) = 0$
 $x = 4, 2$
 $y^2 - 8y + 15 = 0$
 $y^2 - 5y - 3y + 15 = 0$
 $y(y - 5) - 3(y - 5) = 0$
 $\therefore y = 5, 3$
 \therefore No relation exists

59. (c): $x^2 - 21x + 108 = 0$
 $x^2 - 9x - 12x + 108 = 0$
 $x(x - 9) - 12(x - 9) = 0$
 $x = 9, 12$
 $y^2 - 17y + 72 = 0$
 $\therefore y^2 - 8y - 9y + 72 = 0$
 $y(y - 8) - 9(y - 8) = 0$
 $\therefore y = 8, 9$
 $\therefore x \geq y$

60. (b): $x^2 - 11x + 30 = 0$
 $x^2 - 6x - 5x + 30 = 0$
 $\therefore x(x - 6) - 5(x - 6) = 0$
 $x = 6, 5$
 $y^2 - 15y + 56 = 0$
 $y^2 - 7y - 8y + 56 = 0$
 $y(y - 7) - 8(y - 7) = 0$
 $\therefore y = 7, 8$
 $\therefore x < y$

61. (c): $x^3 = 512$
 $x = \sqrt[3]{512} = 8$
 $y^2 = 64$
 $y = \sqrt{64} = \pm 8$
 $\therefore x \geq y$

62. (c): I. $2x^2 + 11x + 12 = 0$
 $2x^2 + 8x + 3x + 12 = 0$
 $2x(x + 4) + 3(x + 4) = 0$
 $(x + 4)(2x + 3) = 0$
 $x = -4, -\frac{3}{2}$

II. $8y^2 - 22y - 21 = 0$
 $8y^2 + 6y - 28y - 21 = 0$
 $2y(4y + 3) - 7(4y + 3) = 0$
 $(2y - 7)(4y + 3) = 0$
 $y = \frac{7}{2}, -\frac{3}{4}$
 So, $x < y$

63. (a): I. $x^2 - 17x - 60 = 0$
 $x^2 - 20x + 3x - 60 = 0$
 $x(x - 20) + 3(x - 20) = 0$
 $(x + 3)(x - 20) = 0$
 $x = -3, 20$

II. $y^2 + 42y + 185 = 0$
 $y^2 + 37y + 5y + 185 = 0$
 $y(y + 37) + 5(y + 37) = 0$
 $(y + 5)(y + 37) = 0$
 $y = -5, -37$
 So, $x > y$

64. (c): I. $x^2 + 41x + 420 = 0$
 $x^2 + 21x + 20x + 420 = 0$
 $x(x + 21) + 20(x + 21) = 0$
 $(x + 20)(x + 21) = 0$
 $x = -20, -21$

II. $6y^2 - 11y - 10 = 0$
 $6y^2 - 15y + 4y - 10 = 0$
 $3y(2y - 5) + 2(2y - 5) = 0$
 $(2y - 5)(3y + 2) = 0$
 $y = \frac{5}{2}, -\frac{2}{3}$
 So, $x < y$

65. (e): I. $x^2 - 8x - 273 = 0$
 $x^2 - 21x + 13x - 273 = 0$
 $x(x - 21) + 13(x - 21) = 0$
 $(x + 13)(x - 21) = 0$
 $x = -13, 21$

II. $y^2 + 6y - 432 = 0$
 $y^2 + 24y - 18y - 432 = 0$
 $y(y + 24) - 18(y + 24) = 0$
 $(y - 18)(y + 24) = 0$
 $y = 18, -24$
 So, No relation

66. (e):

<p>I. $2x^2 - 4x - x + 2 = 0$ $\Rightarrow 2x(x - 2) - 1(x - 2) = 0$ $\Rightarrow (2x - 1)(x - 2) = 0$ $\Rightarrow x = \frac{1}{2}, 2$ \therefore No relation</p>	<p>II. $2y^2 - 9y + 7 = 0$ $\Rightarrow 2y^2 - 7y - 2y + 7 = 0$ $\Rightarrow y(2y - 7) - 1(2y - 7) = 0$ $\Rightarrow y = \frac{7}{2}, 1$</p>
--	--

67. (a):

<p>I. $3x^2 + 3x + 4x + 4 = 0$ $\Rightarrow 3x(x + 1) + 4(x + 1) = 0$ $\Rightarrow x = -1, -\frac{4}{3}$</p>	<p>II. $y^2 + 5y + 4y + 20 = 0$ $\Rightarrow y(y + 5) + 4(y + 5) = 0$ $\Rightarrow y = -4, -5$</p>
--	--

$\therefore x > y$

68. (d):

<p>I. $x^2 - 5x - 2x + 10 = 0$ $\Rightarrow x(x - 5) - 2(x - 5) = 0$ $\Rightarrow x = 2, 5$ $\therefore x \leq y$</p>	<p>II. $y^2 - 9y - 5y + 45 = 0$ $\Rightarrow y(y - 9) - 5(y - 9) = 0$ $\Rightarrow y = 9, 5$</p>
---	--

69. (a): I. $x^2 - 3x - 4 = 0$
 $x^2 - 4x + x - 4 = 0$
 $(x - 4)(x + 1) = 0$
 $x = 4, -1$

II. $y^2 + 6y + 8 = 0$
 $y^2 + 2y + 4y + 8 = 0$
 $(y + 2)(y + 4) = 0$
 $y = -2, -4$
 $\Rightarrow x > y$

70. (b): I. $x^2 - 3x = 10$
 $x^2 - 3x - 10 = 0$
 $x^2 - 5x + 2x - 10 = 0$
 $(x - 5)(x + 2) = 0$
 $x = -2, 5$

II. $y^2 + 7y + 10 = 0$
 $y^2 + 5y + 2y + 10 = 0$
 $(y + 5)(y + 2) = 0$
 $y = -2, -5$
 $\Rightarrow x \geq y$

71. (d): **Quantity I:**

length of train = $\frac{24 \times 75}{18} \times 5 = 500$ meter.

Quantity II:

Let speed of train be 'V km/hr' and length of train be 'x meter'.

ATQ,

$$\frac{x}{12} = V \dots(i)$$

Now,

$$\frac{x+1800}{55.2} = V \dots(ii)$$

On solving (i) & (ii), we get:

$$x = 500 \text{ meter}$$

So, Quantity II = quantity I

72. (b): **Quantity I:** Let C. P = Rs. 100 x

Then M. P = $100x \times \frac{150}{100} = \text{Rs. } 150x$

S.P = $100x \times \frac{120}{100} = \text{Rs. } 120x$

ATQ,

$$120x = \text{Rs. } 1020$$

$$x = \text{Rs. } 8.5$$

$$\text{So, } 150x = \text{Rs. } 1275$$

Quantity II:

Perimeter of field = $37.5 \times 4 = 150$ meter
 = 15000 cm.

Total cost of fencing = $15000 \times 0.17 = \text{Rs. } 2550$

So, Quantity I < Quantity II.

73. (e): **Quantity I:**

$$(x+3)^2 = (x-3)^2 + x^2$$

$$x^2 + 9 + 6x = x^2 + 9 - 6x + x^2$$

$$x^2 - 12x = 0$$

$$x(x-12) = 0$$

$$x = 0, 12$$

Quantity II:

$$y^2 - 29y + 204 = 0$$

$$y^2 - 12y - 17y + 204 = 0$$

$$y(y-12) - 17(y-12) = 0$$

$$(y-12)(y-17) = 0$$

$$y = 12, 17$$

So, Quantity II \geq Quantity I

74. (a): **Quantity I:**

$$\text{Amount} = 2450 + 2450 \times \frac{1}{7} \times 2$$

$$= 2450 + 700 = \text{Rs. } 3150$$

Quantity II:

$$\text{Amount} = 2450 \left(1 + \frac{1}{8}\right)^2$$

$$= 2450 \times \frac{81}{64} = \text{Rs. } 3100.78.$$

So, Quantity I > Quantity II

75. (d): **Quantity I:**

Let total M. R. P of 5 article = Rs. 100x

1 article is free, then S. P for 5 articles

$$= 100x - 20x = \text{Rs. } 80x$$

Again, he gives 20% discount, S.P become of each

$$\text{article} = 80x \times \frac{80}{100} \times \frac{1}{5} = \text{Rs. } 12.8x$$

$$\text{Actual Discount percentage} = \frac{20x - 12.8x}{20x} \times 100$$

$$= \frac{7.2}{20} \times 100 = 36\%$$

Quantity II:

Let C.P = Rs. x

Let Initial S.P = Rs. 7y

Final S.P = Rs. 8y

ATQ

$$\frac{36}{19} \left(\frac{7y-x}{x}\right) \times 100 = \frac{8y-x}{x} \times 100$$

$$252y - 36x = 152y - 19x$$

$$\frac{x}{y} = \frac{100}{17}$$

Let C.P = Rs. 100a

Final S.P = Rs. 136a

$$\text{Final profit \%} = \frac{136a - 100a}{100a} \times 100 = 36\%$$

So, Quantity I = Quantity II



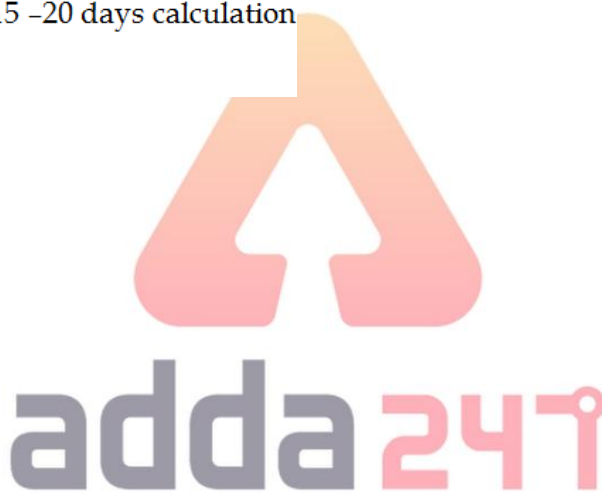
What is data interpretation: When data is organized into tables and charts it is done with the purpose of making it meaningful. The objective of data interpretation is to assess whether a student can understand bars and charts and Answer some questions based on them. This act of organizing and interpreting data to get meaningful information under a given set of conditions is Data interpretation.

About data interpretation: This is the calculation intensive portion, it consists of a myriad of graph, charts and tables and analyze data. The key to crack this area is to quickly Identify the key pieces of information that you will require to work on.

Basic key that will help you to solve this topic:

- Calculation
 - Square
 - cube
 - table
 - BODMAS
- Percentage
- Profit and loss
- Ratio and proportion
- Average

15 -20 days calculation



Types of Data Interpretation:

- Data table
- Line graph
- Pie charts
- Bar graph
- Mixed graph
 - Line with pie chart
 - Table with Bar
 - Table with Line, etc.
- Radar graph
- Triangular graph
- Case study (Puzzle)
 - Venn Diagram
 - Table format

Approach for data interpretation:

- First you look carefully at the table or graph and the direction. Note the years to which, the data refers to and the units. Sometimes the figures may be given in thousands. While the Answer may be millions Resulting in mistakes.
- The level of approximation that can be done is assessed from the choices. If the answer is wide, time should not be wasted in working out exact figures. If the choice 'none of the above exists, a close approximation may be required'.
- Read the question carefully, it will give an indication as to which row and column should be seen. A careful reading of the question will reveal exactly what is to be done and the units in which the answer is required.
- There may be one or two very large question requiring calculations. Attempt these at the last.
- Revise bar charts, table and line graphs before attempting D.I. question remember that the D.I. section is a scoring one and also time saving.

Data Table: The numbers in the bracket give the maximum marks in each subject.

The following table gives the percentage of marks obtained by seven students in six different subjects in an examination. Study it and answer the question given below it.

Students	Subject (Maximum Marks)					
	Maths (150)	Chemistry (130)	Physics (120)	Geography (100)	History (60)	Computer Science (40)
Golu	90	50	90	60	70	80
Mithi	100	80	80	40	80	70
Suraj	90	60	70	70	90	70
Gapplu	80	65	80	80	60	60
Mahi	80	65	85	95	50	90
Khushi	70	75	65	85	40	60
Sheetal	65	35	50	77	80	80

- What are the average marks obtained by all the seven students in physics? (Round off two digits after decimal)

(a) 77.26 (b) 89.14 (c) 91.37 (d) 96.11 (e) None of these
- The number of students who obtained 60% or above marks in all subjects is

(a) 1 (b) 2 (c) 3 (d) 4 (e) None of these
- What was the aggregate of marks obtained by suraj in all the six subjects ?

(a) 409 (b) 419 (c) 429 (d) 449 (e) None of these
- In which subject is the overall percentage the best?

(a) Maths (b) Chemistry (c) Physics (d) History (e) None of these
- What is the overall percentage of sheetal

(a) 52.5% (b) 55% (c) 60% (d) 63% (e) None of these

Solution 1: $\frac{1}{7} [(90\% \text{ of } 120) + (80\% \text{ of } 120) + (70\% \text{ of } 120) + (80\% \text{ of } 120) + (85\% \text{ of } 120) + (65\% \text{ of } 120) + (50\% \text{ of } 120)]$

$$= \frac{1}{7} [(520\% \text{ of } 120)]$$

$$= \frac{624}{7} = 89.14$$

Solution 2: From the table, it is clear that Suraj & Gapplu have 60% or more marks in each of the six subjects.

Solution 3: Aggregate marks obtained by suraj

$$= [(90\% \text{ of } 150) + (60\% \text{ of } 130) + (70\% \text{ of } 120) + (70\% \text{ of } 100) + (90\% \text{ of } 60) + (70\% \text{ of } 40)]$$

$$= [135 + 78 + 84 + 70 + 54 + 28] = 449$$

Solution 4: We shall find the best overall % with respect to each subject: Mathematics

Solution 5: Aggregate marks obtained by sheetal.

$$= [(65\% \text{ of } 150) + (35\% \text{ of } 130) + (50\% \text{ of } 120) + (77\% \text{ of } 100) + (80\% \text{ of } 60) + (80\% \text{ of } 40)] = 360$$

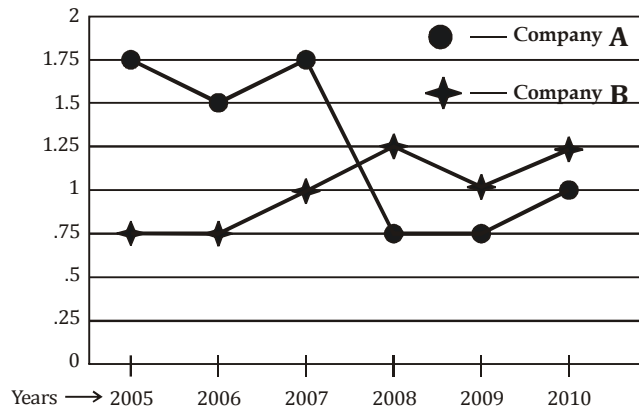
Maximum marks = 600

$$\text{Overall \%} = \frac{360}{600} \times 100 = 60\%$$

Line Graph:

Answer the question based on the given line graph

Following line graph shows the ratio of export to import of company A and company B over the year



- In how many of the given years were the exports more than the imports for company A?
 (a) 2 (b) 3 (c) 4 (d) 5 (e) None of these
- If the imports of company A in 2007 were increased by 40%. What would be the ratio of exports to the increased imports?
 (a) 1.20 (b) 1.25 (c) 1.30 (d) 1.35 (e) None of these
- If the exports of company B in 2008 was Rs 237 Crore, what was the amount of imports in that years ?
 (a) 189.6 crore (b) 243 crore (c) 281 crore (d) 316 crore (e) None of these
- In 2005, the export of company A was double that of company B. If the imports of company A during the year was 180 crore. What was the approximate amount of imports of company B during that year?
 (a) 190 crore (b) 210 crore (c) 225 crore (d) 200 crore (e) None of these
- In which year were the exports of company A minimum proportionate to its imports.
 (a) 2008 and 2009 (b) 2010 (c) 2008 and 2010 (d) 2005 and 2007 (e) None of these

Solution 1: required ratio, more than 1 for the years; 2005, 2006 and 2007, ie; for 3 years

Solution 2: In 2007, for company A the ratio of exports to import = 175 : 100

Let exports of company A = 175 x ⇒ and imports of company A = 100x

New imports of company = 140% of 100x = 140x

There for required ratio = $\frac{175x}{140x} = 1.25$

Solution 3: Let import of company B in 2008 = x

Then, $\frac{237}{x} = 1.25 \Rightarrow x = \frac{237}{1.25} \Rightarrow 189.6$ crore

Solution 4: In 2005 for company A ⇒ Export = 1.75 × 180 crore

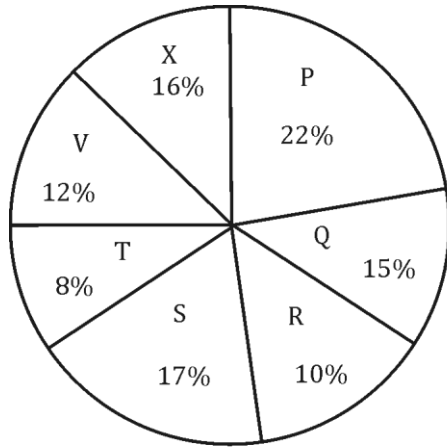
in 2005 for company B export = = 157.5 crore, But $\frac{Ex}{Im} = .75$

Import of company B = $\frac{1.75 \times 180}{2} = 210$ crore

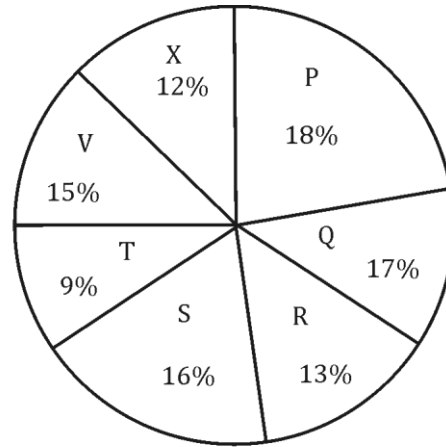
Solution 5: 2008 and 2009, A option.

Pie Charts or Circle Graphs:

Distribution of candidate who were enrolled in MBA and the candidate (out of those enrolled) who passed the exam in different institutes



Total number of candidates enrolled = 8550



Total number of candidates who passed the exam = 5700

- What percentage of candidates passed the exam from institute T out of the total no. of candidate enrolled from the same institute?
 (a) 50% (b) 62.5% (c) 75% (d) 80% (e) None of these
- Which institute has the highest % of candidates passed to the candidates enrolled?
 (a) Q (b) R (c) V (d) T (e) None of these
- The no. of candidates passed from institute S and P together exceeds the no. of candidates enrolled from institutes T and R together by?
 (a) 228 (b) 279 (c) 399 (d) 407 (e) None of these
- What is % of candidates passed to the candidate enrolled for institutes Q and R together ?
 (a) 68% (b) 80% (c) 74% (d) 65% (e) None of these
- What is the ratio of candidates passed to the candidates enrolled from institute P ?
 (a) 9 : 11 (b) 14 : 17 (c) 6 : 11 (d) 9 : 17 (e) None of these

Solution 1: Required % = $\frac{9\% \text{ of } 5700}{8\% \text{ of } 8550} \times 100 = 75\%$

Solution 2: The % of candidates passed to candidates enrolled can be determined for each institute as under.

For Q $\Rightarrow \frac{17\% \text{ of } 5700}{15\% \text{ of } 8550} \times 100 = 75.56\%$; For R $\Rightarrow \frac{13\% \text{ of } 5700}{10\% \text{ of } 8550} \times 100 = 86.67\%$

For T $\Rightarrow \frac{9\% \text{ of } 5700}{8\% \text{ of } 8550} \times 100 = 75\%$; For V $\Rightarrow \frac{15\% \text{ of } 5700}{12\% \text{ of } 8550} \times 100 = 83.33\%$

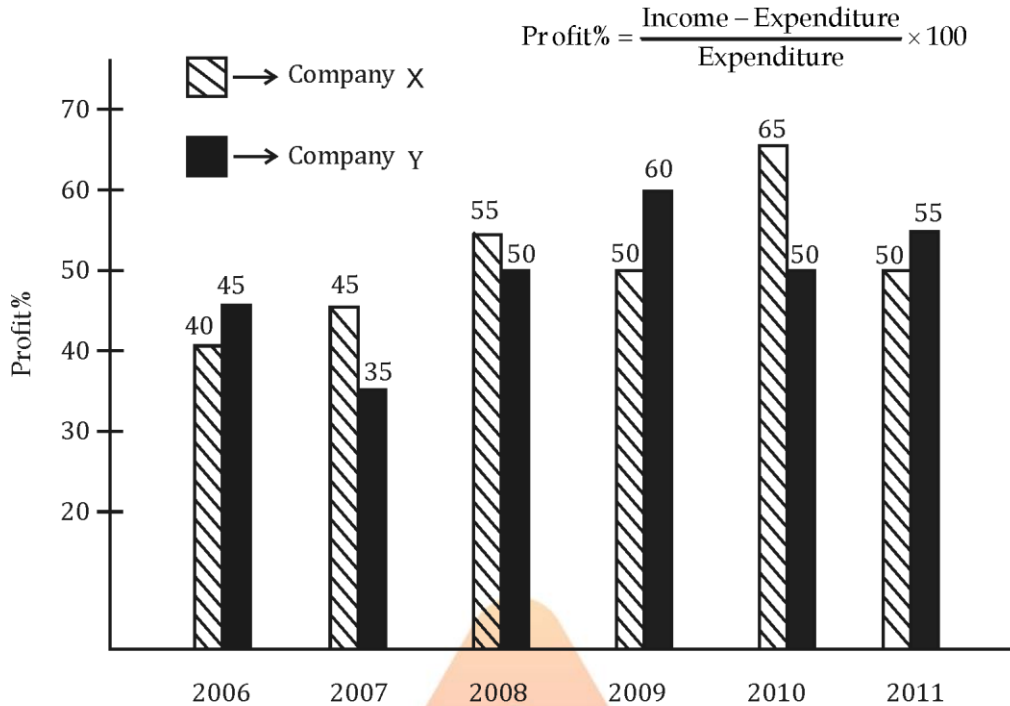
So the highest of these is 86.67% corresponding to institutes R.

Solution 3: Required Difference = $[(16\% + 18\%) \text{ of } 5700] - [(8\% + 10\%) \text{ of } 8550] = 1938 - 1539 = 399$

Solution 4: $\frac{30\% \text{ of } 5700}{25\% \text{ of } 8550} \times 100 = 80\%$

Solution 5: $\frac{18\% \text{ of } 5700}{22\% \text{ of } 8550} = \frac{6}{11} = 6 : 11$

Bar Graph: Percentage profit earned by two companies X & Y over the given years.



- The income of two company X and Y in 2010 were in the ratio of 3 : 4, respectively. What is the respective ratio of their expenditures in 2010?
 (a) 7 : 22 (b) 14 : 19 (c) 15 : 22 (d) 27 : 35 (e) None of these
- If the expenditure of company Y in 2007 was Rs 220 crore, what was its income in 2007?
 (a) Rs. 312 crore (b) Rs. 297 crore (c) Rs. 283 crore (d) Rs. 275 crore (e) None of these
- If the expenditures of company X and Y in 2006 were equal and the total income of the two companies in 2006 was Rs 342 crore, what was the total profit of the two company together in 2006?
 (a) Rs. 240 crore (b) Rs. 171 crore (c) Rs. 120 crore (d) Rs. 102 crore (e) None of these
- The expenditure of company X in the year 2008 was Rs 200 crore and the income of company X in 2008 was the same as its expenditure in 2011. The income of company X in 2011 was?
 (a) Rs. 465 crore (b) Rs. 385 crore (c) Rs. 335 crore (d) Rs. 295 crore (e) None of these
- If the income of two company were equal in 2009, then what was the ratio of expenditure of company X to that of company Y in 2009?
 (a) 6 : 5 (b) 5 : 6 (c) 11 : 6 (d) 16 : 15 (e) None of these

Solution 1: $\frac{165\% \text{ of } E_1}{150\% \text{ of } E_2} = \frac{3}{4} \Rightarrow \text{Therefore, } \frac{E_1}{E_2} = \frac{15}{22} = 15 : 22$

Solution 2: $220 + 35\% \text{ of } 220 \Rightarrow 220 + 77 = 297$ crore

Solution 3: Let the expenditure of each companies X and Y in 2006 be 100

Then we have $100 + 40 + 100 + 45 = 342$ crore \Rightarrow Required profit = $\frac{342}{285} \times 85 = 102$ crore

Solution 4: Expenditure Company X in year 2008 is 200 crore, Then income of company X in year 2008 = $200 + 55\% \text{ of } 200 = 310$ crore

Hence, the expenditure of company X in year 2011 is 310 crore,

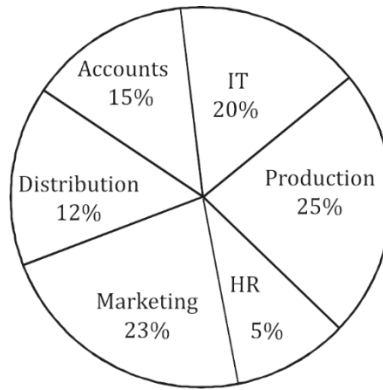
Therefore, the required income of X in year 2011 = $310 + 50\% \text{ of } 310 = 465$ crore

Solution 5: $\frac{150}{100}X = \frac{160}{100}Y$

be the incomes of two companies in 2009; $\frac{X}{Y} = \frac{160}{150} = \frac{16}{15} = 16 : 15$

Mixed Graph: Pie Chart breakup shows that number of employees in different department of an organization. Table shows the percentage of men in each department (Rest one woman)

Total number of employees = 1200



Departments	Percentage of Men
IT	35
PRODUCTION	87
HR	25
MARKETING	75
DISTRIBUTION	50
ACCOUNTS	65

- What is the Respective Ratio of the number of men from the marketing department to those from the accounts department
 (a) 23 : 13 (b) 13 : 9 (c) 27 : 19 (d) 17 : 11 (e) None of these
- The number of women from the IT department are what percent of the number of men from the same department (Rounded off to two deigits after decimal)
 (a) 159.38% (b) 190.07% (c) 185.71% (d) 168.23% (e) None of these
- The total number of men from all departments together forms what percent of the total no. of employees in the organization?
 (a) 67% (b) 63% (c) 55% (d) 58% (e) None of these
- What is the total number of women from the production department and the HR department together?
 (a) 78 (b) 84 (c) 92 (d) 64 (e) None of these
- Which department has the highest number of women employees
 (a) IT (b) marketing (c) Accounts (d) Distribution (e) None of these

Solution 1: Required Ratio = $\frac{75 \times 23}{65 \times 15} = 23 : 13$

Solution 2: Required Percentage = $\frac{65 \times 100}{35} = 185.71\%$

Solution 3: Men in IT = $\frac{20 \times 35 \times 1200}{100 \times 100} = 89$, Similarly calculate men from all departements; Total men = 756

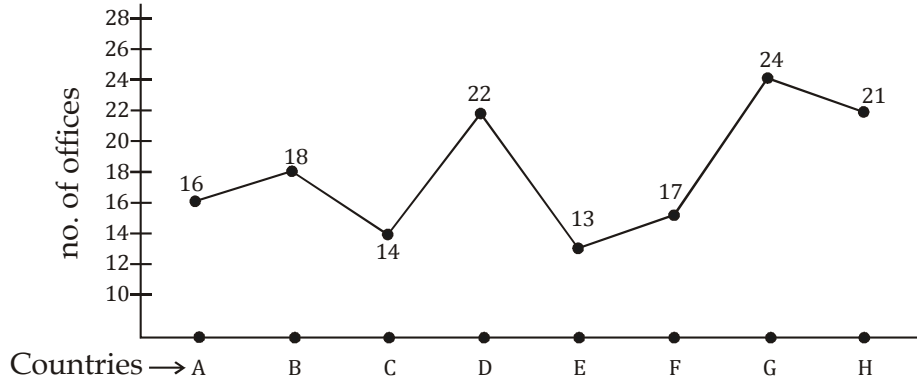
Required Percentage = $\frac{756}{1200} \times 100\% = 63\%$

Solution 4: Required number of woman = no. of women from production department + number woman from HR department 39 + 45 = 84

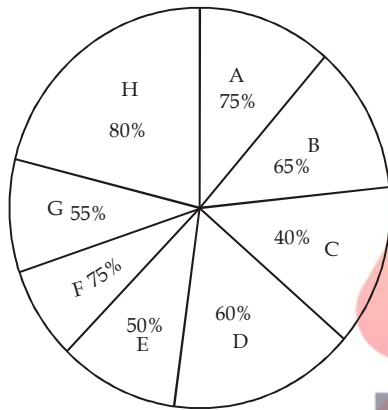
Solution 5: From the table, it is clear that IT department has highest number of women emp.

Mixed Graph:

Data Related to human resource of a multinational company (x) which has 145 offices across 8 – countries



Percentage distribution of post-graduate employees across - 8 - countries



Number of employees and respective Ratio male to female across - 8 countries

Countries	Total no. of Employees	Respective ratio of Male and Female emp.
A	2568	5 : 7
B	2880	11 : 5
C	2310	10 : 11
D	3575	3 : 2
E	2054	7 : 6
F	2788	20 : 21
G	3720	8 : 7
H	3360	9 : 5

- If the number of male post – graduate, employees in country H is 1800 what percent of female employees in that particular country is post graduate?
 (a) 76 (b) 74 (c) 72 (d) 64 (e) 68
- In which of the given countries is percentage of woman employees to number of employees (both male and female) in that country the second Lowest?
 (a) G (b) B (c) E (d) H (e) D
- What is the respective ratio between total number of male employees in countries B and H together and total number of female employees. in countries C and D together?
 (a) 63 : 52 (b) 51 : 38 (c) 77 : 64 (d) 69 : 44 (e) 57 : 40
- What is the difference between average number of post graduate employees in countries A, B and D together and Average number of Post-graduate employees in countries F, G, and H together?
 (a) 282 (b) 276 (c) 294 (d) 342 (e) 299
- Which of the given countries has the highest number of average employees per offices?
 (a) F (b) H (c) B (d) C (e) D

Solution 1: Total PG emp = $\frac{3360 \times 80}{100} = 2688 \Rightarrow$ Male PG = 1800 \Rightarrow Female PG. emp. = 2688 – 1800 = 888

Total female in country H = $\frac{3360 \times 5}{14} = 1200 \Rightarrow$ Required % F% = $\frac{888}{1200} \times 100 = 74\%$

Solution 2: Required ratio of country

$G = \frac{7}{15} \times 100 = 46.6\%$; $E = \frac{6}{13} \times 100 = 46.15\%$; $B = \frac{5}{16} \times 100 = 31.1\%$; $H = \frac{5}{14} \times 100 = 35.7\%$; $D = 40\%$

Hence, 2nd lowest country H

Solution 3: Total male in B and H or girl C and D

Requird Ratio

$$\left(\frac{2880 \times 11}{16} + \frac{3360 \times 9}{14}\right) : \left(\frac{2310 \times 11}{21} + \frac{3575 \times 2}{5}\right) \Rightarrow (1980 + 2160) : (1210 + 1430)$$

$$4140 : 2640 \Rightarrow 207 : 132 \Rightarrow 69 : 44$$

Solution 4: Total PG. emp in A, B and D is: $2568 \times \frac{75}{100} + \frac{2880 \times 65}{100} + \frac{3575 \times 60}{100}$

$$1926 + 1872 + 2145 = 5943 \Rightarrow \text{Average Pg in AB \& D is} = \frac{5943}{3} = 1981$$

Total PG in F,G and H = $2091 + 2046 + 2688 = 6825$

$$\text{Average PG in F.G.H} = \frac{6825}{3} = 2275 \Rightarrow \text{Required Diff} = 2275 - 1981 = 294$$

Solution 5: Average employee/office is

$$F = \frac{2788}{17} = 164 \Rightarrow B = \frac{2880}{18} = 160 \Rightarrow H = \frac{3360}{21} = 160 \Rightarrow D = \frac{3575}{22} = 162.5 \Rightarrow C = \frac{2310}{14} = 165$$

Hence C is required Answer.

Missing Data Interpretation—

No. Of People	A	B	C	D	E
Principal	—	—	—	—	—
Rate of interest	—	—	10%	—	—
Simple interest for 1st year	—	—	—	—	—
Compound interest	—	—	—	—	—
1st year	—	—	—	—	—
First two year	—	21000	—	—	—
First three year	—	33800	—	—	—
First four year	—	—	—	—	—
Amount 2nd year for compound interest	4624	—	—	—	—
Amount 3rd year for compound	4913	—	—	—	—

1. If the principal of E is 20% more than the principal of B than , find the principal of E?

(a) 72830 (b) 82320 (c) 76380 (d) 84430 (e) 78340
2. Find the principal of (A) person?

(a) 4000 (b) 4096 (c) 3840 (d) 4286 (e) 4300
3. For the person D if the Diff between simple interest and compond interest for the fourth year is 507. If rate of interest of person D is same as person 'B'. Then the principal of (D)?

(a) 7000 (b) 7120 (c) 7203 (d) 7224 (e) 7189

4. Find the compound interest for the person (c). For 3 years if the principal of C is the sum of principal of A, E, and D
 (a) 24839.212 (b) 28487.312 (c) 30987.889 (d) 32183.789 (e) 29813.312

Solution 1. To find principal of E, we must know B's principal.

$$\text{for 2 year } C\% = 21000 = P \left[\left(1 + \frac{r}{100} \right)^2 - 1 \right] \quad \dots(i)$$

$$\text{for 3 year } C\% = 33800 = P \left[\left(1 + \frac{r}{100} \right)^3 - 1 \right] \quad \dots(ii)$$

Equation (ii) divide by equation (i)

(ii) and (i)

$$\frac{21000}{33800} = \frac{\left(1 + \frac{r}{100} \right)^2 - 1}{\left(1 + \frac{r}{100} \right)^3 - 1}; \text{ let } = x \Rightarrow 210 [(1+x)^3-1] = 338 [(1+x)^2-1]$$

$$210 [1+x^3+3x(1+x)-1] = 338 [1+x^2+2x-1] \Rightarrow 105x^2 + 315x + 315 = 169x + 338 \Rightarrow 105x^2 + 146x - 23 = 0$$

$$x = \left(\frac{-161}{105} \text{ neglect} \right) \text{ coz } (-)$$

$$\text{Now, } \frac{r}{100} = \frac{15}{105} \quad r = \frac{100}{7} = 14.28\% \text{ or } 14\frac{2}{7}\% \Rightarrow \text{Find } P = 21000 = P \left[\left(1 + \frac{100}{700} \right)^2 - 1 \right]$$

$$21000 = P \times \frac{(64-49)}{49} \Rightarrow \frac{21000 \times 49}{15} = P$$

68600 = P B's Principal \Rightarrow E's principal is 20% more than B

So B = 68600 \Rightarrow E = 82320

Solution 2: for R = $\frac{289 \times 100}{4624} = 6.25\% \Rightarrow 4624 = P \left(1 + \frac{6.25}{100} \right)^2 \Rightarrow 4624 = \frac{P \times 17 \times 17}{16 \times 16} \Rightarrow \frac{4624 \times 16 \times 16}{17 \times 17} = P$

$$4096 = P$$

Solution 3: By question - 1- Rate of interest D = B as we know B = 14.28%

P A

$$7^4 - 8^4 = 4096 (\text{forth year amount})$$

$$(7^3 - 8^3) = 3584 (\text{3rd year amount})$$

$$(7^3 - 8^3) \times 7$$

Comound input only 4th year Amount = 512, Simple interest for the 4th year = 343

$$\text{Difference} = 512 - 343 = 169 \Rightarrow 169 = 507$$

$$1 = \frac{507}{169} \Rightarrow 7^4 = \frac{507}{169} \times 7^4 = 7203$$

Solution 4: Principal of C = A + D + E = 4096 + 7203 + 82320 = 93619

$$\text{Now C.I. for person 'C'} = 93619 \left[\left(1 + \frac{10}{100} \right)^3 - 1 \right] = 30987.889$$

Missing D.I.: A professor keeps data on students in tabular form on performance and sex of the student. The data is kept on a computer disk, but unfortunately some of its data has been lost because of a virus. Only the following has been recovered.

	Performance			Total
	Average	Good	Excellent	
Male	—	—	10	—
Female	—	—	—	32
Total	—	30	—	—

An expert committee was formed, which decided that the following facts were self evident.

- (1) Half the students were either excellent or good.
- (2) 40% of the students were females.
- (3) One third of the male students were average.

1. How many students were both female and excellent
 (a) 0 (b) 8 (c) 16 (d) 32 (e) None of these
2. How many students are both male and good?
 (a) 10 (b) 16 (c) 22 (d) 48 (e) None of these
3. Among average students, what is the ratio of male to female?
 (a) 1 : 2 (b) 2 : 1 (c) 3 : 2 (d) 2 : 3 (e) None of these
4. What proportion of female students are good?
 (a) 0 (b) 0.25 (c) 0.5 (d) 1.0 (e) None of these
5. What proportion of good students are male?
 (a) 0 (b) 0.73 (c) 0.4 (d) 1.0 (e) None of these

Solution:

- From the table it is given that the number female is 32 and this number is 40% of the students. This means that the total no. of students is 80 and the number of males is 48.
- Now in the question we are given that half the students were excellent or good, also, it is given that one third of the male students were average. So the number of male average students is 16.
- (No. of good students + No. of Excellent student) \Rightarrow 40
- Total good students = 30
- Therefore the number of Excellent Students \Rightarrow 40 - 30 \Rightarrow 10
- Also in the question it is mentioned that 1/3 rd of male students were average, therefore total no. of males students that were good = (48 - 16 - 10) = 22

Now fill the graph

	Performance			Total
	Average	Good	Excellent	
Male	16	22	10	48
Female	24	8	0	32
Total	40	30	10	80

Solution 1: (a);No. of student are both, Female and Excellent = 0

Solution 2: (c);No. of students who are both, Male and good = 22

Solution 3: (d);Ratio male to female among Average student = 16 : 24 = 2 : 3

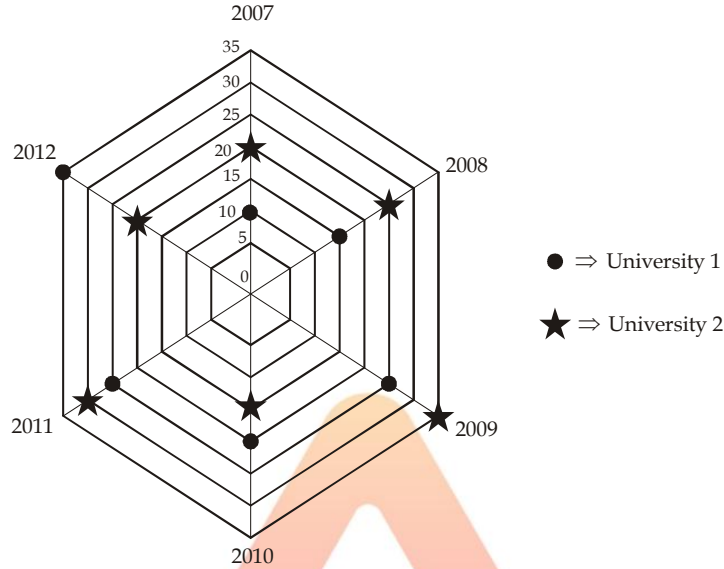
Solution 4: (b);Proportion of female student who are good = 8/32 = 0.25

Solution 5: (b);Proportion of good students who are male = $\frac{22}{30} \Rightarrow$ 0.73

Radar Graph: The radar chart is a chart that consists of a sequence of equi-angular spokes, called radii, with each spoke representing one of the variables. The radar chart also known as a spider chart because of its appearance, has its zero starting point in the middle from the middle of each axis of the chart can protrude out like the spokes on a wheel. There can be one axis for each subject. And there is no limit on the no. of subject that can be used it can also be described as a radial grid with zero starting point being the middle.

Radar Graph

Number of students (in thousands) in two different universities in six different years.



- What was the difference between the number of students in university-1 in the year 2010 and the number of students in university-2 in the year 2012?
 (a) zero (b) 5000 (c) 15000 (d) 10000 (e) 1000
- What is the sum of the number of students in university-1 in the year 2007 and the number of students in university-2 in the years 2011 together?
 (a) 40000 (b) 55000 (c) 45000 (d) 57000 (e) 40000
- If 25% of the students in university-2 in the year 2010 were female what was the number of male students in the university - 2 in the same year?
 (a) 11250 (b) 12350 (c) 12500 (d) 11500 (e) 11750
- What was the percentage increase in the number of students in university - 1 in the year 2011 as compared to the previous year?
 (a) 135 (b) 15 (c) 115 (d) 25 (e) 35
- In which year was the difference between the number of students in university-1 and the number of students in university-2 highest?
 (a) 2008 (b) 2009 (c) 2010 (d) 2011 (e) 2012

Solution 1: Required $\Rightarrow 20,000 - 20,000 \Rightarrow 0$ (zero)

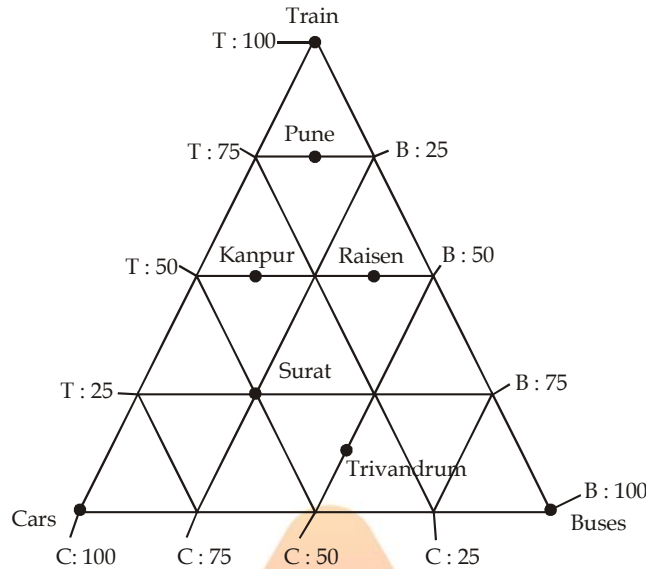
Solution 2: Required $\Rightarrow 30,000 + 10,000 \Rightarrow 40,000$

Solution 3: Boys $\Rightarrow 15000 \times \frac{75}{100} \Rightarrow 11250$

Solution 4: Required increased Percentage $\frac{5000}{20000} \times 100 \Rightarrow 25\%$

Solution 5: Difference $\Rightarrow 2012$ higher (shows in figure)

Triangular Bar diagram: A survey was conducted in five cities viz. Pune, Kanpur, Raisen, Surat and Trivandrum for the percentage of people using T (Trains), B (Buses) & C (Cars), as mode of transport. Number of persons surveyed in cities Pune, Kanpur, Raisen, Surat and Trivandrum are 2000, 4000, 6000, 3000 and 8000 respectively.



- The city, where the least number of Persons use buses is,
 - Surat
 - Raisen
 - Kanpur
 - Pune
 - None of these
- The average number of persons using trains for transportation in Pune, Kanpur, Raisen and Trivandrum is
 - 1880
 - 1750
 - 1950
 - 1850
 - None of these
- The mode of transport used by the least number of persons in all the given cities
 - trains
 - buses
 - cars
 - cars & buses
 - None of these
- Out of total number of car users in all the cities together, how many cities have less than 30% of car user?
 - One
 - Two
 - Three
 - Four
 - None of these

Solution 1: Number of Persons using buses in

$$\begin{aligned} \text{Surat} &\Rightarrow 75\% \text{ of } 3000 \Rightarrow 2250; & \text{Raisen} &\Rightarrow 50\% \text{ of } 6000 \Rightarrow 3000; & \text{Kanpur} &\Rightarrow 50\% \text{ of } 4000 \Rightarrow 2000 \\ \text{Pune} &\Rightarrow 25\% \text{ of } 2000 \Rightarrow 500; & & & & \text{Thus, Pune is the required city} \end{aligned}$$

Solution 2: Number of persons using trains in

$$\begin{aligned} \text{Pune} &\Rightarrow 75\% \text{ of } 2000 \Rightarrow 1500; & \text{Raisen} &\Rightarrow 50\% \text{ of } 6000 \Rightarrow 3000 \\ \text{Kanpur} &\Rightarrow 50\% \text{ of } 4000 \Rightarrow 2000; & \text{Trivandrum} &\Rightarrow 12.5\% \text{ of } 8000 \Rightarrow 1000 \end{aligned}$$

$$\text{Thus, required average number} = \frac{1500 + 2000 + 3000 + 1000}{4} = \frac{7500}{4} \Rightarrow 1875$$

Solution 3: No. of persons using buses $\Rightarrow 25\% \text{ of } 2000 + 50\% \text{ of } 4000 + 50\% \text{ of } 6000 + 75\% \text{ of } 3000 + 87.5\% \text{ of } 8000$
 $\Rightarrow 14750$, No. of persons using trains
 $\Rightarrow 75\% \text{ of } 2000 + 50\% \text{ of } 4000 + 50\% \text{ of } 6000 + 25\% \text{ of } 3000 + 12.5\% \text{ of } 8000 = 8250$
 Number of persons using cars
 $\Rightarrow 50\% \text{ of } 2000 + 62.5\% \text{ of } 4000 + 37.5\% \text{ of } 6000 + 62.5\% \text{ of } 3000 + 43.75\% \text{ of } 8000 \Rightarrow 11125$
 Hence, Trains are used by the least no. of persons in the given cities.

Solution 4: Total no. of cars users = 11125 & 30% of 11125 = 3337.5

Thus, in four cities, the no. of car users is less than 3337.5 i.e less than 30% of the car users. These cities are Pune, Kanpur, Raisen, Surat.

Case Studies or Puzzle D.I.

Table (Case Studies)

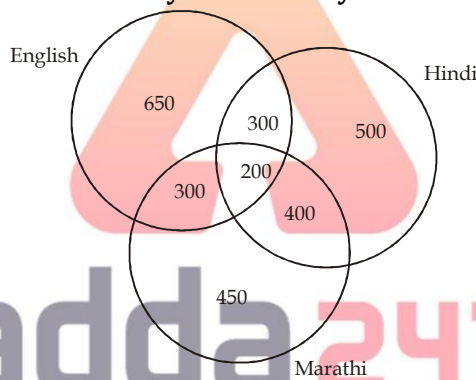
Puzzle (Venn Diagram)

Study the following information carefully to answer the question.

The officer's colony of Badown has 2800 members out of which 650 members read only English newspaper. 500 members read only Hindi newspaper and 450 member read only Marathi newspapers. The number of member reading all the three newspapers is 200. 400 members read Hindi as well as Marathi newspapers only and 300 members read English and as well as Marathi newspaper only and 300 members read English and as well as Hindi newspaper only.

- How many members read atleast two newspaper?
(a) 1200 (b) 1800 (c) 1500 (d) 1100 (e) None of these
- Find the number of members reading Hindi newspaper?
(a) 750 (b) 980 (c) 1400 (d) 1020 (e) None of these
- How many members read only one newspaper?
(a) 1560 (b) 1600 (c) 1650 (d) 1540 (e) None of these
- Find the number of members reading atleast three newspaper?
(a) 200 (b) 300 (c) 460 (d) 750 (e) None of these

Given information can be easily described by the following venn diagram



Solution 1: From the above venn diagram $\Rightarrow 300 + 300 + 400 + 200 = 1200$

Solution 2: No. of members reading Hindi newspaper $\Rightarrow 500 + 300 + 200 + 400 = 1400$

Solution 3: The number of members reading only one newspaper $\Rightarrow 650 + 500 + 450 = 1600$

Solution 4: The number of members reading atleast three newspapers = 200

Case Study (Table Formate): Study the information carefully to answer the question that follow.

A. Company produced five different products viz. mobile phone, pen drive, calculators, televisions and washing machines. Total number of all the five products is 1650. 24% of the total number of products is mobile phones. One sixth of the total number of products is Pendrives. 14% of the total number of product is calculators. Remaining products are either television or washing machine; number of washing machine is 50 more than the number of televisions produced.

- What is the difference between the total number of televisions and mobile phones together and the number of calculators produced?
(a) 534 (b) 524 (c) 511 (d) 523 (e) None of these
- Number of televisions produced is approximately what % of the total number of calculators and washing machines produced together?
(a) 63% (b) 55% (c) 59% (d) 51% (e) 67%
- What is the total number of pen drives, calculator and washing machines produced by the company?
(a) 907 (b) 917 (c) 925 (d) 905 (e) None of these

Solution: Total no. of products = 1650 \Rightarrow Number of mobile phone = 24% of 1650 = 396

Number of pen drive = $\frac{1}{6}$ of 1650 = 275, Number of calculator = 14% of 1650 = 231

Remaining number of products = $1650 - (396 + 275 + 231) = 748$

These remaining products i.e, 748 products are either televisions or washing machines.

Let the number of washing machine and televisions be x and y respectively then,

$$x + y = 748; x - y = 50 \Rightarrow x = 399, y = 349$$

Now,

Products	Number of products
Mobile phones	396
Pen drives	275
Calculators	231
Washing Machines	399
Televisions	349

Solution 1: Total no. of television & mobile phones together = $396 + 349 = 745$

And No. of calculators = 231, Required difference = $745 - 231 = 514$

Solution 2: No. televisions = 349 \Rightarrow Required% = $\frac{349}{630} \times 100\% \Rightarrow 55\%$

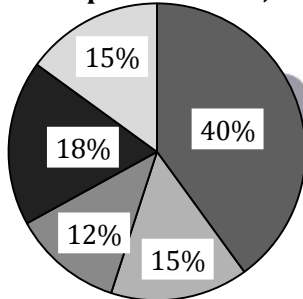
Solution 3: Total no. of pen drives, Calculators & Washing Machines = $275 + 231 + 399 \Rightarrow 905$

Basic Questions

Directions (1-5):- The given pie chart shows percentage distribution of various expense of a family in a given month.

Study the graph carefully and answer the following questions.

Total expense = Rs 25,000



■ Food □ Rent ■ Electricity bill ■ Others □ Clothes

Note:- Monthly Income = Expense + Savings

- What is the average expense on Rent, Electricity bill and Others?
(a) Rs 5000 (b) Rs 3000 (c) Rs 3750
(d) Rs 2750 (e) Rs 3250
- If expense on Food is $\frac{125}{4}\%$ of monthly family income, then find the total monthly income of family.
(a) Rs 28000 (b) Rs 42000 (c) Rs 35000
(d) Rs 38000 (e) Rs 32000
- If expense on Others consist of Telephone bill, expense on Entertainment and expense on commuting in the ratio 4 : 6 : 5, then monthly expense on Electricity bill is what percent more or less than that on Telephone bill?

- (a) 100% (b) 150% (c) $\frac{200}{3}\%$
(d) 125% (e) 75%

4. If monthly saving of the family is 30% of the monthly income, then find the ratio of the expense on the Clothes to Savings of the family.

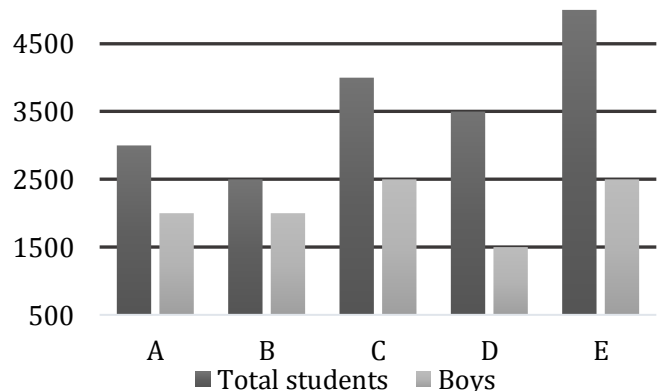
- (a) $\frac{3}{20}$ (b) $\frac{7}{20}$ (c) $\frac{11}{20}$
(d) $\frac{9}{20}$ (e) $\frac{1}{4}$

5. Find central angle (in degrees) of monthly expense of family on electricity bill.

- (a) 76.4 (b) 68.6 (c) 32.8
(d) 54.6 (e) 43.2

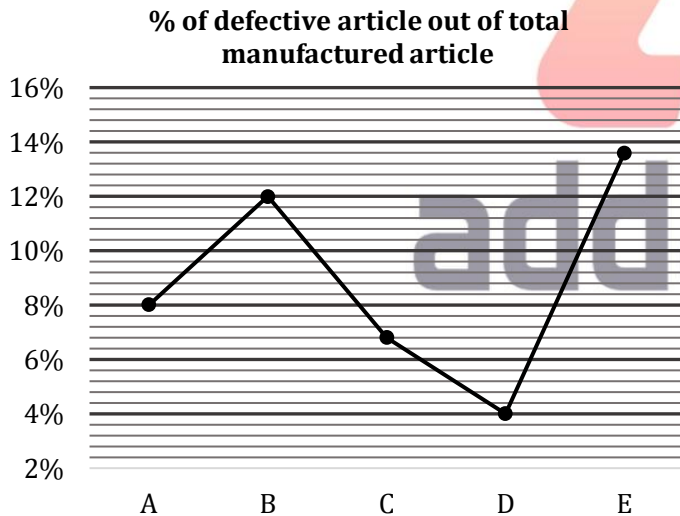
Directions (6-10): The given bar graph shows the total no. of students of 5 different schools and no. of boys from each school.

Study the graph carefully and answer the following questions.



6. What is the ratio between no. of boys of school B and no. of girls of school C?
 (a) 4 : 3 (b) 1 : 1 (c) 5 : 4
 (d) 3 : 4 (e) 4 : 5
7. No. of girls of school B and C together is what percent of total students of school A?
 (a) 150% (b) 125% (c) 100%
 (d) 66.67% (e) 75%
8. What is the average no. of boys in school A, B, C and E?
 (a) 1800 (b) 2250 (c) 2300
 (d) 1950 (e) 2875
9. Girls in school A and B together are what percent more/less than girls of school B and D together?
 (a) 60% (b) 50% (c) 40%
 (d) 70% (e) 80%
10. No. of boys in school B and E together are how much more/less than girls in school A, C and D together?
 (a) 500 (b) 1000 (c) 1500
 (d) 2000 (e) 0

Direction (11-15): - Line graph given below shows percentage of defective article out of total manufactured article in five different company i.e. (A, B, C, D and E).



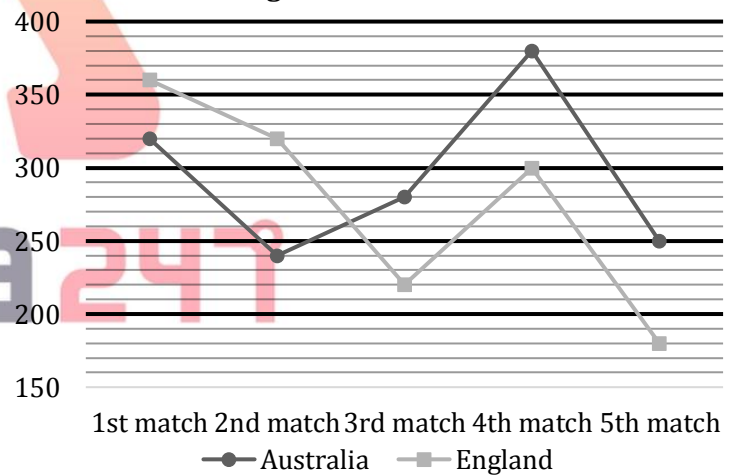
11. If ratio between total no. of article manufactured in company C to company E is 1:2. Find ratio of defective article manufactured in E to that of C?
 (a) 2:1 (b) 4:1 (c) 8:3
 (d) 4:3 (e) 3:2
12. If no. of article manufactured in each company are equal, find no. of non-defective article manufactured in company D are how much percent more/less than no. of non-defective article manufactured in company B?
 (a) $11\frac{1}{9}\%$ (b) $9\frac{1}{11}\%$ (c) $14\frac{2}{7}\%$
 (d) $7\frac{1}{7}\%$ (e) $37\frac{1}{5}\%$

13. No. of defective article manufactured by company A is 96. Find total no. of article manufactured by company A?
 (a) 9600 (b) 1200 (c) 1600
 (d) 8000 (e) 3200
14. If ratio of defective article of company C to that of D is 2:3. Find ratio between total no. of article manufactured by company C to that of company D?
 (a) 20:7 (b) 3:7 (c) 20:51
 (d) 25:21 (e) Can't be determine.
15. If difference between no. of article manufactured by company A and D is 200 and ratio of no. of article manufactured by A to D is 7:6. Find no. of non-defective article manufactured by A?
 (a) 1288 (b) 1308 (c) 1402
 (d) 1512 (e) 1198

Directions (16-20): Study the line graph carefully and answer the following questions.

The line graph shows the runs scored by two different teams in a series of 5 cricket matches.

Runs scored by England and Australia against each other



16. Runs scored by Australia in first and third match together is what percent of runs scored by England in second and fifth match together?
 (a) 100% (b) 125% (c) $83\frac{1}{3}\%$
 (d) 120% (e) 75%
17. Find the difference between maximum runs scored by England and minimum runs scored by Australia.
 (a) 120 runs (b) 80 runs (c) 150 runs
 (d) 200 runs (e) 180 runs
18. What is the ratio between total runs scored by Australia to that of England in all matches?
 (a) 25 : 23 (b) 46 : 47 (c) 43 : 46
 (d) 49 : 46 (e) 23 : 43

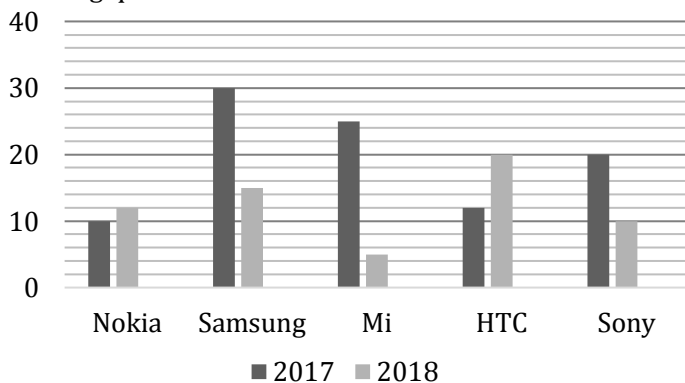
19. Runs scored by Australia in second match is what percent more or less than runs scored by England in fourth match?

- (a) 25% (b) 20% (c) 35%
(d) 10% (e) 50%

20. What are the average runs scored by England in first four matches?

- (a) 250 (b) 280 (c) 345
(d) 320 (e) 300

Directions (21-25): - Bar graph given below shows number of mobile phones ('000) sold in 2017 and percentage increase in sales of these mobile phones in 2018 as compared to previous year of 5 different companies. Read the data carefully and answer the following question.



21. Find the number of phones sold by Nokia and Samsung together in 2018.

- (a) 48400 (b) 43200 (c) 45700
(d) 41900 (e) 47500

22. No. of Mi mobile sold in 2017 are what percent more than no. of Sony mobile sold in same year?

- (a) 20% (b) 12% (c) 14%
(d) 30% (e) 25%

23. No. of HTC mobile sold in 2018 are how much more/less than no. of Sony mobile sold in 2017?

- (a) 5600 less (b) 6600 more (c) 5600 more
(d) 6600 less (e) None of these.

24. If no. of Mi mobile sold in 2016 are 30% less than Mi mobile sold in 2017, find ratio between Samsung mobile sold in 2018 and Mi mobile sold in 2016?

- (a) 17:12 (b) 67:35 (c) 69:35
(d) 69:37 (e) 19:17

25. What is average no. of MI and HTC mobiles sold in year 2018?

- (a) 20325 (b) 17325 (c) 18050
(d) 19050 (e) None of these.

Directions (26-30): - Paragraph given below gives information of literate and illiterate population out of total population of three cities i.e. A, B and C. Read the paragraph carefully and answer the following questions.

Total population of city A and B are 22000 and 16000 respectively. Total literate population of city B is 6000 which is 6.25% of total population of city C. Ratio of literate to illiterate population in city A and C is 5:6 and 2:1 respectively. 40% of literate population in each city is graduate.

26. Literate population from city B are what percent of illiterate population of city A?

- (a) 100% (b) 75% (c) 50%
(d) 40% (e) 60%

27. What is the ratio between graduate population of city C and total population of city B?

- (a) 5:8 (b) 3:5 (c) 5:3
(d) 8:5 (e) 1:3

28. What is the difference between graduate population of city B and illiterate population of city C?

- (a) 29600 (b) 28400 (c) 28600
(d) 29400 (e) None of these.

29. Population which is literate but ungraduated from city A are what percent graduate population of city B?

- (a) 500% (b) 250% (c) 300%
(d) 120% (e) 375%

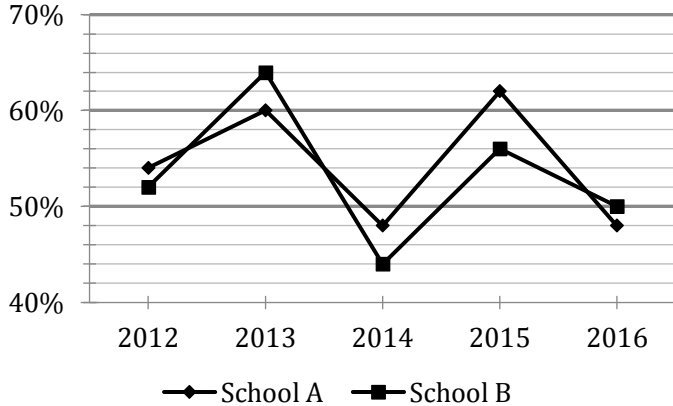
30. If ratio of male to female in graduate population from city C is 9:7, find difference between graduate male from city C to literate but ungraduated from city B?

- (a) 7200 (b) 14400 (c) 10800
(d) 12000 (e) 11800

Prelims Questions

Level - 1

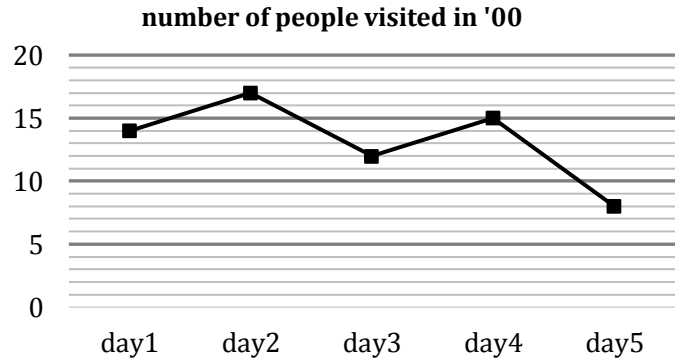
Directions (1-5): Given below is the line graph which shows the percentage of boys in two school A and B in 5 different years.



Total students in any school = Total boys + Total girls in each school

- In 2012, ratio of boys in school A to school B is 45 : 52 and total students in both school in 2012 is 1100. Find the total number of girls in both school in same year.
(a) 568 (b) 528 (c) 518
(d) 418 (e) 488
- If in 2014, boys in school A and B are 288 and 264 respectively then, find total number of girls in both school in 2014.
(a) 594 (b) 640 (c) 564
(d) 648 (e) 630
- If boys in school A in 2014 and girls in school B in 2012 are equal then boys in school B in 2012 are what percent of girls in school A in 2014.
(a) 85% (b) 95% (c) 90%
(d) 80% (e) 100%
- In 2016, girls in school A are $16\frac{4}{5}\%$ less than girls in school B. Find the ratio of boys in school A to that of school B in 2016.
(a) 100 : 123 (b) 98 : 117 (c) 98 : 125
(d) 92 : 117 (e) 96 : 125
- If total students in school A in 2015 and total student in B in 2013 are 700 and 400 respectively, then find the average number of boys in school A in 2015 and boys in school B in 2013.
(a) 344 (b) 345 (c) 348
(d) 368 (e) 358

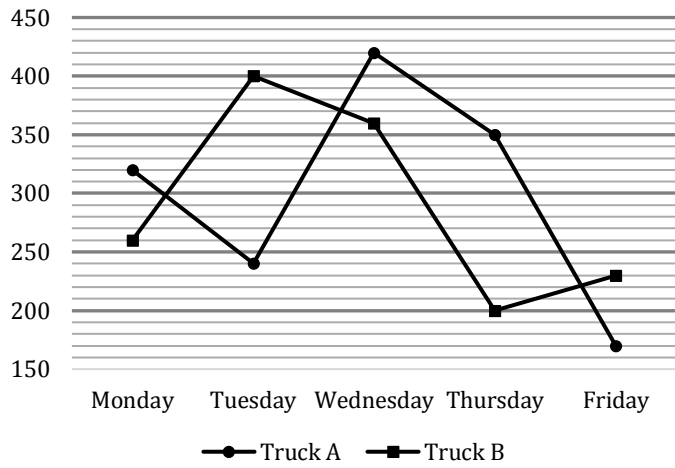
Directions (6-10): line chart given below gives information about total number of people in ('00) who visited statue of liberty in five days of week and table given tells about ratio of male to female who visited statue of liberty in these five days.



Days	Male : female
Day1	13:15
Day2	37:31
Day3	13:12
Day4	7:8
Day5	11:5

- Maximum no. of male is how much percent more than minimum number of females who visited statue of liberty in any day of the week?
(a) 150% (b) 270% (c) 125%
(d) 200% (e) 185%
- In how many days of the week, number of people is less than average no. of people who visited statue of liberty?
(a) 5 (b) 4 (c) 3
(d) 1 (e) 2
- What is the square root of number of females who visited on day3 of the week?
(a) 26 (b) 22 (c) 24
(d) 18 (e) None of these.
- What is the ratio of average number of females who visited on day1, day2 and day4 to average number of males who visited on day2 and day4?
(a) 65:62 (b) 63:62 (c) 62:65
(d) 62:61 (e) 63:65
- If 4% of number of males visited on day1 were also come on day3 and ratio of male and female remain unchanged, then find increase in number of females who visited on day3?
(a) 26 (b) 24 (c) 12
(d) 13 (e) 39

Direction (11-15): Line graph given below shows distance (in km) covered by Truck A and Truck B on five different days. Study the data carefully and answer the following questions.

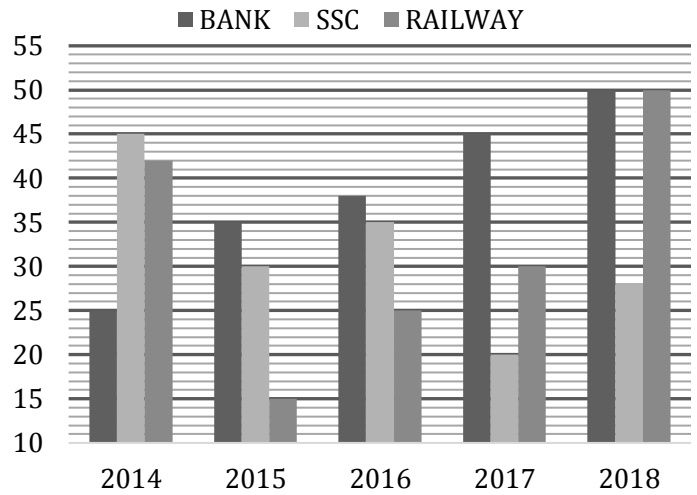


Note - Both truck travel 6 hours a day.

- Find the ratio between average speed of Truck B on Tuesday to that of Truck B on Thursday.
 - 1 : 3
 - 2 : 1
 - 1 : 2
 - 4 : 1
 - 3 : 2
- Average speed of truck A on Friday is what percent of the average speed of truck B on Monday?
 - $65\frac{5}{11}\%$
 - $45\frac{7}{13}\%$
 - $55\frac{5}{13}\%$
 - $65\frac{5}{13}\%$
 - None of these
- Find the average distance travelled by truck A on all days except Thursday?
 - 287.5 km
 - 293.5 km
 - 269.5 km
 - 274.5 km
 - 282.5 km
- Distance travelled by truck A on Tuesday is how much percent more or less than distance travelled by truck B on Thursday?
 - 15%
 - 20%
 - 30%
 - 25%
 - None of these
- Find the difference between average speed of truck A on Tuesday and average speed of truck B on Wednesday?
 - 30 km/hr
 - 24 km/hr
 - 20 km/hr
 - 36 km/hr
 - 18 km/hr

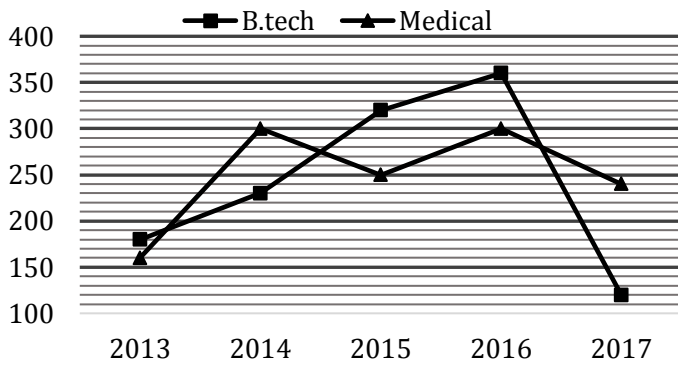
Direction (16- 20): Bar graph given below shows number of students (in'000) who joined Adda247 for Bank, SSC, Railway in five different years

Study the following graph carefully and answer the questions that follows



- no. of students is how much percent more than minimum no. of students in any year who joined for banking, ssc and railways?
 - 266.67%
 - 233.33%
 - 266.33%
 - 267.66%
 - 233.67%
- What is the ratio of average no. of students who joined for railway in 2014, 2016 and 2017 to average no. of students who joined for banking in year 2015 & 2018?
 - 194:255
 - 97:117
 - 117:97
 - 177:194
 - None of these.
- If ratio of boys to girls in banking in year 2016 is 11:8 and no. of boys are 25% less than that of girls in ssc in same year, then find the difference between no. of boys in banking and no. of girls in ssc in 2016?
 - 3000
 - 4000
 - 7000
 - 2500
 - 2000
- In 2014 no. of students qualified in exam are 50%, 25% and 20% in banking, ssc and railways respectively out of total students who joined Adda247 for banking, ssc & railways in 2014 respectively. Find average no. of students qualified in banking and ssc in 2014 are how much more than who qualified in railway in 2014?
 - 3425
 - 3405
 - 3475
 - 3450
 - 3440
- No. of student who joined for ssc in 2018 are what percent of number of students who joined for railway in 2014?
 - $66\frac{2}{3}\%$
 - $33\frac{2}{3}\%$
 - $33\frac{1}{3}\%$
 - $66\frac{1}{3}\%$
 - None of these.

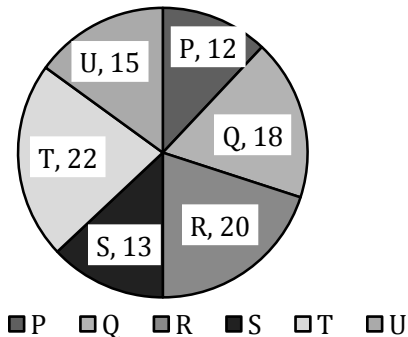
Direction (21-25): The following line graph shows the number of students enrolled in two different courses (B.Tech, & Medical) in a college during 2013 to 2017. Study the given graph carefully and answer the following questions.



21. What was the percent increase/decrease in number of students in medical in the year 2017 as compared to previous year?
 (a) 12.5% (b) 25% (c) 20%
 (d) 22.5 (e) 33.33%
22. Number of students enrolled in B.Tech in the year 2014 and 2015 together was what percent of the total number of students enrolled in Medical in the year 2015?
 (a) $\frac{500}{11}\%$ (b) 120% (c) 150%
 (d) 220% (e) 70%
23. Find the average no. of students enrolled in B.Tech all over the years.
 (a) 242 (b) 422 (c) 264
 (d) 342 (e) 282
24. What is the ratio between students enrolled in B.tech in year 2014 and 2016 together to that of Medical in year 2017 and 2016 together?
 (a) 54 : 59 (b) 9 : 10 (c) 55 : 58
 (d) 59 : 54 (e) 57 : 59
25. Total number of students enrolled in year 2016 is how much percentage more or less than total no. of students enrolled in year 2017? (total students = medical + B-tech)
 (a) $83\frac{1}{3}\%$ (b) $85\frac{1}{3}\%$ (c) $87\frac{2}{3}\%$
 (d) 90 % (e) $93\frac{1}{3}\%$

Directions (26-31): pie chart given below gives information about distribution of voters in six different city out of total voters.

Percentage distribution of voters in six different cities total voters = 75000



26. Average no. of voters in city P, Q, and U are equal to total no. of voters of which city?
 (a) P (b) Q (c) S
 (d) T (e) U
27. If 90% and 88% of total voters of city R and T respectively voted on the day of voting, then find no. of voters who did not vote in these two cities?
 (a) 3480 (b) 2280 (c) 2440
 (d) 2240 (e) 3280
28. What is the difference between total voters of city P and S together to total voters of city Q and T together?
 (a) 11250 (b) 9750 (c) 9000
 (d) 16500 (e) 15000
29. If ratio of male voters to female voters in city S and city U is 13:12 and 29:16 respectively, then find difference between no. of male voters in these cities?
 (a) 2050 (b) 2180 (c) 3400
 (d) 3140 (e) None of these.
30. If in city T 40% of total voters are female and 20% of female voters did not cast vote and total 13840 vote were polled, then find how difference of male and female who did not cast vote?
 (a) 20 (b) 40 (c) 25
 (d) 15 (e) 38
31. No. of book sold varies with no. of selection of candidate when 1200 book were sold, total 1050 candidate were selected. Find no. selection if 400 books were sold.
 (a) 250 (b) 350 (c) 200
 (d) 375 (e) 275

Directions (32-36) :- The given table shows the number of votes cast in a city in given years. Some data is missing. Study the following table and answer the following questions.

Year	Total number of votes	Percentage of valid votes	Respective ratio of valid votes of A and valid votes of B
2013	1000	40%	-
2014	2500	50%	-
2015	800	-	7 : 4
2016	-	75%	8 : 5
2017	-	-	5 : 3

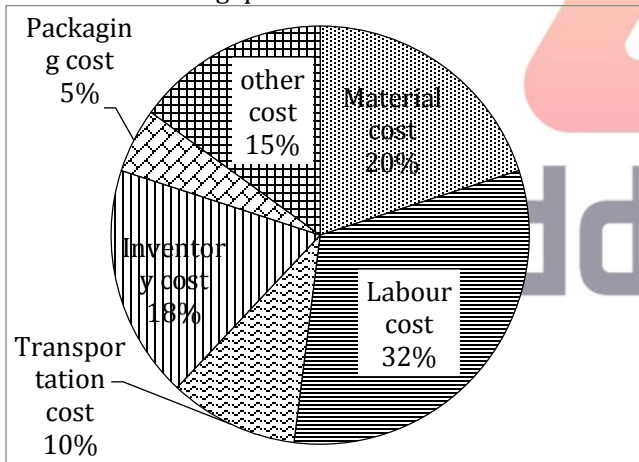
Note :- Total votes = valid votes + invalid votes

Total valid votes = valid votes of A + valid votes of B

32. The total number of votes increased by 40% in 2018 with respect to 2015 and out of which only 20% votes are invalid. Find the no. of valid votes in 2018.
 (a) 224 (b) 896 (c) 1024
 (d) 908 (e) 696

33. If the average no. of valid votes in 2014 and 2016 are 1000. Find the total no. of votes cast in 2016.
 (a) 1250 (b) 1750 (c) 1000
 (d) 750 (e) 1500
34. What was the respective ratio of no. of valid votes of A and no. of valid votes of B in year 2014, if the no. of valid votes of B was 650 in the same year?
 (a) 12/25 (b) 13/12 (c) 13/25
 (d) 12/13 (e) 11/13
35. If 55% of total cast votes are valid in year 2015, find the difference between valid votes of A and B in the same year?
 (a) 240 (b) 150 (c) 180
 (d) 90 (e) 120
36. In 2016, the difference between no. of valid votes of A and B was 225. What was the total no. of votes cast in 2016?
 (a) 1500 (b) 1300 (c) 1700
 (d) 900 (e) 1100

Direction (36 – 41): The following pie chart shows the percentage distribution of the expenditure incurred in production of a car. Study the pie chart carefully and answer the following questions.



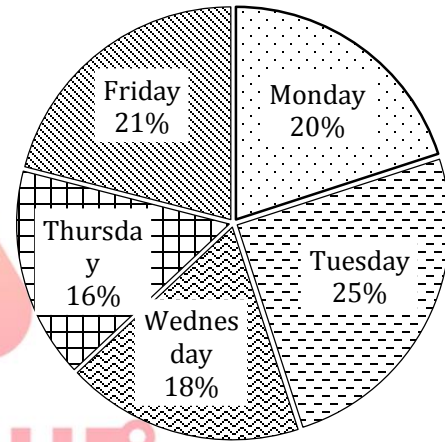
37. What is the central angle of the expenditure incurred on Transportation?
 (a) 72° (b) 115° (c) 80°
 (d) 54° (e) 36°
38. Inventory cost is how much percent more/less than the material cost?
 (a) 15% (b) 20% (c) 10%
 (d) 17.5% (e) 12.5%
39. If the difference between expense incurred on labour cost and material cost is Rs 27000, then find the overall cost incurred on production of a car?
 (a) Rs 2,70,000 (b) Rs 2,25,000 (c) Rs 2,00,000
 (d) Rs 1,00,000 (e) Rs 2,75,000

40. The market price of car is 20% more than the cost price. If the market price of the car is Rs 3,60,000 then what is the cost of material?
 (a) Rs 60,000 (b) Rs 72000 (c) Rs 90,000
 (d) Rs 45,000 (e) Rs 54,000
41. If the packaging cost is Rs 13500, then what is the average expense incurred on material, transportation and others?
 (a) Rs 36400 (b) Rs 41400 (c) Rs 38600
 (d) Rs 53200 (e) Rs 40500

Directions (42-46): Study the pie chart given below and answer the following questions.

Pie chart shows the percentage distribution of total distance travelled by Anurag on 5 days (Monday, Tuesday, Wednesday, Thursday and Friday).

Total distance travelled = 900 km



42. On Monday, Anurag travelled $\frac{5^{th}}{9}$ of the distance at an average speed of 50 km/hr. and remaining distance at an average speed of 60 km/hr., then find average speed (in km/hr.) of Anurag on Monday.
 (a) 57 (b) 54 (c) 53
 (d) 56 (e) 55
43. Distance travelled by Anurag on Wednesday and Friday together is how much more or less than distance travelled by Anurag on Tuesday and Thursday together?
 (a) 9km (b) 45km (c) 18km
 (d) 27km (e) 36km
44. If ratio of distance travelled by Anurag on Tuesday via Bus, Car & Train is 7 : 3 : 5 and speed of Bus, Car & Train is 21 km/hr., 30 km/hr. & 25 km/hr. respectively, then find total time taken by Anurag on Tuesday to cover the whole distance.
 (a) 16 hours (b) 13 hours (c) 12.5 hours
 (d) 9.5 hours (e) 15 hours

45. Find average distance travelled by Anurag on Wednesday, Thursday & Friday.
 (a) 165km (b) 182km (c) 154km
 (d) 176km (e) 162km
46. If on Sunday Anurag travelled 250% of the distance travelled by him on Monday and time taken by Anurag to travel whole distance on Sunday is 20 hours, then find average speed of Anurag on Sunday.
 (a) 25 km/hr. (b) 30 km/hr. (c) 22.5 km/hr.
 (d) 20 km/hr. (e) 17.5 km/hr.

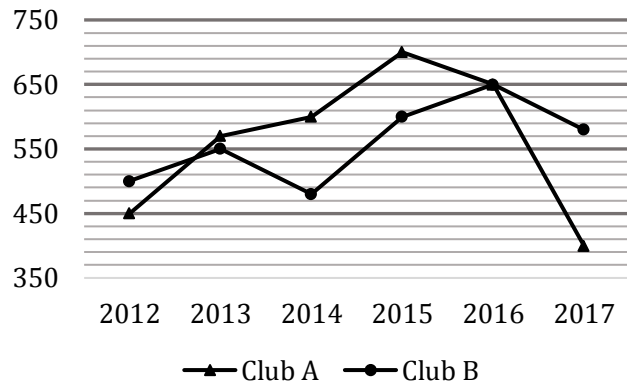
Directions (46—50): Study the table given below and answer the following questions.

Table shows the number of girls in 5 different schools (A, B, C, D & E) and ratio of boys & girls in these schools.

School	Number of girls	Ratio of boys to girls
A	720	11 : 9
B	540	3 : 2
C	270	7 : 3
D	576	13 : 12
E	350	8 : 7

46. Find ratio of boys in school – A & E together to boys in school – B & C together.
 (a) 3 : 5 (b) 11 : 14 (c) 8 : 9
 (d) 1 : 2 (e) 6 : 11
47. Average number of girls in school – B, C & D is what percent of average number of students in school – A & D?
 (a) 50% (b) 15% (c) 35%
 (d) 20% (e) None of the above.
48. Students in school – B are how much more than girls in school – E and boys in school – D together?
 (a) 388 (b) 382 (c) 394
 (d) 376 (e) 374
49. Students in school – C & E together are what percent more or less than girls in school – A?
 (a) $118\frac{1}{6}\%$ (b) $112\frac{2}{3}\%$ (c) $145\frac{1}{2}\%$
 (d) $129\frac{1}{6}\%$ (e) $123\frac{2}{3}\%$
50. Girls in school – A & D together are what percent of boys in school – A & E together?
 (a) $101\frac{1}{4}\%$ (b) $93\frac{3}{4}\%$ (c) $108\frac{1}{2}\%$
 (d) $97\frac{3}{4}\%$ (e) $99\frac{1}{2}\%$

Direction (51-55): The given line chart shows the number of members enrolled into membership of two clubs A and B in different years from 2012 to 2017. Study the line chart carefully and answer the following questions.

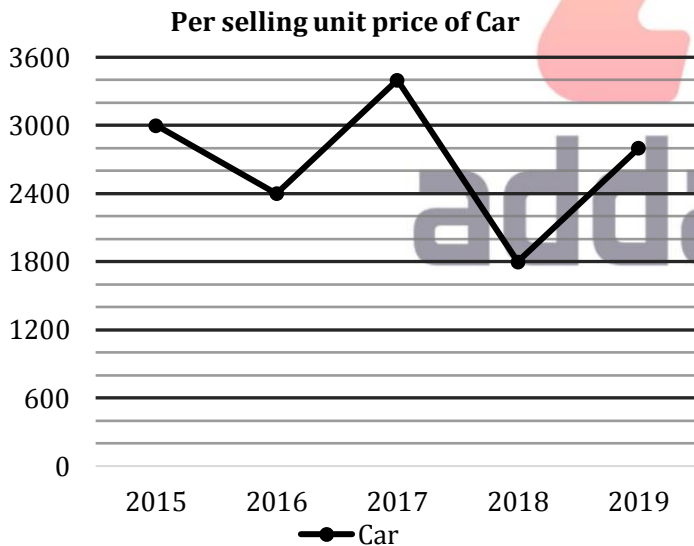
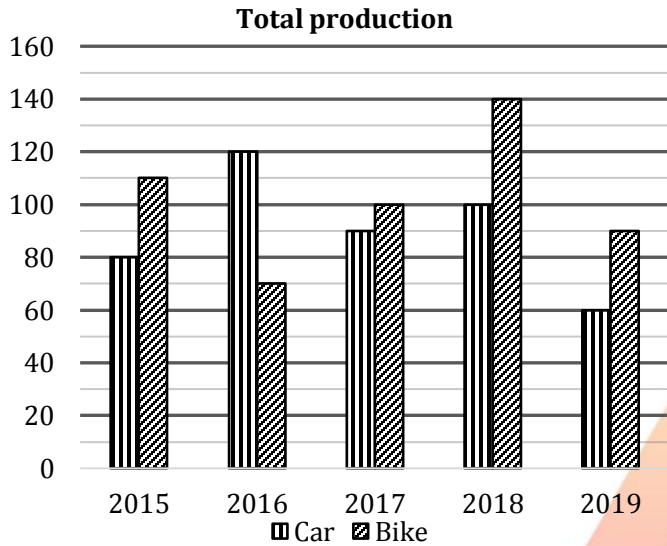


51. Find the difference between average members enrolled into club B all over the years and members enrolled in club A in year 2013.
 (a) 30 (b) 20 (c) 10
 (d) 40 (e) 60
52. Members enrolled into club B in year 2012 and 2015 together is what percent of members enrolled into club A in year 2014 and 2017 together?
 (a) 110% (b) 125% (c) 90.9%
 (d) 87.5% (e) 75%
53. Find the ratio between number of members enrolled into club A during 2012 to 2014 and number of members enrolled in club B during 2012 to 2014.
 (a) 17:18 (b) 54:53 (c) 19:17
 (d) 18:17 (e) 13:18
54. If the membership fee of club A is Rs 1200 for a member and of club B is Rs 1500 for a member, then revenue of club A is how much more/less than that of club B all over the year?
 (a) Rs 9,69,000 (b) Rs 9,96,000 (c) Rs 9,06,000
 (d) Rs 8,69,000 (e) Rs 9,60,000
55. If in 2018, number of members enrolled into club A is increased by $7\frac{9}{13}\%$ with respect to year 2016 and number of members enrolled into club B is increased by $8\frac{1}{3}\%$ with respect to year 2014, then find the sum of total members enrolled in year 2018.
 (a) 1320 (b) 1230 (c) 1120
 (d) 1410 (e) 1220

Level - 2

Directions (1-5) : Study graph carefully and answer the following questions.

The Bar graph shows the total production of Car and Bike in given years by a company and the Line graph shows the per unit selling price of Car in given years.

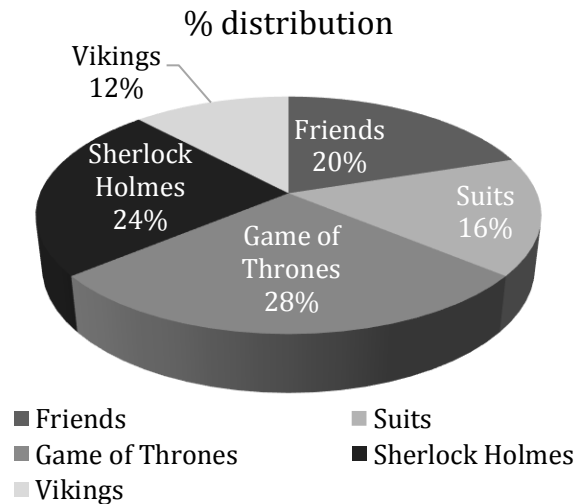


- If total revenue obtained by company by selling Car and Bike in year 2017 is Rs. 4.5 Lakh, then find per unit selling price of Bike in 2017?
 (a) Rs. 1640 (b) Rs. 1440 (c) Rs. 4500
 (d) Rs. 3400 (e) Rs. 2500
- If ratio of per unit selling price of Car and Bike in 2018 is 3:4, then Find the ratio of revenue made by Bike to Car in the year 2018?
 (a) 15:28 (b) 8:5 (c) 5:8
 (d) 28:15 (e) 14:15

- If selling price of per unit bike in 2018 is 37.5% of selling price of Car in 2016, then find revenue made by selling of Cars in 2018 is how much per cent of revenue made by selling of Bike in 2018?
 (a) $\frac{1000}{7}\%$ (b) $\frac{2000}{7}\%$ (c) $\frac{3000}{7}\%$
 (d) $\frac{4000}{7}\%$ (e) 135%
- If production of car in 2020 is increased by 20% over previous year and selling price of Car increased by 12.5% over previous year, then find total per cent increase in revenue of car in 2020 over previous year?
 (a) 37.5% (b) 35% (c) 32.5%
 (d) 40% (e) 42.5%
- The selling price of a bike in 2020 is $14\frac{2}{7}\%$ less than the selling price of a car in 2019. If profit on selling one Bike is 25% and total manufactured Bikes in 2020 are 120, then Find cost price of Bike in 2020?
 (a) Rs.1960 (b) Rs. 1820 (c) Rs. 1920
 (d) Rs. 1840 (e) Rs. 1880

Directions (6-10): Read the below mentioned pie chart carefully to answer the following questions.

Pie chart shows the percentage distribution of people who watches different web series. Consider that people watch no other web series apart from those which are mentioned in the pie chart.



- The ratio of male to female watching Suits is 23 : 17 and people watching Friends is 40000 less than the people watching Sherlock Holmes. Find difference between total male watching Suits and total female watching Suits?
 (a) 16000 (b) 24000 (c) 28000
 (d) 30000 (e) 36000

7. 30% people who watch Friends also watch Sherlock Holmes and number of females watching both Friends & Sherlock Holmes is 16000. Then find ratio of male to female watching Vikings, if number of males watching Vikings is 32000. (Ratio of male to female watching both Friends & Sherlock Holmes is 7:8)?
 (a) 12 : 11 (b) 4 : 3 (c) 8 : 7
 (d) 1 : 2 (e) 9 : 7
8. Average of people watching Friends, Suits and Sherlock Holmes is 20000. Ratio of male to female watching Game of Thrones and Vikings is 13 : 7 and 5 : 7 respectively. Find the difference between number of males watching Vikings and number of females watching Game of thrones.
 (a) 4800 (b) 9800 (c) 5000
 (d) 11200 (e) 13200
9. Find the central angle (in degrees) of people watching Game of Thrones web series.
 (a) 121.2 (b) 100.8 (c) 112.9
 (d) 105.5 (e) 116.2
10. People watching Sherlock Holmes & Suits together is what percent of people watching Friends, Game of Thrones and Vikings together?
 (a) 50% (b) 100% (c) $63\frac{2}{3}\%$
 (d) $60\frac{2}{3}\%$ (e) $66\frac{2}{3}\%$

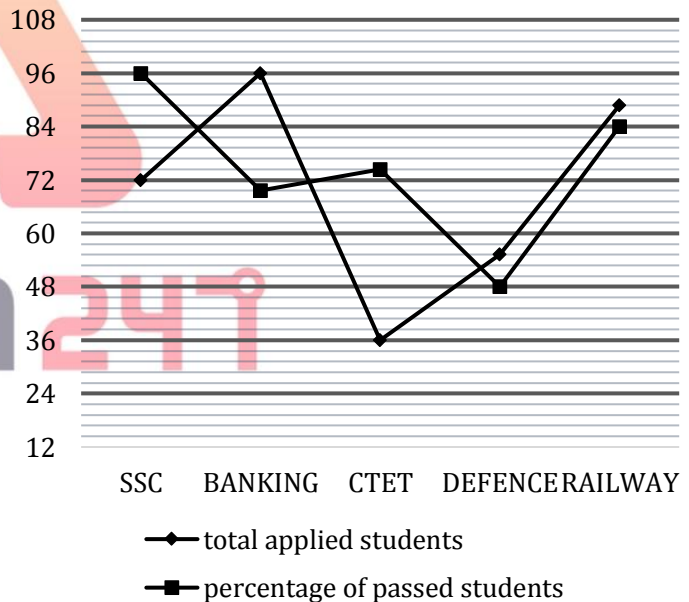
Directions (11 -15) Table given below gives information about total no. of product sold by five companies, ratio of product sold in rural area to product sold in urban area by each company and also gives ratio of total mobile sold in rural area to total laptop sold in rural area by each company.

Company	Total product sold	Rural : urban (sold)	Mobile : laptop (sold in rural area)
MI	10010	5:6	8:5
LENOVO	77000	8:3	3:4
MICROSOFT	14300	15:7	22:30
HP	91000	6:7	33:19
APPLE	20020	4:3	67:76

11. In rural area, no. of mobile sold by MI is how much less than no. of laptop sold by Apple.
 (a) 5360 (b) 2560 (c) 2800
 (d) 3280 (e) 6080
12. If 650 laptops for MICROSOFT are defected and after selling non-defective laptop company earns no profit no loss on total quantity. Find selling price of laptop was how much percent more than C.P.(for MICROSOFT ratio of mobile sold to laptop sold is 15:7)
 (a) $16\frac{2}{3}\%$ (b) $14\frac{2}{7}\%$ (c) 12%
 (d) 18% (e) $14\frac{1}{7}\%$

13. Find ratio of average no. of mobile sold by MI, MICROSOFT and APPLE in rural area to no. of product sold by LENOVO in urban area.
 (a) 39 : 200 (b) 39 : 193 (c) 13 : 85
 (d) 200 : 39 (e) 193 : 39
14. Average no. of product sold by all companies is how much more or less than total product sold by HP in urban area.
 (a) 6543 less (b) 6534 more (c) 6354 more
 (d) 6534 less (e) 6543 more.
15. If ratio of mobile sold by MI to laptop sold by MI in urban area is 16 : 23, then find no. of laptop sold by APPLE in rural area is what part of laptop sold by MI in urban area.
 (a) $\frac{304}{261}$ (b) $\frac{261}{161}$ (c) $\frac{304}{161}$
 (d) $\frac{161}{304}$ (e) $\frac{161}{261}$

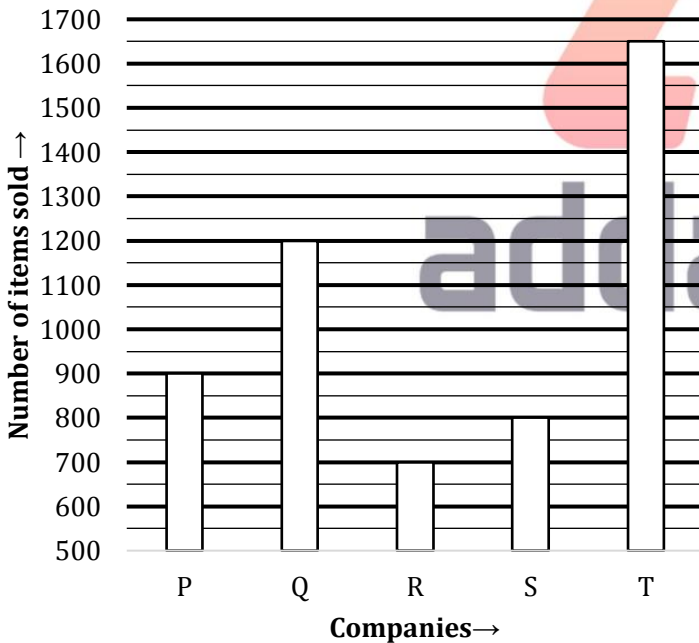
Directions (16-20): Line chart given below gives information about total no. of students (in '00) applied for various exams in a city and percentage of students who passed exam out of total appeared students.



16. If in RAILWAY exams non-appeared students are $5\frac{5}{7}\%$ of total appeared students, then find total students who passed in RAILWAY exams.
 (a) 7046 (b) 8000 (c) 8400
 (d) 7056 (e) 8006
17. In SSC exam, out of total applied students 720 students were not able to reach the exam center and another 1080 students didn't take the exam. Find percentage of passed students out of total applied students.
 (a) 72% (b) 75% (c) 84%
 (d) 48% (e) $83\frac{1}{3}\%$

18. In BANKING exam $83\frac{1}{3}\%$ of total applied students appeared in exam. Find total students who passed BANKING exam.
 (a) 5184 (b) 8008 (c) 5000
 (d) 7058 (e) 5568
19. If in DEFENCE exam total 2400 students passed the examination, then find total appeared students in DEFENCE exam is what percent of total no. of applied students in DEFENCE exam. (approx.)
 (a) 95% (b) 91% (c) 96%
 (d) 92% (e) 89%
20. In CTET exam, 83.2% of appeared boys and 70% of appeared girls passed the exam. If ratio of appeared girls to appeared boys is 2:1 and total 2232 students passed in CTET exam, then find ratio of total applied students to total appeared girls in CTET exam.
 (a) 9:5 (b) 18:1 (c) 6:5
 (d) 18:5 (e) 9:4

Direction (21-25): - Bar chart given below shows total number of items sold by five companies and table shows the percentage of items which are rejected (due to some defect in them) by customers out of total items sold by respective companies.



Companies	Percentage of items rejected
P	25
Q	20
R	15
S	40
T	30

Note - Total items sold = number of items rejected + number of items which are not rejected

21. Find the average number of items which are rejected by the customers to company P, R and T?
 (a) 275 (b) 255 (c) 325
 (d) None of these (e) 350
22. Number of items sold by company P which are not rejected are what percent more or less than total items which are rejected by customers to company Q and R together?
 (a) 85% less (b) $85\frac{11}{23}\%$ more (c) $75\frac{13}{23}\%$ less
 (d) $95\frac{15}{23}\%$ more (e) 77% less
23. Find the ratio of number of items which are not rejected by customers to company S to total number of items which are rejected by customers to company R and T together?
 (a) 2 : 5 (b) 1 : 2 (c) 4 : 5
 (d) 3 : 5 (e) None of these
24. Rejected items by customers to company Q is what percent of rejected items by customers to company S?
 (a) 50% (b) 75% (c) 45%
 (d) 60% (e) 65%
25. What is the difference between no. of items which are sold by company R and T, which are not rejected by customers?
 (a) None of these (b) 420 (c) 520
 (d) 440 (e) 560

Direction (26-30): Study the given passage carefully & answer the questions.

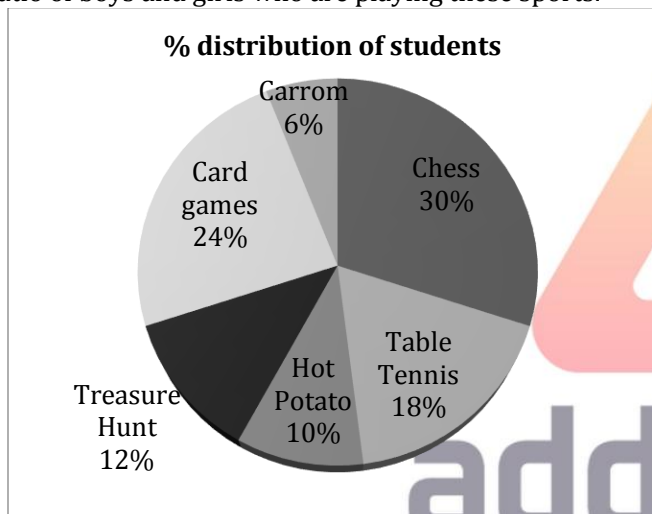
In a sport Academy 'XY', there are some student who can play three games i.e. tennis, cricket & chess. Total number of players who play tennis is 160 & all three games are played by 10% of total tennis players. Ratio of cricket to chess players is 3:5 and total of cricket & chess players is 100% more than tennis players. Players who play both tennis and chess are $12\frac{1}{2}\%$ of total tennis players. Ratio of players who play both tennis & cricket to players who play both chess & cricket is 2:3 & total of players who play both tennis & cricket and players who play both chess & cricket is equal to one-fourth of chess players.

26. What is the average no. of players who play only one game?
 (a) $139\frac{2}{3}$ (b) $129\frac{1}{3}$ (c) 135
 (d) None of these (e) $129\frac{2}{3}$
27. Players who play chess but not cricket is approximately what percent of total players?
 (a) 35% (b) 45% (c) None of these
 (d) 40% (e) 50%

28. What is ratio of players who play both tennis & chess to players who play only cricket?
 (a) 7 : 13 (b) 9 : 41 (c) 10 : 43
 (d) None of these (e) 2 : 5
29. Players who play at least two games is approximately what percent of players who play utmost two games?
 (a) 4% (b) 6% (c) 15%
 (d) 12% (e) 9%
30. What is the difference between no. of players who can play tennis & players who play only cricket?
 (a) 74 (b) 64 (c) 68
 (d) None of these (e) 72

Directions (31-35): Study the below mentioned charts carefully and answer the following questions.

Pie chart shows the percentage distribution of students of a school playing different sports and table chart shows the ratio of boys and girls who are playing these sports.



Games	Ratio of boys to girls
Chess	7 : 5
Table Tennis	25 : 11
Hot Potato	2 : 3
Treasure Hunt	5 : 7
Card Games	1 : 1
Carrom	5 : 3

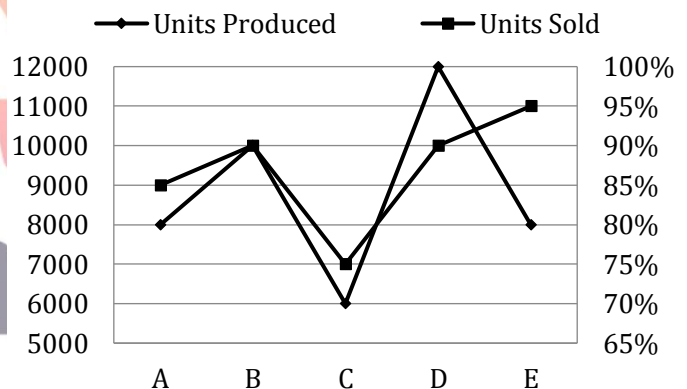
Note - Total number of students = 800
 1 student plays only 1 game.

31. Girls playing Hot Potato and Chess together is what percent more or less than the boys playing Table Tennis?
 (a) 39% (b) 42% (c) 36%
 (d) 48% (e) 57%
32. Find the ratio of average of girls playing Chess, Table Tennis and Card Games to number of boys playing Hot Potato and Card games together.
 (a) 4 : 7 (b) 7 : 4 (c) 5 : 9
 (d) 9 : 5 (e) 5 : 8

33. Boys playing Chess and Table Tennis together is what percent of girls playing Hot Potato, Treasure Hunt and Card Games together?
 (a) 130% (b) 100% (c) 110%
 (d) 120% (e) 140%
34. 75% of students who play Carrom stops playing Carrom and starts playing Treasure Hunt due to which number of girls playing Treasure Hunt increased by 25%, then find the ratio of boys to girls who are still playing Carrom.
 (a) 3 : 2 (b) 4 : 3 (c) 2 : 1
 (d) 5 : 4 (e) None of the above.
35. Find the central angle (in degrees), enclosed boys playing Treasure Hunt.
 (a) 18 (b) 8.5 (c) 9.75
 (d) 10 (e) 7.25

Directions (36-40): Study the below mentioned line chart carefully and answer the following questions.

Line chart shows the units produced (in units) and units sold (in %) by 5 different companies in a given year.



Note - % Units sold by a company

$$= \frac{\text{Units sold by a company}}{\text{Units produced by a company}} \times 100$$

Note - Total units produced = Total units sold + Total units unsold.

36. Find unsold units of company-A & C together is what percent of sold units of company-D?
 (a) 20% (b) 10% (c) 30%
 (d) 25% (e) 15%
37. Selling price of an unit sold by company-E & company-B is Rs.15 and Rs.13 respectively. 12% and 15% of units sold by company-E & company-B respectively are returned by the customers. Then, find the difference between total revenue of company-B & company-E.
 (a) Rs.970 (b) Rs.870 (c) Rs.910
 (d) Rs.840 (e) Rs.810

38. Revenue of company-D is Rs.48,600 more than revenue of company-C and selling price of each unit of company-C is Rs.6 more than the selling price of each unit of company-D. If profit % earned by company-C is 20%, then find the cost price of each unit sold by company-C.

- (a) Rs.20 (b) Rs.15 (c) Rs.10
(d) Rs.25 (e) Rs.30

39. Find difference of average of unsold units of company-A, C & D and average of units sold of company-A & E.

- (a) 5900 (b) 6300 (c) 5400
(d) 5200 (e) 6000

40. If units sold by company-F is 350% of the unsold units of company-D & E together and ratio of sold units to unsold units of company-F is 7 : 3. Then, find total units produced by company-F.

- (a) 10000 (b) 9000 (c) 8000
(d) 12000 (e) 11000

Direction (41-45): Read the paragraph carefully and answer the following questions.

Two general stores P & Q sells five items i.e. A, B, C, D & E. Total number of items sold by these two stores is 8400 and ratio between total items sold by store P to store Q is 3 : 4. Total item A sold by store P is $16\frac{2}{3}\%$ more than total item D sold by that store, while total item C sold by store P is 160 less than total item D sold by store P. Total item B sold by store P is $77\frac{7}{9}\%$ more than total item D sold by store P and total number of item E sold by store P is 1080 less than that of item B sold by store P. Total item D & item B sold by store Q is 240 and 12.5 % more than same items sold by store P respectively. Respective ratio of total item A, C & E sold by store Q is 26 : 23 : 11.

41. Total item B sold by store Q is what percent less than total item A & item D together sold by store P?

- (a) $7\frac{11}{13}\%$ (b) $7\frac{9}{13}\%$ (c) $7\frac{5}{13}\%$
(d) $6\frac{9}{13}\%$ (e) $7\frac{4}{13}\%$

42. Find average number of item D sold by store P & Q?

- (a) 880 (b) 800 (c) 860
(d) 840 (e) 720

43. Find difference between total number of item B, item C & item E together sold by store P and total number of item A & item D together sold by store Q?

- (a) 120 (b) 100 (c) 20
(d) 60 (e) 40

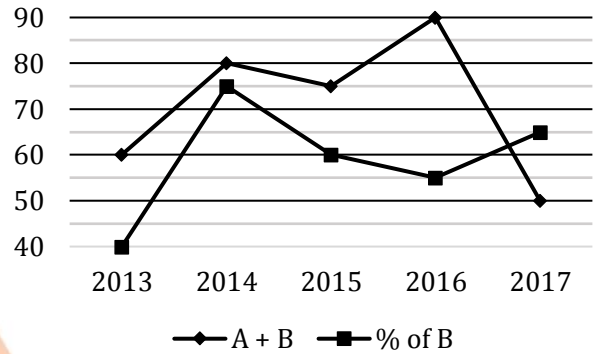
44. Total item E sold by store Q is what percent more than that of total number of same item sold by store P ?

- (a) 75% (b) 115% (c) 125%
(d) 120% (e) 110%

45. Find the ratio between total item B & item D together sold by store P to total number of item A & item D together sold by store Q?

- (a) 2 : 1 (b) 3 : 1 (c) 1 : 1
(d) 4 : 1 (e) 2 : 3

Directions (46-50): Line graph given below shows total number of books (in hundred) printed by two different publishers A and B together and shows percentage of books printed by publisher B out of total books printed. Read data carefully and answer the following questions:



46. Total books printed by publisher B in year 2015 and 2016 together is what percent more than total books printed by publisher A in year 2013?

- (a) 162.5% (b) 160.25% (c) 164.25%
(d) 158.25% (e) 166.25%

47. What is the average number of books printed by publisher A in 2013, 2015 & 2016?

- (a) 3250 (b) 3750 (c) 3500
(d) 3550 (e) 3600

48. Books printed by A in year 2018 is half of the total books printed by both in year 2014 and ratio of books printed by publisher A to B in year 2018 is 5 : 3. Then books printed by publisher B in the year 2018 is how much less than books printed by A in year 2015?

- (a) 800 (b) 400 (c) 600
(d) 200 (e) 500

49. If books printed in 2016 by publisher A is sold at the profit of 25% and selling price of each book is Rs 350, then find the total cost price of all the books which is sold by publisher A in 2016(in Rs.) (A sold all books)?

- (a) 11,36,000 (b) 11,42,000 (c) 11,48,000
(d) 11,32,000 (e) 11,34,000

50. What is the ratio of books printed by publisher A in 2014 and 2017 together to books printed by publisher B in the year 2016?

- (a) 25 : 29 (b) 25 : 27 (c) 25 : 31
(d) 25 : 33 (e) 25 : 36

Direction (51 - 55): Read the data carefully and answer the following questions:

Total 2800 voters in the three villages, i.e. Vasantpur, Govindpur and Vilashpur. Ratio of total voters in Vasantpur, Govindpur and Vilashpur is 27 : 18 : 25 respectively. Ratio of male voters in Vasantpur and Govindpur 10 : 7 and total female voters in Vasantpur are 60% more than total female voters in Govindpur. Total male voters in Vilashpur are $42\frac{6}{7}\%$ more than total male voters in Govindpur.

- 51.** Total male voters in Vasantpur are what percent more than total female voters in Vilashpur?
 (a) 50% (b) 60% (c) 55%
 (d) 45% (e) 40%
- 52.** Find average number of female voters in Vasantpur and Vilashpur?
 (a) 420 (b) 440 (c) 480
 (d) 640 (e) 400
- 53.** If 65% and 60% of total male and female voters are literate in Govindpur, then find total illiterate voters in Govindpur are what percent less than total female voters in Vilashpur?
 (a) 33.25% (b) 31.25% (c) 35.25%
 (d) 30.25% (e) 29.25%
- 54.** Find the ratio of male voters in Govindpur to female voters Vasantpur ?
 (a) 6 : 7 (b) 7 : 9 (c) 7 : 10
 (d) 7 : 12 (e) 7 : 8
- 55.** Find the difference between total male voters and total female voters in all the three villages?
 (a) 400 (b) 480 (c) 440
 (d) 420 (e) 500

Directions (56-60): Read the given information carefully and answer the following questions.

A boat covers certain distance of its journey in three parts i.e. upstream, downstream and in still water. Ratio of distance covered in downstream to upstream is 7:3 and total distance covered is 375 km. When boat goes downstream it consume 25% less fuel per km and while moving in upstream it consumes $12\frac{1}{2}\%$ more fuel per km than that of in still water and it cover 175km in still water. Now, after reaching its destination, boat returns to initial point covering the same path and it takes $\frac{10}{3}$ lit more fuel in return journey.

- 56.** If in return journey boat takes 5hr 30 min more to cover upstream than downstream and speed of boat in downstream is 40km/h, then find speed of boat in upstream?
 (a) 10 km/h (b) 15 km/h (c) 20 km/h
 (d) 25 km/h (e) None of these.
- 57.** How much fuel is consumed in covering downstream distance in whole journey? (approx.)
 (a) 15 lit (b) 17 lit (c) 18 lit
 (d) 12 lit (e) 10 lit
- 58.** Total Distance covered in still water is how much percent more or less than total distance covered in upstream in whole journey?
 (a) 50% (b) 100% (c) 150%
 (d) 75% (e) 125%
- 59.** What is the rate of consumption of fuel of boat in upstream?
 (a) 7 km in 1 lit (b) 8 km in 1 lit (c) 10 km in 1 lit
 (d) 12 km in 1 lit (e) 9 km in 1 lit
- 60.** If fuel costs 81 rupee per liter, then find money spent on fuel to cover distance still in water in return journey?
 (a) Rs. 1550 (b) Rs. 1575 (c) Rs. 1350
 (d) Rs. 1275 (e) Rs. 1250

Mains Questions

Direction (1 - 6): Table given below shows five colleges in which there are five departments viz - Arts, commerce, Medical, science and vocational. Also, table tells shows total received application in department and percentage of cancel applications (Male + female) and ratio of male to female in approved application.

Departments	Total Application received	Percentage of cancel applications	Ratio of (male: female) Approved
Arts	P	40%	11 : 7
commerce	1400	Q	29:21
Medical	1600	35%	R
Science	S	55%	43:17
vocational	800	60%	T

- 1.** If the difference between approved male applications and approved female applications in Arts department is 200, then find P is how what percent more than applications received in vocational department?
 (a) 75% (b) 87.5% (c) 62.5%
 (d) $66\frac{2}{3}\%$ (e) 50%
- 2.** If the difference between approved male applications and approved female applications in science department is 234, then find the sum of total applications received in science, commerce and medical department together?
 (a) 4200 (b) 4400 (c) 4600
 (d) 3800 (e) 5200

3. If the difference between approved male applications and approved female applications in Arts department is 100, then find difference between P and cancel application in medical department?
 (a) 170 (b) 180 (c) 190
 (d) 165 (e) 175
4. If the number of approved male applications in vocational department is 40 more than that of approved female applications, then find the ratio of approved female applications to approved male applications in the same department?
 (a) 9 : 7 (b) 5 : 7 (c) 13 : 9
 (d) 7 : 9 (e) 7 : 11
5. find the ratio of canceled application in medical department to vocational department?
 (a) 7 : 5 (b) 5 : 7 (c) 13 : 9
 (d) 9 : 7 (e) 7 : 6
6. If the difference between approved male applications and approved female applications in commerce department is 112, then find sum of Q and total application received in medical department?
 (a) 2300 (b) 2400 (c) 2700
 (d) 2800 (e) 3200

Direction (7 - 11): Given table shows the number of applications filled for three various exams (CAT, MAT & SAT) and applicants who attempted these exams in years 2018, 2019 & 2020. Read the data carefully and answer the questions. (Some data are missing which you have to calculate as per information provided in question).

Years	CAT		MAT		SAT	
	Filled	Attempted	Filled	Attempted	Filled	Attempted
2018	2000	---	1600	1200	---	800
2019	2400	2200	---	1000	1400	---
2020	---	2400	2000	1800	1800	1600

(exam & year is in format i.e. CAT 2018 is written as CAT'18)

(Each applicant filled only one form and there are only these 3 exams)

Note - Total applicants who filled the form of any exam in any year = Total applicants (who attempted + who have not attempted) that exam in that year.

7. In year 2018, only 3600 applicants attempted all three exams together and applicants who filled MAT'19 are 25% less than those who attempted CAT'18, then what percent of applicants attempted MAT in all given years together?
 (a) $77\frac{1}{3}\%$ (b) $93\frac{1}{3}\%$ (c) 120%
 (d) $83\frac{1}{3}\%$ (e) $88\frac{1}{3}\%$

8. Ratio of applicants who filled CAT'20 to those who attempted SAT'19 is 7 : 3 and number of applicants who attempted SAT'19 is equal to number of applicants who filled SAT'18 . If 4400 applicants filled SAT in all given years together, then find how many applicants not attempted any exam in 2020?
 (a) 400 (b) 1200 (c) 800
 (d) 1000 (e) 600
9. Average number of applicants who filled CAT in all given years is $\frac{8000}{3}$ and percentage of applicants attempted CAT'20 out of total who filled CAT'20 is same as that for MAT'19, then in which year maximum percent of applicants attempted MAT?
 (a) 2018 & 2019 (b) 2019 (c) 2019 & 2020
 (d) 2018 (e) 2020
10. Difference between number of applicants who filled MAT and those who attempted same exam is maximum in 2018 and minimum in 2020. If number of applicants who filled MAT'19 is equal to number of applicants who attempted SAT'19, then what can be the possible ratio of applicants who attempted SAT'19 to those who attempted SAT'20?
 (a) 1 : 1 (b) 4 : 5 (c) 21 : 20
 (d) 3 : 4 (e) 7 : 8
11. How many applicants filled CAT'20?
 I. no. of applicants who attempted CAT'18 is same as no. of applicants who filled MAT'19.
 II. no. of applicants who did not attempt CAT in all given years together is equal to no. of applicants who did not attempt MAT in all given years together.
 (a) Both statements together are necessary
 (b) Either statement I alone or II alone is sufficient
 (c) Only statement I alone is sufficient
 (d) Both statements together are not sufficient
 (e) Only statement II alone is sufficient

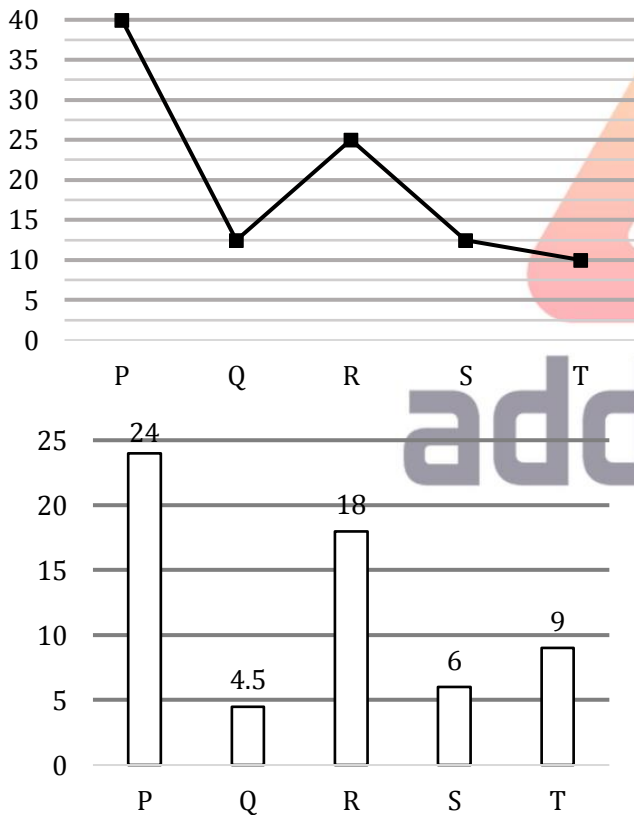
Directions (12-16): Study the following information carefully and answer the questions given below.

Out of 6000 students from a college X, 20% of total students have majored in physics only, 12% have majored in chemistry only. 20% have majored in both chemistry & mathematics only. 5% of total students have majored in all three subjects together while 45% students have majored in only two subjects. In chemistry, 45% students have majored.

12. How many students have majored in only one subject?
 (a) 2400 (b) 2200 (c) 3000
 (d) 3600 (e) 2000
13. How many students have majored in Mathematics as a subject?
 (a) 1080 (b) 2520 (c) 3600
 (d) 2700 (e) 3300

14. What is the total number of students who have majored in only 2 subjects?
 (a) 1020 (b) 2700 (c) 1200
 (d) 3000 (e) 2100
15. Students who have majored in both Mathematics & Physics only are what percent of total students who have majored in physics?
 (a) 76% (b) 36% (c) 40%
 (d) 44% (e) 34%
16. Find the ratio of students who have majored in Physics to students who have majored in all three subjects together.
 (a) 13 : 2 (b) 8 : 3 (c) 7 : 1
 (d) 10 : 1 (e) None of the above.

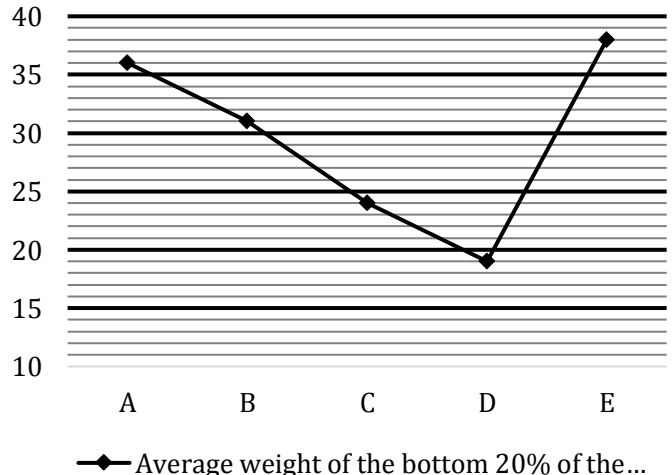
Direction (17-21): Line graph given below shows percentage of a tank filled by each pipe and bar graph shows hours taken by each pipe to do fill that part of tank.

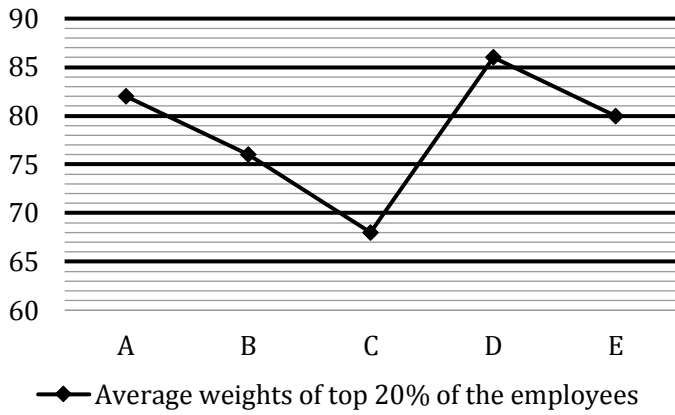


17. Pipe P and pipe T Start filling the tank together and fill it for 't' hours after that both pipes replaced by R and S, who fill for next (t + 2) hours and $\frac{50}{9}$ % of total tank still unfilled. If pipe A can fill with the efficiency of (t + 2) unit/hours, then find the time taken by pipe A to fill tank alone?
 (a) 36 hours (b) 24 hours (c) 30 hours
 (d) 39 hours (e) 45 hours

18. Pipe Q and T start filling tank alternatively starting with pipe Q and fill the tank for 25 hours, after that both are pipe replaced by pipe P and R and both pipe start filling alternatively starting with pipe R. Find in how much time remaining tank will be filled?
 (a) $28\frac{1}{6}$ hours (b) $33\frac{1}{6}$ hours (c) $46\frac{1}{3}$ hours
 (d) $38\frac{1}{6}$ hours (e) $42\frac{1}{3}$ hours
19. Pipe P and S start filling the tank together and fill it for y hours, after that pipe Q fill for (y - 4) hours and remaining tank filled by pipe T in (y - 10) hours. If all four pipes P, Q, S & T for (y - 3) hours together, then what portion of tank will be unfilled?
 (a) $\frac{1}{36}$ (b) $\frac{1}{124}$ (c) $\frac{1}{128}$
 (d) $\frac{1}{144}$ (e) $\frac{1}{148}$
20. If for first 15 hours pipe P start filling with its 25% less efficiency and pipe S fill the tank with $33\frac{1}{3}$ % more its efficiency together and remaining tank filled by another pipe B in 57 hours. Find in how much time pipe B can fill the tank alone?
 (a) 102 hours (b) 128 hours (c) 108 hours
 (d) 144 hours (e) 162 hours
21. Five pipes P and T, Q and R and S work alternatively in such a manner that on first hour P and T fill together, on second hour Q and R fill together and third hour S fill alone, find in how much time whole tank will be filled?
 (a) $54\frac{3}{4}$ hours (b) $33\frac{1}{4}$ hours (c) $22\frac{1}{2}$ hours
 (d) $36\frac{1}{4}$ hours (e) $42\frac{3}{4}$ hours

Direction (22-26): The given bar graph shows average weight of the employees of five different organizations when weights are arranged in descending order.





22. If there are 60 employees in the organization D and average weight of the employees is 60 kg, then maximum weight of the employee who is at 48th position.
 (a) 30 kg (b) 54 kg (c) 48 kg
 (d) 60 kg (e) 65 kg
23. For how many of the given organizations average weight of the remaining 60% of the employees of organization be more than 45 kg if average weight of all the employees for each of the organization is 50 kg.
 (a) 1 (b) 2 (c) 3
 (d) 4 (e) 5
24. If in each of the organizations remaining employees has the highest possible average weight, then the 2nd highest average weight is for which organization?
 (a) A (b) B (c) C
 (d) D (e) E
25. Which of the following option can be the least possible average weight of any organization?
 (a) 32.4 kg (b) 32.6 kg (c) 32.2 kg
 (d) 30.8 kg (e) 31.4 kg

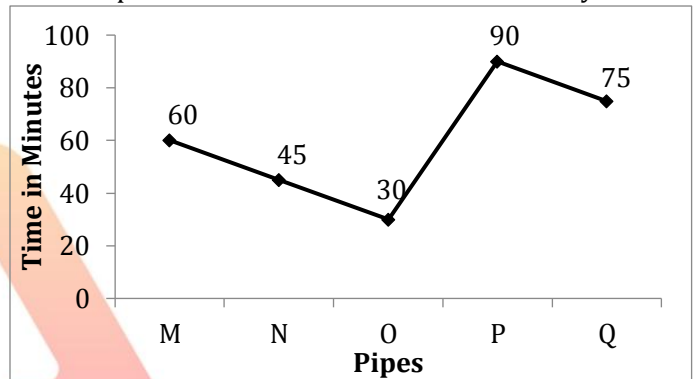
Direction (26-28): The following table shows the time taken by four different persons (in hours) to do four different tasks. No tasks can be done at a time by two different persons.

Person \ Task	W ₁	W ₂	W ₃	W ₄
A	6	7	8	4
B	3	8	5	7
C	7	7	6	2
D	5	6	5	8

26. What is the minimum time in which all the tasks can be completed if task is done one after the other in the order of W₃, W₁, W₂ and W₄ and each person can do any one of the task in a day?
 (a) 16 h (b) 15 h (c) 17 h
 (d) 18 h (e) 19 h

27. If on a particular day, A is absent then what is the minimum time required to finish all the tasks, if tasks can be done simultaneously.
 (a) 10 h (b) 8 h (c) 12 h
 (d) 9 h (e) 11 h
28. If only two persons work on a particular day, then find the minimum time required to complete all the tasks, if the tasks can be done simultaneously?
 (a) 10 h (b) 12 h (c) 11 h
 (d) 8 h (e) 9 h

Directions (29-33): Given below is the line graph which shows the time taken by five pipes M, N, O, P and Q to fill a tank individually in minutes. Table shows the pipes which remain open to fill the same tank on different days of week



Days	Pipe which remain on different days.
Mon	M, P
Tue	N, O, P
Wed	O, M
Thrus	N, O, P
Frid	M, Q

29. If on Monday pipe M works with a efficiency of 120 % and both pipe M and P on Monday remained open for 7 minutes but alternatively on each minute starting with M. Remaining part of the tank is filled on next day. What is the total time for which pipe P remained open on both days if next day all pipes filled the tank together?
 (a) 12 min 15 sec (b) 16 min 18 sec (c) 18 min 15 sec
 (d) 17 min 12 sec (e) 20 min 10 sec
30. On Wednesday tank is filled by both pipes working simultaneously but on Thursday all pipes work alternatively on each minute starting from pipe N then O and then P. Find the difference in time taken to fill the tank on Wednesday and the time taken to fill tank on Thursday.
 (a) 5 min (b) 18 min (c) 15 min
 (d) 20 min (e) 25 min

31. If on Friday 36 litre of water per minute is filled by both the pipes then, amount of water filled by pipe P on Monday is what percent of amount of water filled by pipe Q on Friday.

- (a) 80% (b) 95% (c) 90%
(d) 87.5% (e) 75%

32. On Friday M worked with 120% of its efficiency and Q with 75% of its efficiency and they together can fill 162 litre of water in 12 min. On Monday if both the pipes (M and P) are working with a different efficiency then both pipes working together can fill $\frac{7}{30}$ part of the tank in 8 min and if M is opened for 8 min and P is opened for 15 min then they can fill 157.5 litre of water. Find the ratio of time taken by M alone and time taken by P alone to fill tank according to new efficiency on Monday.

- (a) 2 : 3 (b) 4 : 3 (c) 3 : 4
(d) 5 : 3 (e) 3 : 5

33. If rate of flow of pipe N is 18 litre/min, and cost incurred in filling 1 litre of water in the tank by pipe N, O and P is 12 Rs./L, 15 Rs./L and 10 Rs./L respectively, then find the total cost incurred in filling the tank on Tuesday if all the pipes filled the tank simultaneously.

- (a) 10,665 Rs. (b) 11,552 Rs. (c) 12,666 Rs.
(d) 9,848 Rs. (e) 8,440 Rs.

Directions (36-39): Neeraj have some toys which are in the form of different structures. These are cylindrical, conical, spherical. Other than solid conical structure, all two are of both types i.e., hollow as well as solid.

→ Volume of a conical toy is three times of the volume of a solid cylindrical toy while radius of a solid spherical toy is half than that the radius of a conical toy. Outer radius of hollow cylindrical toys is same as radius of solid spherical toy while average of outer radius and inner radius of hollow cylindrical toys is equal to radius of solid cylindrical toy. Height of cylindrical, conical and hollow cylindrical toys is same i.e., 14c.m

→ Number of solid spherical toys is 20% of total number of toys Neeraj have. Number of hollow spherical toys is 150% more than number of conical toys. Ratio between number of solid cylindrical toys to number of conical toys is 3 : 2. Total number of hollow cylindrical toys is 40% of total number of toys Neeraj have and also '20' more than the total number of solid spherical toys Neeraj have.

→ Volume of a hollow spherical toy is 33,957 cm² whose inner radius is half of its outer radius. Volume of a hollow spherical toy is 5.25 time of volume of conical toy.

34. Find the total space taken by all solid spherical toys? (in cm³)

- (a) 97020 (b) 48510 (c) 72765
(d) 14553 (e) 24255

35. Find the number of conical toys Neeraj have?

- (a) 40 (b) 20 (c) 15
(d) 12 (e) 8

36. Find the curved surface area of one hollow cylindrical toy? (in cm²)

- (a) 616 (b) 1232 (c) 924
(d) 462 (e) 1386

37. Find the ratio between outer radius of hollow spherical toy to radius of solid cylindrical toy?

- (a) 4 : 1 (b) 3 : 2 (c) 3 : 1
(d) 4 : 3 (e) 2 : 1

38. Volume of one hollow cylindrical toy is how much more than volume of one cylindrical toy?(in cm³)

- (a) 4312 (b) 3234 (c) 2696
(d) 2156 (e) 1078

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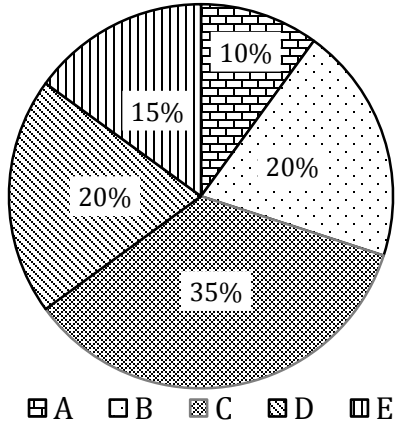
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Previous Year Question

Direction (1 -6): Given below pie chart shows percentage distribution of total orders of ice cream purchased by five different shops and table shows percentage of orders of ice cream sold by these five shops. Read the data carefully and answer the questions.

Total orders of ice cream purchased by all shops together = 400



Shops	Percentage of order of ice cream sold out of total order purchased
A	60%
B	75%
C	80%
D	95%
E	90%

- Total unsold order of ice cream by shop E is what percent more than total unsold order of ice cream by shop D?
(a) 30% (b) 50% (c) 40%
(d) 20% (e) 60%
- Out of total order of ice cream sold by shop B, 25% are chocolate, 15% are vanilla and rest are strawberry. If $33\frac{1}{3}\%$ & 75% of total order of chocolate and vanilla were sold, then find the total orders of strawberry purchased by B?
(a) 19 (b) 27 (c) 29
(d) 23 (e) 21
- The cost price of each order purchased by shop D is Rs. 200. If shop D sold 25% order at Rs. 175 each and rest at Rs. 250 each. Find the overall profit (approximate) of shop D?
(a) 25% (b) 5% (c) 15%
(d) 10% (e) 20%

- Find average number of unsold orders of ice cream for A, B & E?
(a) 14 (b) 12 (c) 16
(d) 18 (e) 22
- If total orders of ice cream purchased by shop X is 25% more than that of B and total unsold orders of ice cream by shop X is equal to difference between total unsold orders of ice cream by shop C & D, then find total sold orders of ice cream by shop X?
(a) 76 (b) 78 (c) 72
(d) 70 (e) 64
- Find the central angle for total orders of ice cream purchased by C?
(a) 96° (b) 102° (c) 112°
(d) 108° (e) 126°

IBPS PO Prelims 2019

Direction (7 - 12): Given below table shows number of seats available in five different buses and percentage of seats booked in these buses out of total available seats. Read the data carefully and answer the questions.

Buses	Total seats available	Percentage of seats booked, out of total available seats
A	20	60%
B	24	75%
C	15	60%
D	NA	80%
E	NA	62.5%

- Note** - Total seats available in any bus = Booked seats + Vacant seats
- Total seats available in bus D & E together is 65.
(ii) Total vacant seats in all five buses are 40.
 - If total vacant seats in bus C is 60% less than that of in bus E, then find number of vacant seats in D?
(a) 6 (b) 5 (c) 4
(d) 7 (e) 3
 - Find ratio of total vacant seats in bus B to total booked seats in bus A?
(a) 1 : 3 (b) 1 : 2 (c) 2 : 3
(d) 3 : 4 (e) 1 : 1
 - Vacant seats in bus C are what percent less than vacant seats in bus A?
(a) 15% (b) 20% (c) 30%
(d) 25% (e) 36%
 - What percent of seats remained vacant in bus A, C & D, if ratio of total seats booked in bus B to bus E is 18 : 25?
(a) 30% (b) $33\frac{2}{3}\%$ (c) $31\frac{2}{3}\%$
(d) $33\frac{1}{3}\%$ (e) None of these

11. If difference between total vacant seats in bus D and E is 10, then find ratio of booked seats in D to E?
 (a) 4 : 3 (b) 4 : 5 (c) 4 : 7
 (d) 3 : 5 (e) 3 : 4

12. Find average number of booked seats in bus A, B & C?
 (a) 13 (b) 8 (c) 9
 (d) 11 (e) 7

SBI PO Prelims 2020

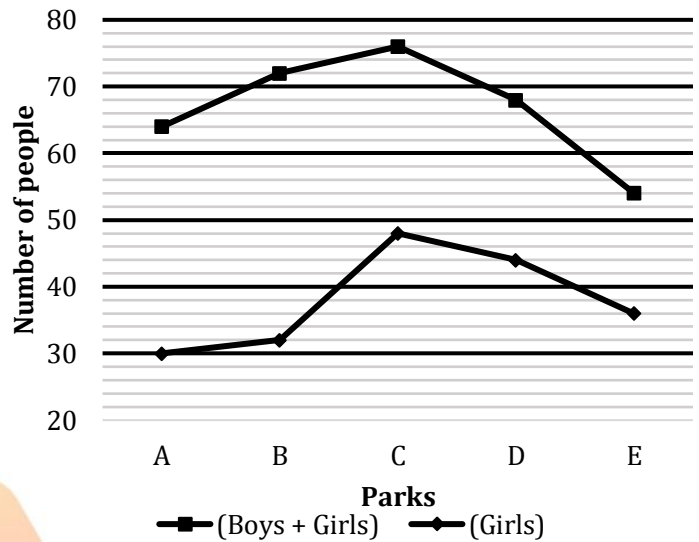
Directions (13-17): Table given below shows the number of male and female participated in an event from five different schools (A, B, C, D & E). Study the table carefully and answer the following questions.

Schools	Male	Female
A	650	450
B	540	420
C	720	500
D	560	450
E	680	320

13. Find average number of female participated from school – A, B & D.
 (a) 400 (b) 380 (c) 350
 (d) 440 (e) 450
14. Total male participated from school – B & D together are how much more or less than total female participated from school – A & C together?
 (a) 150 (b) 110 (c) 170
 (d) 120 (e) 240
15. Total male participated from school – B & C together are what percent more or less than total female participated from school – A & D together?
 (a) 20% (b) 60% (c) 50%
 (d) 40% (e) 30%
16. If total male participated from school – F are 40% more than that of from school – A and ratio of female participated from school – B to that of from school – F is 21:32, then find total students participated from school – F.
 (a) 1420 (b) 1550 (c) 1580
 (d) 1460 (e) 1490
17. Find total number of male students participated from all the five schools together.
 (a) 2860 (b) 3150 (c) 2940
 (d) 3200 (e) 3020

IBPS PO Prelims 2020

Direction (18 –22): The Line graph shows the number of people (Boys + girls) visited five (A, B, C, D & E) different parks and the number of girls visited out of total people visited these five parks. Read the data carefully and answer the questions.



18. Find total number of boys visited in park A, B & C together?
 (a) 104 (b) 102 (c) 106
 (d) 108 (e) 96
19. If total number of people visited in park F are 18 more than total number of people visited in park C and D together and out of total people visited in park F, $\frac{4}{9}$ th are girls, then find number of boys visited in park F?
 (a) 90 (b) 92 (c) 96
 (d) 84 (e) 102
20. What percent of girls visited in park A with respect to the total number of people (Boys + Girls) visited that park (approximately)?
 (a) 41% (b) 43% (c) 47%
 (d) 49% (e) 51%
21. If park E charge Rs. 24 for each people (Boys + Girls) who visited the park, then find the total revenue get by park E?
 (a) 1166 Rs. (b) 1296 Rs. (c) 1248 Rs.
 (d) 1268 Rs. (e) 1284 Rs.
22. Total people (Boys + Girls) who visited park B is what percent more than total people (Boys + Girls) who visited park E (Approximate)?
 (a) 25% (b) 39% (c) 43%
 (d) 33% (e) 66%

IBPS PO Prelims 2020

Direction (23-27): Given below table shows total three types of items (A, B & C) sold by a store on five days of a week. Table also shows total type A items sold by store and percentage of items B and items C sold by store. Read the data carefully and answer following questions:

Note- only three types of items sold by the store.

Days	Items A	% of items B	% of items C
Monday	240	32%	20%
Tuesday	320	48%	12%
Wednesday	420	45%	20%
Thursday	360	56%	20%
Friday	340	22%	10%

23. Total items B sold by store on Monday & Friday together are what percent less than total items C sold by store on Wednesday & Thursday together?
 (a) 60% (b) 50% (c) 20%
 (d) 30% (e) 10%
24. Find the difference between average number of items B sold by store on Tuesday & Thursday and average number of items A sold by store on Thursday & Friday?
 (a) 260 (b) 264 (c) 262
 (d) 272 (e) 268
25. If total items B sold by store on Sunday is 25% more than that sold on Thursday and total items C sold on Sunday is 300% more than that sold on Friday, then find total number of items B & items C sold by store on Sunday ?
 (a) 1250 (b) 1150 (c) 1050
 (d) 950 (e) 1350
26. Total items C sold by store on Wednesday is what percent more than total items C sold by store on Monday and Tuesday together?
 (a) $26\frac{22}{49}\%$ (b) $24\frac{22}{49}\%$ (c) $22\frac{22}{49}\%$
 (d) $21\frac{22}{49}\%$ (e) $18\frac{22}{49}\%$
27. Find the ratio between total items sold by store on Monday to total items sold by store on Thursday?
 (a) 1 : 5 (b) 1 : 3 (c) 1 : 7
 (d) 1 : 4 (e) 1 : 2

IBPS PO Prelims 2020

Direction (28-32): Given data shows total male and female employee in three companies in a seminar. Read data carefully and answer the questions: -

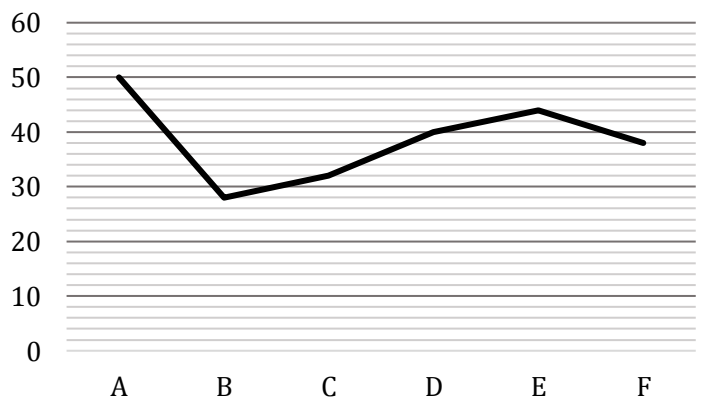
In annual seminar of three companies, A, B and C some male and female employees represent their companies. Average number of female employees who represent A and

B is 420. Total male employee in A and B is 1620. Number of female employees is $\frac{2}{3}rd$ and $\frac{2}{5}th$ of male employee in A and B respectively. Total female employee who represent C are 25% more than total female employee who represent A and total male employee who represent C are $33\frac{1}{3}\%$ more than total female employee who represent B.

28. Total employees who represent A is what percent more than total male employee who represent B ?
 (a) $33\frac{1}{3}\%$ (b) $30\frac{1}{3}\%$ (c) $27\frac{1}{3}\%$
 (d) $29\frac{1}{3}\%$ (e) $39\frac{1}{3}\%$
29. 25% of total female employee and 20% of total male employee who represent B & C together have MBA degree, then find total employee who do not have MBA degree?
 (a) 1624 (b) 1424 (c) 1824
 (d) 1648 (e) 1244
30. Find the ratio between total male employee who represent B & C together to total female employee who represent A & C together?
 (a) 23 : 13 (b) 23 : 14 (c) 23 : 18
 (d) 23 : 12 (e) 23 : 20
31. Find difference between Total male employees who represent C and total female employee who represent B?
 (a) 120 (b) 140 (c) 100
 (d) 160 (e) 180
32. Find average number female in B & C ?
 (a) 480 (b) 420 (c) 520
 (d) 540 (e) 600

IBPS Clerk Prelims 2020

Direction (33 - 37): The line graph given below shows the total number of posts (Photos + Videos) shared by six (A, B, C, D, E & F) people in December 2019. Read the data carefully and answer the questions.

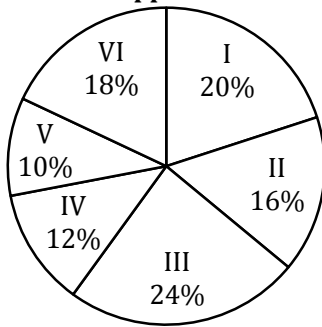


33. The total post shared by C is what percent less than the total post shared by D?
 (a) 20% (b) 25% (c) 15%
 (d) 10% (e) 30%
34. In January 2020 total posts shared by B & F is 12 and 15 more than previous month respectively, then find the total number of the post shared by B & F in January 2020?
 (a) 95 (b) 91 (c) 93
 (d) 97 (e) 99
35. Find the average number of posts shared by A, C & F?
 (a) 42 (b) 48 (c) 40
 (d) 36 (e) 44
36. Total photos shared by E is four more than total videos shared by him, then find total videos shared by E?
 (a) 24 (b) 20 (c) 28
 (d) 22 (e) 30
37. If the ratio of total photos to total videos shared by B is 5: 9, then find total photos shared by B?
 (a) 10 (b) 18 (c) 12
 (d) 14 (e) 16

RRB PO Prelims 2020

Directions (38-43): Pie chart shows the percentage distribution of total students appeared in six different shifts of an exam. Study the pie chart given below and answer the following questions.

Total students appeared in exam - 5500



38. Find average number of students appeared in shift I, II & IV of the exam.
 (a) 1040 (b) 900 (c) 720
 (d) 1140 (e) 880
39. Find the central angle for students appeared in shift II of the examination.
 (a) 64.2° (b) 48° (c) 57.6°
 (d) 43.6° (e) 52.8°
40. Find total number of students appeared in shift V & VI together of the examination.
 (a) 1740 (b) 1600 (c) 1820
 (d) 1960 (e) 1540

41. Students appeared in shift III & IV together of the examination are what percent more or less than students appeared in shift I of the examination?
 (a) 90% (b) 80% (c) 70%
 (d) 50% (e) 60%
42. Find ratio of students appeared in shift IV & VI together of the examination to students appeared in shift II & III together of the examination.
 (a) 3:4 (b) 5:7 (c) 4:3
 (d) 7:5 (e) None of the above.
43. Students appeared in shift I & VI together of the examination are how much more or less than students appeared in shift III & V together of the examination?
 (a) 330 (b) 150 (c) 360
 (d) 280 (e) 220

RRB PO Prelims 2020

Directions (44-49): Study the table given below and answer the following questions.

Table gives information about total number of students in 3 different schools in 1999 & 2000 and also gives information about total number of girls in these 3 schools in 1999 & 2000.

School	Year			
	1999		2000	
	Total students	Total Girls	Total students	Total girls
A	720	360	900	450
B	360	180	600	180
C	450	270	400	120

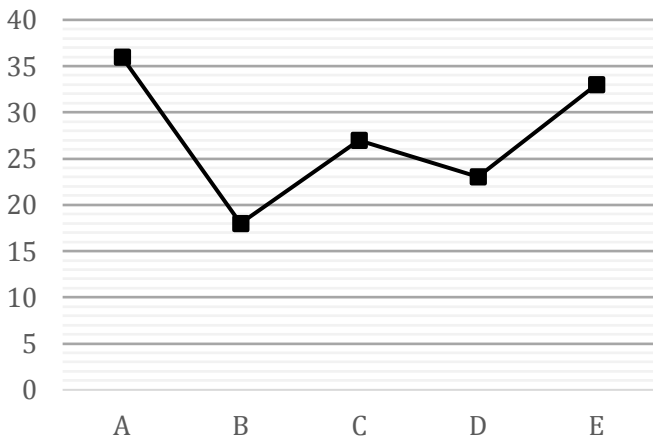
Note: Total students in any school in any year = Total (Boys + Girls) in that school in that year.

44. If average number of students in school A in 1999, 2000 & 2001 are 700, then find total number of students in school A in 2001.
 (a) 540 (b) 480 (c) 420
 (d) 600 (e) 360
45. Number of girls in school - A & B together in 2000 are what percent more or less than total number of students in school - B & C together in 2000?
 (a) 27% (b) 42% (c) 37%
 (d) 30% (e) 45%
46. Find total number of boys in school - A, B & C together in 1999.
 (a) 720 (b) 640 (c) 680
 (d) 760 (e) 800
47. Average number of students in school - A, B & C in 1999 are what percent of total students in school - B in 2000?
 (a) 95% (b) 85% (c) 75%
 (d) 55% (e) 65%

48. Find ratio of number of boys in school – B in 2000 to number of boys in school – C in 2000.
 (a) 5:4 (b) 4:5 (c) 2:3
 (d) 3:2 (e) None of the above.
49. Total number of girls in school – A, B & C together in 1999 are how much more or less than total number of girls in school – A, B & C together in 2000?
 (a) 140 (b) 60 (c) 180
 (d) 90 (e) 100

RRB Clerk Prelims 2020

Directions (50-54): Line graph given below shows number of passengers travelling in five (A, B, C, D & E) different compartment of a trains. Read the data carefully and answer the questions.



50. Total passengers in E are what percent less than total passengers in A?
 (a) $6\frac{1}{4}\%$ (b) $8\frac{1}{3}\%$
 (c) $6\frac{2}{3}\%$ (d) $6\frac{3}{5}\%$ (e) 5%
51. Find average number of passengers in A, C & E?
 (a) 32 (b) 30
 (c) 36 (d) 33 (e) 27
52. Find the ratio of total passenger in B to that of in D?
 (a) 7 : 9 (b) 9 : 10
 (c) 11 : 9 (d) 9 : 13 (e) 9 : 11
53. Total passenger in C and E together are what percent more than total passenger in A?
 (a) $33\frac{1}{3}\%$ (b) $66\frac{2}{3}\%$
 (c) $66\frac{1}{3}\%$ (d) 50% (e) 60%
54. Find total number of passengers traveling in B, C & D together?
 (a) 69 (b) 65
 (c) 67 (d) 63 (e) 71

RRB Clerk Prelims 2020

Directions (55-59): Table given below shows number of orders received by three (P, Q & R) companies of their three (A, B & C) items. Read the data carefully and answer the questions.

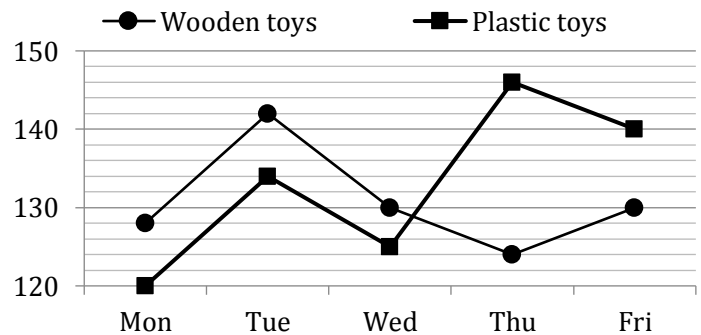
Companies	A	B	C
P	80	60	50
Q	40	70	90
R	80	100	30

55. Total orders of item A & B received by R is how much more than total orders of item B & C received by Q?
 (a) 50 (b) 10
 (c) 40 (d) 20 (e) 30
56. Find total orders (all three items) received by R is what percent more than that of total orders (all three items) received by Q?
 (a) 5% (b) 12.5%
 (c) 10% (d) 15% (e) 20%
57. Find ratio of total orders of item A & B received by P to total orders of item B & C received by Q?
 (a) 7 : 9 (b) 8 : 7
 (c) 4 : 7 (d) 5 : 6 (e) 7 : 8
58. Find average number of orders of item B received by Q & R is what percent of total orders of item A received by P?
 (a) $104\frac{1}{4}\%$ (b) $106\frac{1}{4}\%$
 (c) $108\frac{1}{4}\%$ (d) $102\frac{1}{4}\%$ (e) $110\frac{1}{4}\%$
59. Find total orders of item A, B & C received by P?
 (a) 210 (b) 220
 (c) 190 (d) 180 (e) 200

RBI Assistant Prelims 2020

Directions (60-64): Given below is the line graph which shows the numbers of wooden toys and plastics toys sold in 5 different days of the week. Read the given information carefully and answer the following questions.

Total toys = Wooden toys + Plastic toys



60. Find the difference between total toys sold on Monday and on Wednesday?
 (a) 10 (b) 8 (c) 9
 (d) 7 (e) 5

61. Total Plastic toys sold on Tuesday and Friday together is what percent more or less than total Wooden toys sold on Wednesday and Friday together.
 (a) $5\frac{3}{13}\%$ (b) $5\frac{5}{7}\%$ (c) $5\frac{4}{13}\%$
 (d) $5\frac{5}{13}\%$ (e) $5\frac{4}{7}\%$
62. What is the average of Plastic toys sold on Tuesday, Wednesday and Friday?
 (a) 131 (b) 133 (c) 132
 (d) 130 (e) 138
63. Total toys sold on Thursday is what percent more or less than total toys sold on Friday?
 (a) 12.5% (b) 10% (c) 0%
 (d) None of these (e) 20%
64. What is number of Wooden toys purchased by female on Wednesday if ratio of Wooden toys sold to female to that of male on Wednesday is 7: 3? (if toys are sold only to male and female)
 (a) 98 (b) 84 (c) 104
 (d) 78 (e) 91

Solutions

Basic Questions

1. (c): required average = $\frac{15+12+18}{3} = 15\%$
 $= \frac{15}{100} \times 25000 = \text{Rs } 3750$
2. (e): required income = $40 \times \frac{4}{125} \times 25000 = \text{Rs } 32000$
3. (b): expense on Telephone bill = $\frac{18}{100} \times 25000 \times \frac{4}{15}$
 $= \text{Rs } 1200$
 \therefore required percentage = $\frac{25000 \times \frac{12}{100} - 1200}{1200} \times 100$
 $= \frac{1800}{1200} \times 100 = 150\%$
4. (b): monthly savings = $25000 \times \frac{30}{100-30} = \text{Rs } \frac{75000}{7}$
 Required ratio = $\frac{\frac{15}{100} \times 25000}{\frac{75000}{7}} = \frac{3750 \times 7}{75000} = \frac{7}{20}$
5. (e): Required angle = $\frac{12}{100} \times 360 = 43.2$

Solutions (6-10)

6. (a): required ratio = $\frac{2000}{(4000-2500)} = \frac{2000}{1500} = \frac{4}{3}$
7. (d): required % = $\frac{(2500-2000)+(4000-2500)}{3000} \times 100$
 $= \frac{2000}{3000} \times 100 = 66.67\%$
8. (b): required average = $\frac{2000+2000+2500+2500}{4} = \frac{9000}{4}$
 $= 2250$
9. (c): Total girls in school A and B
 $= (3000 - 2000) + (2500 - 2000)$
 $= 1000 + 500 = 1500$
 Total girls in school B and D
 $= (2500 - 2000) + (3500 - 1500)$
 $= 500 + 2000 = 2500$
 So, required percentage = $\frac{2500-1500}{2500} \times 100$
 $= \frac{1000}{2500} \times 100 = 40\%$

10. (e): Total no. of girls in school A, C and D
 $= (3000 - 2000) + (4000 - 2500) + (3500 - 1500)$
 $= 1000 + 1500 + 2000 = 4500$
 Required difference = $(2000 + 2500) - (4500) = 0$
11. (b): let total no. of article manufactured by company C and E are m and 2m respectively
 Required ratio = $\frac{(2m \times \frac{13.6}{100})}{m \times \frac{6.8}{100}} = 4:1$
12. (b): let total article manufactured in each company = 100m
 Non-defective article manufactured in company D
 $= 100m \times \frac{96}{100} = 96m$
 Non-defective article manufactured in company B
 $= 100m \times \frac{88}{100} = 88m$
 Required percentage = $\frac{96m-88m}{88m} \times 100 = 9\frac{1}{11}\%$
13. (b): Total no. of article manufactured by company A = $\frac{96}{8} \times 100 = 1200$
14. (c): let total no. of article manufactured by company C and company D are c and d respectively.
 ATQ
 $\frac{6.8\% \times c}{4\% \times d} = \frac{2}{3}$
 $\frac{c}{d} = \frac{2}{3} \times \frac{40}{68}$
 $c: d = 20: 51$
15. (a): non-defective article manufactured by company
 $A = \frac{200}{7-6} \times 7 \times \frac{92}{100} = 1288$

Solutions (16-20)

16. (d): required percentage = $\frac{320+280}{320+180} \times 100$
 $= \frac{600}{500} \times 100 = 120\%$
17. (a): required difference = $360-240=120$ runs
18. (d): required ratio = $\frac{320+240+280+380+250}{360+320+220+300+180} = \frac{1470}{1380} = \frac{49}{46}$
19. (b): required percentage = $\frac{300-240}{300} \times 100 = 20\%$
20. (e): required average = $\frac{360+320+220+300}{4} = \frac{1200}{4}$
 $= 300$ runs
21. (c): Phones sold by Nokia in 2018 = $10000 \times \frac{112}{100}$
 $= 11200$
 Phones sold by Samsung in 2018 = $30000 \times \frac{115}{100}$
 $= 34500$
 Required number of phones = $11200 + 34500$
 $= 45700$
22. (e): Required percentage = $\frac{25000-20000}{20000} \times 100 = 25\%$
23. (a): No. of HTC mobile sold in 2018 = $12000 \times \frac{120}{100}$
 $= 14400$
 Required difference = $20000 - 14400$
 $= 5600$ less
24. (c): Required ratio = $(30000 \times \frac{115}{100}) : (25000 \times \frac{70}{100})$
 $= 34500:17500 = 69:35$
25. (a): Required average = $\frac{1}{2} \times (25000 \times \frac{105}{100} + 12000 \times \frac{120}{100})$
 $= \frac{1}{2} \times (26250 + 14400)$
 $= 20325$

Solutions (26-30): -

For city C

- Total population of city C = $\frac{6000}{6.25} \times 100 = 96000$
 Literate population of city C = $96000 \times \frac{2}{3} = 64000$
 Illiterate population = $96000 \times \frac{1}{3} = 32000$
 Graduate population = $64000 \times \frac{40}{100} = 25600$

For city B

- Total population = 16000
 Literate population = 6000
 Illiterate population = $16000 - 6000 = 10000$
 Graduate population = $6000 \times \frac{40}{100} = 2400$

For city A

- Total population = 22000
 Literate population = $22000 \times \frac{5}{11} = 10000$
 Illiterate population = $22000 - 10000 = 12000$
 Graduate population = $10000 \times \frac{40}{100} = 4000$

26. (c): Required percentage = $\frac{6000}{12000} \times 100 = 50\%$
27. (d): Required ratio = $25600:16000$
 $= 8:5$
28. (a): Required difference = $32000 - 2400 = 29600$
29. (b): Population which is literate but ungraduated from city A = $10000 \times \frac{60}{100} = 6000$
 Required percentage = $\frac{6000}{2400} \times 100 = 250\%$
30. (c): Graduate male from city C = $\frac{25600}{16} \times 9 = 14400$
 Literate but ungraduated from city B = $6000 \times \frac{60}{100} = 3600$
 Required difference = $14400 - 3600 = 10800$

Prelims Solutions

Level - 1

1. (c): Let total boys in school A = $45x$
 and total boys in school B = $52x$
 So, girls in school A = $\frac{45x}{54} \times 46$
 $= \frac{5x}{6} \times 46 = \frac{115x}{3}$
 And girls in school A = $\frac{52x}{52} \times 48 = 48x$
 So, $45x + 52x + \frac{115}{3}x + 48x = 1100$
 $135x + 156x + 115x + 144x = 3300$
 $x = 6$
 Required total number of girls
 $= \frac{115}{3} \times 6 + 48 \times 6$

$= 230 + 288 = 518$

2. (d): Girls in school A in 2014 = $\frac{288}{48} \times 52 = 312$
 Girls in school B in 2014 = $\frac{264}{44} \times 56 = 336$
 Required sum = $312 + 336 = 648$
3. (e): Let total boys in school A in 2014 = $4800x$
 So total girls in school B in 2012 = $4800x$
 Therefore, total boys in school B in 2012 = $5200x$
 Girls in school A in 2014 = $\frac{4800}{48}x \times 5200 = 5200x$
 Required % = $\frac{5200x}{5200x} \times 100 = 100\%$

4. (e): Let girls in school B in 2016 = $50x$
 So girls in school A in 2016
 $= 50x \times \left(100\% - 16\frac{4}{5}\%\right)$
 $= 50x \left(\frac{500-84}{5 \times 100}\right) = \frac{208}{5}x$
 Boys in school A in 2016 = $\frac{208x}{5 \times 52} \times 48$
 $= \frac{192}{5}x$
 Boys in school B in 2016 = $50x$
 Required ratio = $\frac{192}{5 \times 50} = \frac{96}{125}$
5. (b): Boys in school A in 2015 = $700 \times \frac{62}{100} = 434$
 Boys in school B in 2013 = $400 \times \frac{64}{100} = 256$
 Required average = $\frac{434+256}{2} = 345$
6. (b): required percentage = $\frac{925-250}{250} \times 100 = 270\%$
7. (e): average no. of people of five days of week
 $= \frac{1400+1700+1200+1500+800}{5} = 1320$
 So, in 2 days of week no. of people visited are less than average no. of people.
8. (c): required value = $\sqrt{576} = 24$
9. (c): required ratio = $\frac{750+775+800}{3} : \frac{925+700}{2}$
 $= \frac{2325}{3} : \frac{1625}{2} = 62:65$
10. (b): total no. of male visited on day3
 $= 624 + 650 \times \frac{4}{100} = 650$
 Total no. of female visited on day3 = $\frac{650}{13} \times 12$
 $= 600$
 Required no. of female = $600 - 576 = 24$
11. (b): Required ratio = $\frac{\frac{400}{6}}{\frac{200}{6}} = \frac{2}{1}$
12. (d): Required percentage = $\frac{\frac{170}{6}}{\frac{260}{6}} \times 100$
 $= \frac{850}{13} \% = 65\frac{5}{13} \%$
13. (a): Required average = $\frac{320+240+420+170}{4} = 287.5 \text{ km}$
14. (b): Required percentage = $\frac{240-200}{200} \times 100$
 $= \frac{40}{200} \times 100 = 20\%$
15. (c): Required difference = $\frac{360}{6} - \frac{240}{6}$
 $= 60 - 40$
 $= 20 \text{ km/hr}$
16. (b): maximum no. of students in any year = 50000
 Minimum no. of students in any year = 15000
 Required percentage = $\frac{50000-15000}{15000} \times 100$
 $= 233.33\%$

17. (a): required ratio = $\frac{42000+25000+30000}{3} : \frac{35000+50000}{2}$
 $= 194:255$
18. (e): no. of boys who joined for banking in 2016
 $= \frac{38000}{19} \times 11 = 22000$
 Let no. of girls who joined for ssc in 2016 = $4x$
 Then no. of boys who joined for ssc in 2016
 $= 4x \times \frac{75}{100} = 3x$
 No. of girls who joined for ssc in 2016
 $= \frac{35000}{7x} \times 4x = 20000$
 Required difference = $22000 - 20000 = 2000$
19. (c): average no of students qualified in ssc and banking in 2014 = $\frac{25000 \times \frac{50}{100} + 45000 \times \frac{25}{100}}{2} = 11875$
 No. of students qualified in railways in 2014
 $= 42000 \times \frac{20}{100} = 8400$
 Required difference = $11875 - 8400 = 3475$
20. (a): required percentage = $\frac{28000}{42000} \times 100 = 66\frac{2}{3} \%$
21. (c): Required percentage = $\frac{300-240}{300} \times 100$
 $= \frac{60}{300} \times 100 = 20\%$
22. (d): Required percentage = $\frac{230+320}{250} \times 100$
 $= 220\%$
23. (a): Required average = $\frac{180+230+320+360+120}{5}$
 $= \frac{1210}{5} = 242$
24. (d): Required ratio = $\frac{230+360}{300+240} = \frac{590}{540}$
 $= 59:54$
25. (a): Required percentage = $\frac{(360+300)-(120+240)}{(120+240)} \times 100$
 $= \frac{660-360}{360} \times 100 = \frac{300}{360} \times 100$
 $= \frac{250}{3} \% = 83\frac{1}{3} \%$
26. (e): average no. of voter in city P, Q and U
 $= \left(\frac{12+18+15}{3}\right) \% = 15\%$
 So, average no. of voters in city P, Q and U equal to total no. of voters in city U (15%)
27. (a): required no. of voters = $75000 \times \frac{20}{100} \times \frac{10}{100} +$
 $75000 \times \frac{22}{100} \times \frac{12}{100} = 3480$
28. (a): required difference = $75000 \times \frac{(18+22-12-13)}{100}$
 $= 11250$
29. (b): required difference = $75000 \times \frac{15}{100} \times \frac{29}{45} -$
 $75000 \times \frac{13}{100} \times \frac{13}{25} = 2180$

30. (a): In city T

$$\begin{aligned} \text{Total no. of female who did not cast vote} \\ &= 75000 \times \frac{22}{100} \times \frac{40}{100} \times \frac{20}{100} = 1320 \\ \text{Total voters who did not cast vote} \\ &= 75000 \times \frac{22}{100} - 13840 = 2660 \\ \text{Total male who did not cast vote} \\ &= 2660 - 1320 = 1340 \\ \text{Required difference} &= 1340 - 1320 = 20 \end{aligned}$$

31. (b): No. of book sold = $K \times$ no. of selection
When K is constants

$$\begin{aligned} \text{Atq,} \\ 1200 &= K \times 1050 \\ K &= \frac{1200}{1050} \Rightarrow K = \frac{8}{7} \end{aligned}$$

$$\begin{aligned} \text{And,} \\ 400 &= K \times \text{no. of selection} \\ \text{No. of selection} &= \frac{400 \times 7}{8} = 350 \end{aligned}$$

32. (b): Required no. = $800 \times \frac{140}{100} \times \frac{80}{100} = 896$

33. (c): Let total no. of votes cast in 2016 be x .

$$\begin{aligned} \text{ATQ} \\ \frac{\frac{50}{100} \times 2500 + \frac{75}{100} \times x}{2} &= 1000 \\ \frac{1250 + \frac{3}{4}x}{2} &= 1000 \\ \frac{3}{4}x &= 2000 - 1250 \\ x &= 1000 \end{aligned}$$

34. (d): Total no. of valid votes in year 2014

$$\begin{aligned} &= \frac{50}{100} \times 2500 = 1250 \\ \text{No. of valid votes of A in 2014} &= 1250 - 650 = 600 \\ \text{So, required ratio} &= \frac{600}{650} = \frac{12}{13} \end{aligned}$$

35. (e): Total valid votes of year 2015 = $\frac{55}{100} \times 800 = 440$

Let valid votes of A and B are $7x$ and $4x$ respectively.

$$\begin{aligned} 7x + 4x &= 440 \\ 11x &= 440 \\ x &= 40 \end{aligned}$$

$$\begin{aligned} \text{So, required difference} &= 7x - 4x = 3x \\ &= 3 \times 40 = 120 \end{aligned}$$

36. (b): Let no. of valid votes of A and B are $8x$ and $5x$ respectively.

$$\begin{aligned} \text{So, } 8x - 5x &= 3x = 225 \\ \text{So, total no. of valid votes} &= 13x = 975 \\ \text{Total no. of votes cast in 2016} &= 975 \times \frac{100}{75} \\ &= 1300 \end{aligned}$$

37. (e): Required angle = $\frac{10}{100} \times 360 = 36^\circ$

38. (c): Required percent = $\frac{(20-18)}{20} \times 100 = 10\%$

39. (b): Required cost = $\frac{27000}{(32-20)} \times 100 = \text{Rs } 2,25,000$

40. (a): Cost price of the car = $\frac{360000}{120} \times 100$

$$= \text{Rs } 3,00,000$$

$$\text{So, material cost} = \frac{20}{100} \times 300000 = \text{Rs } 60,000$$

41. (e): Average expense incurred on material, transportation and others = $\frac{20+10+15}{3} = 15\%$

$$\text{Required cost} = \frac{13500}{5} \times 15 = \text{Rs } 40500$$

42. (b): Time taken by Anurag to cover $\left(\frac{5}{9}\right)^{\text{th}}$ of the

$$\text{distance on Monday} = \frac{900 \times \frac{20}{100} \times \frac{5}{9}}{50} = 2 \text{ hours}$$

Time taken by Anurag to cover remaining distance

$$\text{on Monday} = \frac{900 \times \frac{20}{100} \times \frac{4}{9}}{60} = \frac{80}{60} = \frac{4}{3} \text{ hours}$$

$$\text{Required speed} = \frac{900 \times \frac{20}{100}}{2 + \frac{4}{3}}$$

$$\begin{aligned} &= \frac{180}{\left(\frac{10}{3}\right)} \\ &= \frac{180 \times 3}{10} = 54 \text{ km/hr.} \end{aligned}$$

43. (c): Distance travelled by Anurag on Wednesday & Friday together = $900 \times \frac{(18+21)}{100}$

$$= 900 \times \frac{39}{100} = 351 \text{ km}$$

Distance travelled by Anurag on Tuesday & Thursday together = $900 \times \left(\frac{25+16}{100}\right)$

$$= 900 \times \frac{41}{100} = 369$$

$$\text{Required difference} = 369 - 351 = 18 \text{ km}$$

44. (d): Distance travelled by Anurag on Tuesday

$$= 900 \times \frac{25}{100} = 225 \text{ km}$$

$$\begin{aligned} \text{Distance travelled by Car on Tuesday} &= 225 \times \frac{3}{15} \\ &= 45 \text{ km} \end{aligned}$$

$$\begin{aligned} \text{Distance travelled by Bus on Tuesday} &= 225 \times \frac{7}{15} \\ &= 105 \text{ km} \end{aligned}$$

$$\begin{aligned} \text{Distance travelled by Train on Tuesday} &= 225 \times \frac{5}{15} \\ &= 75 \text{ km} \end{aligned}$$

$$\begin{aligned} \text{Time taken to cover 45 km via car on Tuesday} &= \frac{45}{30} \\ &= \frac{3}{2} \text{ hours} \end{aligned}$$

$$\begin{aligned} \text{Time taken to cover 105 km via bus on Tuesday} &= \frac{105}{21} = 5 \text{ hours} \end{aligned}$$

$$\begin{aligned} \text{Time taken to cover 75 km via train on Tuesday} &= \frac{75}{25} = 3 \text{ hours} \end{aligned}$$

$$\text{Required time} = 5 + 3 + \frac{3}{2} = 9.5 \text{ hours}$$

45. (a): Required average = $\frac{900 \times \left(\frac{18+16+21}{100}\right)}{3} = \frac{9 \times 55}{3}$

$$= 165 \text{ km}$$

46. (c): Distance travelled by Anurag on Sunday

$$= \frac{250}{100} \times 900 \times \frac{20}{100} = 450 \text{ km}$$

$$\text{Required speed} = \frac{450}{20} = 22.5 \text{ km/hr.}$$

47. (c): Boys in school - A & E together

$$= \frac{720}{9} \times 11 + 350 \times \frac{8}{7}$$

$$= 880 + 400 = 1280$$

Boys in school - B & C together

$$= 540 \times \frac{3}{2} + 270 \times \frac{7}{3}$$

$$= 810 + 630$$

$$= 1440$$

$$\text{Required ratio} = \frac{1280}{1440}$$

$$= \frac{8}{9} = 8 : 9$$

48. (e): Average number of girls in school - B, C & D

$$= \frac{540+270+576}{3} = 462$$

Average number of students in school - A & D

$$= \frac{1}{2} \left[720 \times \frac{20}{9} + 576 \times \frac{25}{12} \right]$$

$$= \frac{1}{2} [1600 + 1200]$$

$$= 1400$$

$$\text{Required \%} = \frac{462}{1400} \times 100$$

$$= 33\%$$

49. (d): Students in school - B = $540 \times \frac{5}{2} = 1350$

Girls in school - E and boys in school - D together

$$= 350 + 576 \times \frac{13}{12}$$

$$= 350 + 624 = 974$$

$$\text{Required difference} = 1350 - 974 = 376$$

50. (d): Students in school - C & E together

$$= \left[270 \times \frac{10}{3} + 350 \times \frac{15}{7} \right]$$

$$= 900 + 750 = 1650$$

$$\text{Required \%} = \frac{1650-720}{720} \times 100$$

$$= \frac{930}{720} \times 100 = \frac{775}{6} \%$$

$$= 129 \frac{1}{6} \%$$

51. (a): Girls in school - A & D together = $720 + 576 = 1296$

$$\text{Boys in school - A & E together} = 720 \times \frac{11}{9} +$$

$$350 \times \frac{8}{7}$$

$$= 880 + 400$$

$$= 1280$$

$$\text{Required \%} = \frac{1296}{1280} \times 100$$

$$= \frac{405}{4} \%$$

$$= 101 \frac{1}{4} \%$$

52. (c): Required difference = $570 -$

$$\frac{(500+550+480+600+650+580)}{6}$$

$$= 570 - 560 = 10$$

53. (a): Required percentage = $\frac{(500+600)}{(600+400)} \times 100$

$$= \frac{1100}{1000} \times 100 = 110\%$$

54. (d): Required ratio = $\frac{(450+570+600)}{(500+550+480)} = \frac{1620}{1530}$

$$= \frac{18}{17}$$

55. (b): Required amount = $3360 \times 1500 - 3370 \times 1200$

$$= \text{Rs } 996000$$

56. (e): Required sum = $650 \times \frac{14}{13} + 480 \times \frac{13}{12}$

$$= 700 + 520 = 1220$$

Level - 2

1. (b): Let per unit price of Bike in 2017 be 'x'

ATQ,

$$3400 \times 90 + x \times 100 = 450000$$

$$x = 1440 \text{ Rs.}$$

2. (d): Required Ratio = $\frac{1800 \times \frac{4}{3} \times 140}{1800 \times 100}$

$$= 28 : 15$$

3. (a): Price of Bike in 2018 = $2400 \times \frac{37.5}{100} = 900$

$$\text{So, required no.} = \frac{1800 \times 100}{900 \times 140} \times 100$$

$$= \frac{1000}{7} \%$$

4. (b): Revenue generated in 2020 by selling car

$$= 60 \times 1.2 \times 2800 \times \frac{112.5}{100} = 22,68,00 \text{ Rs.}$$

Revenue generated in 2019 by selling car

$$= 60 \times 2800 = 168,000$$

So, per cent increase in revenue

$$= \frac{22,68,00 - 168,000}{168,000} \times 100 = 35\%$$

5. (c): Total revenue generated in 2020 by selling Bike

$$= 2800 \times \frac{6}{7} \times 120 = 288,000$$

$$\text{Per unit selling price of Bike} = \frac{288,000}{120} = \text{Rs. } 2400$$

$$\text{So, per unit cost price of Bike} = \frac{2400}{1.25} = \text{Rs. } 1920$$

6. (b): ATQ,

Total people watching Suits

$$= \frac{16}{100} \times \left[40000 \times \left(\frac{100}{4} \right) \right] = 160000$$

Number of females watching Suits

$$= 160000 \times \frac{17}{40} = 68000$$

$$\text{Number of males watching Suits} = 160000 \times \frac{23}{40}$$

$$= 92000$$

$$\text{Required difference} = 92000 - 68000 = 24000$$

7. (c): Let number of male & female watching both Friends & Sherlock Holmes be '7x' & '8x' respectively.

ATQ,

Total number of people watching Friends

$$= 16000 \times \frac{15x}{8x} \times \frac{100}{30} = 100000$$

Total number of people watching Viking

$$= 100000 \times \frac{100}{20} \times \frac{12}{100} = 60000$$

Number of females watching Vikings

$$= 60000 - 32000 = 28000$$

$$\text{Required Ratio} = \frac{32000}{28000} = 8 : 7$$

8. (a): Let total number of people watching all the web series be x.

ATQ,

$$20000 = \frac{\frac{20}{100} \times x + \frac{16}{100} \times x + \frac{24}{100} \times x}{3}$$

$$\Rightarrow 20000 = \frac{60x}{300}$$

$$\Rightarrow x = 100000$$

Number of males watching Vikings = $\frac{12}{100} \times$

$$100000 \times \frac{5}{12} = 5000$$

Numbers of female watching Game of Thrones

$$= \frac{28}{100} \times 100000 \times \frac{7}{20} = 9800$$

$$\text{Required difference} = 9800 - 5000 = 4800$$

9. (b): Required angle = $\frac{28}{100} \times 360 = 100.8^\circ$

10. (e): Required % = $\frac{\left(\frac{24}{100} + \frac{16}{100}\right)}{\frac{20}{100} + \frac{28}{100} + \frac{12}{100}} \times 100$
 $= \frac{40}{60} \times 100 = \frac{200}{3} \% = 66\frac{2}{3}\%$

11. (d): No. of mobile sold by MI in rural area

$$= 10010 \times \frac{5}{11} \times \frac{8}{13} = 2800$$

No. of laptop sold by APPLE in rural area

$$= 20020 \times \frac{4}{7} \times \frac{76}{143} = 6080$$

$$\text{Required difference} = 6080 - 2800 = 3280$$

12. (a): Total laptop sold by MICROSOFT = $14300 \times \frac{7}{22}$
 $= 4550$

Non-defective laptop = $4550 - 650 = 3900$

Hence, selling price of 3900 laptop is equal to cost price of 4550 laptop

$$\text{Required percentage} = \frac{650}{3900} \times 100 = 16\frac{2}{3}\%$$

13. (a): Average no. of mobile sold by MI, MICROSOFT and APPLE in rural area =

$$\frac{10010 \times \frac{5}{11} \times \frac{8}{13} + 14300 \times \frac{15}{22} \times \frac{22}{52} + 20020 \times \frac{4}{7} \times \frac{67}{143}}{3} = 4095$$

$$\text{Required ratio} = \frac{4095}{77000 \times \frac{3}{11}} = \frac{39}{200}$$

$$\Rightarrow 39 : 200$$

14. (d): Average no. of product sold by all companies

$$\Rightarrow \frac{10010 + 77000 + 14300 + 91000 + 20020}{5} = 42466$$

Total product sold by HP in urban area

$$= 91000 \times \frac{7}{13} = 49000$$

Required difference = $49000 - 42466$

$$= 6534 \text{ less}$$

15. (c): Required part = $\frac{20020 \times \frac{4}{7} \times \frac{76}{143}}{10010 \times \frac{6}{11} \times \frac{23}{39}} = \frac{304}{161}$

16. (d): Total applied students in RAILWAY exam = 8880

Let no. of students who appeared in RAILWAY exam be $70x$

Then no. of students who did not appeared in

$$\text{exam} = 70x \times \frac{40}{700} = 4x$$

ATQ

$$70x + 4x = 8880$$

$$x = 120$$

$$\text{So, } 70x = 8400$$

Total students who passed RAILWAY exam

$$= 8400 \times \frac{84}{100} = 7056$$

17. (a): Total students applied in SSC exam = 7200

Total no. of students who appeared in SSC exam

$$= 7200 - 720 - 1080 = 5400$$

Total students who passed SSC exam

$$= 5400 \times \frac{96}{100} = 54 \times 96$$

$$\text{Required percentage} = \frac{(54 \times 96)}{7200} \times 100 = 72\%$$

18. (e): Total no. of students applied in BANKING exam

$$= 9600$$

Required no. of students

$$= 9600 \times \frac{250}{300} \times \frac{69.6}{100}$$

$$= 5568$$

19. (b): Total students who applied in DEFENCE exam

$$= 5520$$

Total appeared students in DEFENCE exam

$$= \frac{2400}{48} \times 100 = 5000$$

$$\text{Required percentage} = \frac{5000}{5520} \times 100 \approx 90\%$$

20. (a): total no. of students applied in CTET exam = 3600

Let total no. of girls who appeared in CTET exam be $2x$

Then total no. of boys who appeared in CTET exam

$$= x$$

ATQ

$$2x \times \frac{70}{100} + x \times \frac{83.2}{100} = 2232$$

$$2232x = 2232000$$

$$x = 1000$$

$$\text{Required ratio} = \frac{3600}{2 \times x} = \frac{3600}{2000} \Rightarrow 9:5$$

21. (a): Required average

$$= \frac{1}{3} \left[900 \times \frac{25}{100} + 700 \times \frac{15}{100} + 1650 \times \frac{30}{100} \right]$$

$$= \frac{1}{3} [225 + 105 + 495] = 275$$

22. (d): Number of items which are not rejected by

customer to company P = $900 \times \frac{75}{100} = 675$

Items which were rejected by customer to company Q and R together

$$= 1200 \times \frac{20}{100} + 700 \times \frac{15}{100}$$

$$= 240 + 105 = 345$$

Required Percentage = $\frac{675 - 345}{345} \times 100$

$$= 95\frac{15}{23}\% \text{ more}$$

23. (c): Required ratio = $\frac{800 \times \frac{60}{100}}{700 \times \frac{15}{100} + 1650 \times \frac{30}{100}}$

$$= \frac{480}{105 + 495} = \frac{480}{600} = 4 : 5$$

24. (b): Required Percentage = $\frac{1200 \times \frac{20}{100}}{800 \times \frac{40}{100}} \times 100 = 75\%$

25. (e): Required difference = $1650 \times \frac{70}{100} - 700 \times \frac{85}{100}$

$$= 1155 - 595 = 560$$

Solutions (26-30):

Players who play tennis = 160

Players who play all three games = $160 \times \frac{10}{100} = 16$

Let players who play cricket & chess be $3x$ & $5x$ respectively.

ATQ,

$$8x = 160 \times 2 = 320$$

$$x = 40$$

∴ Cricket players = 120

And chess players = 200

Players who play both tennis and chess = $\frac{1}{8} \times 160 = 20$

Let players who play both tennis and cricket and players who play both chess and cricket be $2y$ & $3y$ respectively.

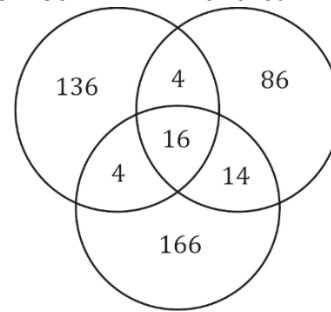
ATQ,

$$5y = 50 \Rightarrow y = 10$$

Total no. of players = $136 + 166 + 86 + 4 + 4 + 14 + 16 = 426$

Tennis = 160

cricket = 120



Chess = 200

26. (b): Required average = $\frac{136 + 166 + 86}{3} = \frac{388}{3} = 129\frac{1}{3}$

27. (d): Required percentage = $\frac{170}{426} \times 100 \approx 40\%$

28. (c): Required ratio = $\frac{20}{86} = 10 : 43$

29. (e): Required percentage = $\frac{(4 + 4 + 16 + 14)}{426 - 16} \times 100 = \frac{380}{410} = 9\%$

30. (a): Required difference = $160 - 86 = 74$

31. (d): Girls playing Hot Potato & Chess together = $800 \times \frac{10}{100} \times \frac{3}{5} + 800 \times \frac{30}{100} \times \frac{5}{12} = 48 + 100 = 148$

Boys playing Table Tennis = $800 \times \frac{18}{100} \times \frac{25}{36} = 100$

So, required % = $\frac{148 - 100}{100} \times 100 = 48\% \text{ more}$

32. (e): Average of girls playing Chess, Table Tennis and Card Games =

$$\frac{\left[800 \times \frac{30}{100} \times \frac{5}{12} + 800 \times \frac{18}{100} \times \frac{11}{36} + 800 \times \frac{24}{100} \times \frac{1}{2} \right]}{3}$$

$$= \frac{100 + 44 + 96}{3} = 80$$

Number of Boys playing Hot Potato and Card Games together = $800 \times \frac{10}{100} \times \frac{2}{5} + 800 \times \frac{24}{100} \times \frac{1}{2} = 32 + 96 = 128$

Required ratio = $\frac{80}{128} = \frac{5}{8} = 5 : 8$

33. (d): Boys playing Chess and Table Tennis together

$$= 800 \times \frac{30}{100} \times \frac{7}{12} + 800 \times \frac{18}{100} \times \frac{25}{36}$$

$$= 140 + 100 = 240$$

Girls playing Hot Potato, Treasure Hunt and Card Games together

$$= 800 \times \frac{10}{100} \times \frac{3}{5} + 800 \times \frac{12}{100} \times \frac{7}{12} + 800 \times \frac{24}{100} \times \frac{1}{2}$$

$$= 48 + 56 + 96 = 200$$

Required % = $\frac{240}{200} \times 100 = 120\%$

34. (c): Number of students who leaves Carrom = $800 \times \frac{6}{100} \times \frac{75}{100} = 36$

Numbers of girls who leaves Carrom

$$= 800 \times \frac{12}{100} \times \frac{7}{12} \times \frac{25}{100} = 14$$

So,

Number of girls who still plays Carrom

$$= 800 \times \frac{6}{100} \times \frac{3}{8} - 14 = 4$$

Number of boys who still plays Carrom

$$= 800 \times \frac{6}{100} \times \frac{5}{8} - (36 - 14)$$

$$= 30 - 22$$

$$= 8$$

$$\text{So, required ratio} = \frac{8}{4} = \frac{2}{1} = 2 : 1$$

35. (a): Percentage distribution of boys playing Treasure

$$\text{Hunt } 12 \times \frac{5}{12} = 5\%$$

$$\text{So, required angle} = \frac{360}{100} = \frac{x}{5} = 18^\circ$$

36. (d): Unsold units of company-A & C together

$$= 8000 \times \frac{15}{100} + 6000 \times \frac{25}{100}$$

$$= 1200 + 1500 = 2700$$

$$\text{Sold units of company-D} = 12000 \times \frac{90}{100} = 10800$$

$$\text{Required \%} = \frac{2700}{10800} \times 100 = 25\%$$

37. (b): Units sold by company-B = $10000 \times \frac{90}{100} = 9000$

$$\text{Units sold by company-E} = 8000 \times \frac{95}{100} = 7600$$

Units returned by customer to company-B

$$= 9000 \times \frac{15}{100} = 1350$$

Units returned by customers to company-E

$$= 7600 \times \frac{12}{100} = 912$$

Total revenue of company-B

$$= 13 \times (9000 - 1350)$$

$$= 13 \times 7650 = \text{Rs. } 99450$$

Total Revenue of company-E = $15 \times (7600 - 912)$

$$= 15 \times 6688 = \text{Rs. } 100320$$

$$\text{Required difference} = 100320 - 99450 = \text{Rs. } 870$$

38. (b): Let selling price of each unit sold by company-C be Rs. x

So, selling price of each unit sold by company-D

$$= \text{Rs. } (x - 6)$$

ATQ,

$$12000 \times \frac{90}{100} \times (x - 6) - 6000 \times \frac{75}{100} \times x = 48600$$

$$10800x - 64800 - 4500x = 48600$$

$$6300x = 113400$$

$$x = \text{Rs. } 18$$

$$\text{Required price} = 18 \times \frac{100}{120} = \text{Rs. } 15$$

39. (a): Average of unsold units of company - A, C & D

$$= \frac{[8000 \times \frac{15}{100} + 6000 \times \frac{25}{100} + 12000 \times \frac{10}{100}]}{3}$$

$$= \frac{1200 + 1500 + 1200}{3} = 1300$$

Average of units sold of company - A and E

$$= \frac{[8000 \times \frac{85}{100} + 8000 \times \frac{95}{100}]}{2}$$

$$= \frac{6800 + 7600}{2} = 7200$$

$$\text{Required difference} = 7200 - 1300 = 5900$$

40. (c): Unsold units of company - D & E together

$$= 12000 \times \frac{10}{100} + 8000 \times \frac{5}{100}$$

$$= 1200 + 400 = 1600$$

$$\text{Units sold of company - F} = 1600 \times \frac{350}{100} = 5600$$

$$\text{Total units produced by company - F} = 5600 \times \frac{10}{7} = 8000$$

Solutions (41 - 45):

$$\text{Total items sold by store P} = 8400 \times \frac{3}{7} = 3600$$

$$\text{Total items sold by store Q} = 8400 \times \frac{4}{7} = 4800$$

Let total item D sold by store P = x

$$\text{So, total item A sold by store P} = \frac{7x}{6}$$

And, total item C sold by store P = (x - 160)

$$\text{Total item B sold by store P} = x + x \times \frac{7}{9}$$

$$= \frac{16x}{9}$$

$$\text{Total item E sold by store P} = \frac{16x}{9} - 1080$$

ATQ -

$$x + \frac{7x}{6} + (x - 160) + \frac{16x}{9} + \left(\frac{16x}{9} - 1080\right) = 3600$$

$$\frac{18x + 21x + 18x - 2880 + 32x + 32x - 19440}{18} = 3600$$

$$121x - 22320 = 64800$$

$$121x = 87120$$

$$x = 720$$

$$\text{Total item A sold by store P} = 720 \times \frac{7}{6} = 840$$

$$\text{Total item C sold by store P} = (720 - 160) = 560$$

$$\text{Total item B sold by store P} = 720 \times \frac{16}{9} = 1280$$

Total item E sold by store P

$$= 3600 - (720 + 840 + 560 + 1280) = 200$$

$$\text{Total item D sold by store Q} = 720 + 240 = 960$$

$$\text{Total item B sold by store Q} = 1280 \times \frac{9}{8} = 1440$$

Let total item A, C & E sold by store Q be 26y, 23y and 11y respectively

Now,

$$26y + 23y + 11y = (4800 - 960 - 1440)$$

$$60y = 2400$$

$$y = 40$$

Items	Store 'P'	Store 'Q'
A	840	1040
B	1280	1440
C	560	920
D	720	960
E	200	440
Total	3600	4800

41. (b): Total item A & D sold by P = $840 + 720 = 1560$

$$\text{Required percentage} = \frac{1560 - 1440}{1560} \times 100 = 7 \frac{9}{13} \%$$

- 42. (d):** Required average = $\frac{720+960}{2} = 840$
- 43. (e):** Total number of item B, item C & item E sold by store P = $(1280 + 560 + 200) = 2040$
Total number of item A & item D sold by store Q = $(1040 + 960) = 2000$
Required difference = $2040 - 2000 = 40$
- 44. (d):** Required percentage = $\frac{440-200}{200} \times 100 = 120\%$
- 45. (c):** Required ratio = $\frac{(1280+720)}{(1040+960)} = 1 : 1$
- 46. (a):** Books printed by publisher B in year 2015 and 2016 = $7500 \times \frac{60}{100} + 9000 \times \frac{55}{100} = 4500 + 4950 = 9450$
Total books printed by publisher A in year 2013 = $6000 \times \frac{60}{100} = 3600$
Required percentage = $\frac{9450-3600}{3600} \times 100 = 162.5\%$
- 47. (d):** Books printed by publisher A in year 2013, 2015 and 2016
 $= 6000 \times \frac{60}{100} + 7500 \times \frac{40}{100} + 9000 \times \frac{45}{100} = 3600 + 3000 + 4050 = 10650$
Required average = $\frac{10650}{3} = 3550$
- 48. (c):** Total books printed by A in the year 2018 = $8000 \times \frac{1}{2} = 4000$
Books printed by B in the year 2018 = $4000 \times \frac{3}{5} = 2400$
Books printed by A in the year 2015 = $7500 \times \frac{40}{100} = 3000$
Required difference = $3000 - 2400 = 600$
- 49. (e):** Cost of one book printed in 2016 by publisher A = $350 \times \frac{4}{5} = 280$ Rs.
Total cost price of all the books which is sold by publisher A in 2016 = $9000 \times \frac{45}{100} \times 280 = 11,34,000$ Rs.
- 50. (d):** Total books printed by publisher A in 2014 and 2017 = $8000 \times \frac{25}{100} + 5000 \times \frac{35}{100} = 2000 + 1750 = 3750$
Total books printed by publisher B in the year 2016 = $9000 \times \frac{55}{100} = 4950$
Required ratio = $\frac{3750}{4950} = 25 : 33$

Solutions (51 – 55):

Total voters in Vasantpur = $2800 \times \frac{27}{70} = 1080$

- Total voters in Govindpur = $2800 \times \frac{18}{70} = 720$
- Total voters in Vilaspur = $2800 \times \frac{25}{70} = 1000$
- Let total male voters in Vasantpur and Govindpur be $10x$ and $7x$ respectively
And total female voters in Govindpur = $5y$
Total female voters in Vasantpur = $8y$
- ATQ –
 $10x + 8y = 1080$ ----- (i)
also, $7x + 5y = 720$ ----- (ii)
From (i) and (ii) we get -----
 $x = 60, y = 60$
Total male voters in Vilaspur = $7 \times 60 \times \left(100 + \frac{300}{7}\right) \times \frac{1}{100} = 600$

	Vasantpur	Govindpur	Vilaspur
Male voters	600	420	600
Female voters	480	300	400

- 51. (a):** Required percentage = $\frac{600-400}{400} \times 100 = 50\%$
- 52. (b):** Required average = $\frac{480+400}{2} = 440$
- 53. (a):** Total illiterate voters in Govindpur = $420 \times \frac{35}{100} + 300 \times \frac{40}{100} = 267$
Required percent = $\frac{400-267}{400} \times 100 = \frac{133}{400} \times 100 = 33.25\%$
- 54. (e):** Required ratio = $\frac{420}{480} = 7 : 8$
- 55. (c):** Required difference = $(600 + 420 + 600) - (480 + 300 + 400) = 440$
- 56. (c):** In return journey downstream distance will become upstream distance and vice-versa
Let speed of boat in upstream = S km/h
ATQ
 $\frac{140}{S} - \frac{60}{40} = \frac{11}{2}$
 $\frac{140}{S} = 7$
 $S = 20$ km/h
- 57. (b):** total distance covered in downstream = $140 + 60 = 200$ km
Rate of fuel consumption = $6x = 6 \times \frac{1}{72} = \frac{1}{12}$
Fuel required = $\frac{200}{12} = 16.67 \approx 17$ lit.
- 58. (d):** total distance covered in still water = $175 + 175 = 350$ km

Total distance covered in upstream = $140 + 60 = 200\text{km}$

Required percentage = $\frac{350-200}{200} \times 100 = 75\%$

59. (b): rate of fuel consumption in upstream

$$= 9x = 9 \times \frac{1}{72} = \frac{1}{8}$$

8 km in 1 lit

60. (b): distance covered in still water in return journey = 175 km

$$\text{Required sum} = 175 \times 8 \times \frac{1}{72} \times 81 = \text{Rs. } 1575$$

Mains Solutions

1. (b): Let approved male applications and approved female applications be $11x$ and $7x$ respectively

Given, $11x - 7x = 4x = 200$

So, $x = 50$

And, $18x = 900$.

So, $P = 900 \times \frac{100}{60} = 1500$

Required percentage = $\frac{1500-800}{800} \times 100 = 87.5\%$

2. (a): Let approved male applications and approved female applications be $43x$ and $17x$ respectively

Given, $43x - 17x = 234$

$x = 9$

$60x = 540$

$S = 540 \times \frac{100}{45} = 1200$

Required sum = $1200 + 1400 + 1600 = 4200$

3. (c): Let approved male applications and approved female applications be $11x$ and $7x$ respectively

Given, $11x - 7x = 4x = 100$

So, $x = 25$

And, $18x = 450$.

So, $P = 450 \times \frac{100}{60} = 750$

Cancel application in medical department

$$= 1600 \times \frac{35}{100} = 560$$

Required difference = $750 - 560 = 190$

4. (d): Total approved application in vocational department = $800 \times \frac{40}{100} = 320$

Given, approved male applications is 40 more than approved female application

Let approved female application be 'x'

So, approved male application = $x + 40$

$$x + x + 40 = 320$$

$$x = 140$$

And $(x + 40) = 180$

Required ratio = $140 : 180 = 7 : 9$

5. (e): Required ratio = $1600 \times \frac{35}{100} : 800 \times \frac{60}{100}$
 $= 560 : 480 = 7 : 6$

6. (a): Let approved male applications and approved female applications be $29x$ and $21x$ respectively

$$29x - 21x = 112$$

$$x = 14$$

$$50x = 700$$

$$Q = 1400 - 700 = 700$$

Required sum = $700 + 1600 = 2300$

Solutions (7 - 11):

Years	CAT		MAT		SAT	
	Filled	Attempted	Filled	Attempted	Filled	Attempted
2018	2000	Y (let)	1600	1200	A (let)	800
2019	2400	2200	Z (let)	1000	1400	B (let)
2020	X (let)	2400	2000	1800	1800	1600

7. (d): $Y + 1200 + 800 = 3600$

$Y = 1600$

$$Z = \frac{75}{100} \times 1600 = 1200$$

Required percentage = $\frac{1200+1000+1800}{1600+1200+2000} \times 100$

$$= 83\frac{1}{3}\%$$

8. (c): $\frac{A}{E} = \frac{7}{3}$

Let X & B be $7x$ & $3x$ respectively.

ATQ,

$$B = A = 3x$$

$$A + 1400 + 1800 = 4400$$

$$A = 1200 = B$$

Now,

$$3x = 1200$$

So, $x = 400$
 And, $X = 2800$
 Required answer = $(2800 - 2400) + (2000 - 1800) + (1800 - 1600) = 800$

9. (e): $2000 + 2400 + X = 8000$

$$X = 3600$$

Now, $\frac{2400}{3600} \times 100 = \frac{1000}{Z} \times 100$
 $Z = 1500$

Percentage of applicants who attempted MAT

In 2018 = $\frac{1200}{1600} \times 100 = 75\%$
 In 2019 = $\frac{1000}{1500} \times 100 = 66\frac{2}{3}\%$
 In 2020 = $\frac{1800}{2000} \times 100 = 90\%$

10. (b): $400 > Z - 1000 > 200$

$$1200 < C < 1400$$

And, $Z = B$
 Required ratio = E : 1600 (ratio should be less than 1)
 Or, $0.75 < \text{required ratio} < 0.875$
 Only (b) satisfies

11. (d): to find $X = ?$

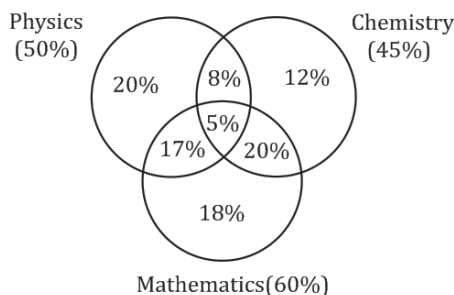
From I, $Y = Z$
 From II, $4400 + X - Y - 4600 = 3600 + Z - 4000$
 $X = Y + Z - 200$
 From I & II, $X = 2Y - 200$
 Clearly, A can't be determined even using both statements

Solutions (12-16):

Students who majored in both Physics and Chemistry only
 = $(45 - 12 - 20 - 5)\%$
 = 8%

Students who majored in both Physics and Mathematics only
 = $(45 - 20 - 8)\%$
 = 17%

Students who majored in Mathematics only
 = $(100 - 20 - 8 - 12 - 17 - 5 - 20)\%$
 = 18%



(Venn Diagram showing % of students in various Subjects)
 Total Students = 6000

12. (c): Students who have majored in only one subject
 = $(20 + 12 + 18)\%$ of 6000
 = 50% of 6000
 = 3000

13. (c): Students who have majored in Mathematics = $(17 + 5 + 20 + 18)\%$ of 6000
 = 60% of 6000
 = 3600

14. (b): Students who have majored in only 2 subjects = $(17 + 8 + 20)\%$ of 6000
 = 45% of 6000
 = 2700

15. (e): Students who have majored in both Mathematics & Physics only = 17% of 6000 = 1020
 Students who have majored in Physics
 = $(20 + 8 + 5 + 17)\%$ of 6000
 = 50% of 6000
 = 3000
 required percentage = $\frac{1020}{3000} \times 100 = 34\%$

16. (d): Required ratio = $\frac{(20+8+5+17)}{5}$
 = 10 : 1

Solutions (17 – 28):

Time taken by P to fill the tank alone = $\frac{24}{40} \times 100 = 60$ hours

Time taken by Q to fill the tank alone = $\frac{4.5}{12.5} \times 100$
 = 36 hours

Time taken by R to fill the tank alone = $\frac{18}{25} \times 100$
 = 72 hours

Time taken by S to fill the tank alone = $\frac{6}{12.5} \times 100$
 = 48 hours

Time taken by T to fill the tank alone = $\frac{9}{10} \times 100$
 = 90 hours

Let Capacity of tank = 720 units (LCM of time taken by all five pipes to fill tank alone)

Efficiency of P = $\frac{720}{60} = 12$ units/hours

Efficiency of Q = $\frac{720}{36} = 20$ units/hours

Efficiency of R = $\frac{720}{72} = 10$ units/hours

Efficiency of S = $\frac{720}{48} = 15$ units/hours

Efficiency of T = $\frac{720}{90} = 8$ units/hours

17. (e): ATQ—

$$(12 + 8) \times t + (10 + 15) \times (t + 2) = 720 \times \left(100 - \frac{50}{9}\right)$$

$$\times \frac{1}{100}$$

$$20t + 25t + 50 = 720 \times \frac{850}{9} \times \frac{1}{100}$$

$$45t = 680 - 50$$

$$t = 630$$

$$t = 14$$

Efficiency of pipe A = $(14 + 2)$ units /hours = 16 units/hours

$$\text{Pipe A can fill the tank alone} = \frac{720}{16} = 45 \text{ hours}$$

18. (b): If Q and R start filling tank alternatively

First hour by Q = 20 units

Second hours by T = 8 units

So, in two hours = 28 units

Total tank filled by pipe Q and T in 25 hr

$$= 20 \times 13 + 8 \times 12$$

$$= 260 + 96$$

$$= 356 \text{ units}$$

Remaining portion of tank = $720 - 356 = 364$ units

Remaining portion of tank filled by pipe P and R alternatively

First hour by R = 10 units

Second hour by P = 12 units

So, in two hours = 22 units

Total tank filled by pipe P and R in 32 hours

$$= \frac{32}{2} \times 22$$

$$= 352 \text{ units}$$

Remaining portion of tank = $364 - 352 = 12$ units

In 33 hours, tank filled by R = 10 = 362 units

Remaining 2 units by P = $\frac{2}{12} = \frac{1}{6}$ hours

$$\text{Total time} = \left(32 + 1 + \frac{1}{6}\right) = 33\frac{1}{6} \text{ hours}$$

19. (d): Efficiency of pipe P and pipe S $\times y$ + Efficiency of pipe Q $\times (y - 4)$ + Efficiency of pipe T $\times (y - 10)$ = 720

$$(12 + 15)y + 20(y - 4) + 8(y - 10) = 720$$

$$27y + 20y - 80 + 8y - 80 = 720$$

$$55y = 880$$

$$y = 16 \text{ hours}$$

ATQ—

Efficiency of $(P + S + Q + T) \times (y - 3) = (12 + 20 + 15 + 8) \times (16 - 3) = 715$ units

$$\text{Required portion} = \frac{5}{720} = \frac{1}{144}$$

20. (d): First 15 hours work of P and S together

$$= \left[\left(12 \times \frac{3}{4}\right) + \left(15 \times \frac{4}{3}\right)\right] \times 15$$

$$= 29 \times 15$$

$$= 435 \text{ units}$$

Remaining unfilled tank = $720 - 435 = 285$ units

Efficiency of pipe B = $\frac{285}{57} = 5$ units/hours

Pipe B alone can complete whole work in = $\frac{720}{5}$

$$= 144 \text{ hours}$$

21. (b): ATQ—

In First hour, tank filled by P & T together = $(12 + 8) = 20$ units

In Second hour, tank filled by Q & R together = $(20 + 10) = 30$ units

In Third hour, tank filled by S = 15 units

Total tank filled in three hours = $(20 + 30 + 15) = 65$ units

In total 33 hours tank filled = $\frac{33}{3} \times 65 = 715$ units

Remaining tank filled by P & T together = $\frac{720 - 715}{20}$

$$= \frac{1}{4} \text{ hours}$$

$$\text{Total time} = 33\frac{1}{4} \text{ hours}$$

22. (e): Total weight of all employees of Organization D

$$= 60 \times 60 = 3600 \text{ kg}$$

Total weight of top 20% and bottom 20% employees.

$$= (86 + 19) \times \frac{20 \times 60}{100} = 105 \times 12 = 1260 \text{ kg}$$

Total weight of other employees = $3600 - 1260 = 2340$ kg

Maximum possible weight of the employee who is at 48th position will be obtained only when the remaining of the employees will have equal weight.

$$\text{Required possible weight} = \frac{2340}{36} = 65.$$

23. (c): Average weight of 40% of employees for each organization

$$\text{For A} - \frac{82 + 36}{2} = 59$$

$$\text{For B} - \frac{76 + 31}{2} = 53.5$$

$$\text{For C} - \frac{68 + 24}{2} = 46$$

$$\text{For D} - \frac{86 + 19}{2} = 52.5$$

$$\text{For E} - \frac{80 + 38}{2} = 59$$

For A : Let remaining 60% of employees has average weight of x kg.

$$\Rightarrow \frac{59 \times 2 + x \times 3}{5} = 50$$

$$\Rightarrow x = 44 \text{ kg}$$

For B : Let remaining 60% of employees had average weight of y kg

$$\Rightarrow \frac{53.5 \times 2 + y \times 3}{5} = 50$$

$$\Rightarrow y = \frac{143}{3} = 47\frac{2}{3} \text{ kg}$$

For C : Let remaining 60% of the employees has average weight of z kg

$$\Rightarrow \frac{46 \times 2 + z \times 3}{5} = 50$$

$$\Rightarrow z = 52\frac{2}{3} \text{ kg}$$

For D : Let remaining 60% of the employees has average weight of p kg.

$$\Rightarrow \frac{52.5 \times 2 + p \times 3}{5} = 50 \Rightarrow p = 48\frac{1}{3} \text{ kg}$$

For E : Let remaining 60% of the employees had average weight of q kg

$$\Rightarrow \frac{59 \times 2 + q \times 3}{5} = 50$$

$$\Rightarrow q = 44 \text{ kg.}$$

So, required answer – B, C, D i.e. 3 organizations

24. (d): For every organization, highest possible average weight of remaining 60% of employees will be equal to average weight of top 20% employees.

For A :

Remaining employees (60%) has the highest possible average weight = 82 kg

$$\text{So, average weight of the organization} = \frac{82 \times 4 + 36}{5} = 72.8 \text{ kg}$$

For B : average weight of the organization = 67 kg

For C : average weight of the organization = 59.2 kg

For D : average weight of the organization = 72.6 kg

For E : average weight of the organization = 71.6 kg

25. (a): For every organization, least possible average weight will be calculated when average weight of remaining 60% of employees is equal to average weight of bottom 20% of the employees.

The least possible average weight of A

$$= \frac{82 + 4 \times 36}{5} = 45.2 \text{ kg}$$

For B : least possible average weight = 40 kg

For C : least possible average weight = 32.8 kg

For D : least possible average weight = 32.4 kg

For E : least possible average weight = 46.4 kg

26. (c): To complete all the tasks in the minimum possible time, each of these tasks should be assigned to those who can do it in minimum possible time.

W_3	W_1	W_2	W_4
↓	↓	↓	↓
D	B	A	C
5h	3h	7h	2h

required time = 17 hrs.

27. (b): Minimum time will be obtained if

$$B \rightarrow W_1 + W_3 \rightarrow 3 + 5 \rightarrow 8 \text{ h}$$

$$C \rightarrow W_4 \rightarrow 2 \text{ h}$$

$$D \rightarrow W_2 \rightarrow 6 \text{ h}$$

So, required time will be 8 h

28. (e): There will be minimum time when

$$B \rightarrow W_1 + W_3 \rightarrow 3 + 5 \rightarrow 8 \text{ h}$$

$$C \rightarrow W_2 + W_4 \rightarrow 7 + 2 \rightarrow 9 \text{ h}$$

So, 9 h will be the required minimum time when all the tasks will be completed.

Solutions (29 -33):

Let x = sum of students who have passed in only one section.

y = sum of students who have passed only in two sections together.

z = all the students who have passed in all the three sections together.

We have,

$$x + y + z = 150 \quad \dots (i)$$

and

	x	y	z
Maximum	≤ 150	≤ 150	≤ 60
Minimum	≥ 0	≥ 0	≥ 0

$$x + 2y + 3z = 240 \quad \dots (ii)$$

When we subtract (i) from (ii)

$$y + 2z = 90 \quad \dots (iv)$$

When we subtract (ii) from $2 \times (i)$

$$x - z = 60 \quad \dots (v)$$

When we subtract (ii) from $3 \times (i)$

$$2x + y = 210 \quad \dots (vi)$$

From (iv)

$$y + 2z = 90$$

	x	y	z
Maximum		90	45
Minimum		0	0
Maximum			
Minimum	60		0
Maximum	105		
Minimum		0	

if y = 0 then z = 45

if z = 0 then y = 90

From (v)

$$x - z = 60$$

if z = 0 then x = 60 (minimum)

From (vi)

$$2x + y = 210.$$

if y = 0 then x = 105

if x = 60 then y = 90

29. (b): With 120% efficiency pipe M alone will fill the tank

in

$$= \frac{60}{6} \times 5 = 50 \text{ min.}$$

Part of tank filled in 7 minutes working alternatively

$$= \frac{4}{50} + \frac{3}{90}$$

$$= \frac{4}{50} + \frac{1}{30} = \frac{12+5}{150} = \frac{17}{150}$$

Part of tank filled in 1 min on Tuesday

$$= \frac{1}{45} + \frac{1}{30} + \frac{1}{90}$$

$$= \frac{2+3+1}{90}$$

$$= \frac{1}{15}$$

So, remaining part of tank will be filled in

$$= 15 \times \left(1 - \frac{17}{150}\right)$$

$$= 15 \times \frac{133}{150}$$

$$= \frac{133}{10} \text{ min}$$

$$= 13 \text{ min } 18 \text{ sec}$$

Required time = (3 + 13) min 18 sec
= 16 min 18 sec

30. (e): Time taken to fill tank on Wednesday

$$= \frac{30 \times 60}{90}$$

$$= 20 \text{ min}$$

Part of tank filled in 3 min on Thursday

$$= \frac{1}{45} + \frac{1}{30} + \frac{1}{90}$$

$$= \frac{2+3+1}{90}$$

$$= \frac{1}{15} \text{ min}$$

Total time to fill tank on Wednesday = 15 × 3 = 45 min.

Required difference = 45 - 20 = 25 min.

31. (c): Total time taken on Friday to fill the tank

$$= \frac{60 \times 75}{135}$$

$$= \frac{100}{3} \text{ min.}$$

Total capacity of tank = $\frac{100}{3} \times 36 = 1200 \text{ litre}$

Ratio of efficiency of pipe M and Q = 5 : 4

Amount of water filled on Friday by Q

$$= \frac{4}{9} \times 1200 = \frac{4800}{9} \text{ Litre}$$

Ratio of efficiency of pipe M to P = 3 : 2

Amount of water filled on Monday by pipe P

$$= \frac{2}{5} \times 1200 = 480 \text{ litre}$$

Required percentage

$$= \frac{480}{\frac{4800}{9}} \times 100$$

$$= 90\%$$

32. (b): Time taken to fill the tank by M alone with increased efficiency = 50 min.

Time taken to fill the tank by Q alone with decreased efficiency = 100 min.

Now, Together they can fill the tank in

$$= \frac{100 \times 50}{150}$$

$$= \frac{100}{3} \text{ min.}$$

Capacity of tank = $\frac{162}{12} \times \frac{100}{3} = 450 \text{ litre}$

Let M and P can fill tank alone with different efficiency in x min and y min respectively

$$\text{So, } \frac{8}{x} + \frac{8}{y} = \frac{7}{30} \dots (i)$$

$$\text{and } \frac{8}{x} + \frac{15}{y} = \frac{7}{20} \dots (ii)$$

Solving (i) and (ii)

$$\frac{7}{y} = \frac{7}{20} - \frac{7}{30}$$

$$\frac{7}{y} = \frac{21-14}{60}$$

$$y = 60 \text{ min}$$

So, x = 80 min.

Required ratio = 4 : 3

33. (a): Rate of flow of pipe N = 18 ℓ/min.

Capacity of tank = 18 × 45 = 810 litre

Rate of flow of pipe O

$$= \frac{810}{30} = 27 \text{ ℓ/min.}$$

Rate of flow of pipe P

$$= \frac{810}{90} = 9 \text{ ℓ/min.}$$

Part of tank filled in one min

$$= \frac{1}{45} + \frac{1}{30} + \frac{1}{90} = \frac{1}{15}$$

Time taken to fill tank by all = 15 min

Total cost incurred in filling tank

$$= 15 \times 18 \times 12 + 15 \times 27 \times 15 + 15 \times 9 \times 10$$

$$= 15 (216 + 405 + 90)$$

$$= 10665 \text{ Rs.}$$

Solution (34-35)

Volume of hollow spherical toy = 33,957 cm³

Let Outer radius of hollow spherical toy = R

Inner radius of hollow spherical toy = $\frac{R}{2}$

ATQ,

$$\frac{4}{3} \pi \left(R^3 - \left(\frac{R}{2} \right)^3 \right) = 33,957$$

$$\Rightarrow R^3 = 9261$$

$$\Rightarrow R = 21$$

Outer radius of hollow spherical toy = 21 cm

Inner radius of hollow spherical toy = 10.5 cm

Volume of conical toy = $\frac{33957}{5.25} = 6468 = \pi(\text{radius of cone})^2 \times \frac{14}{3}$

⇒ Radius of cone = 21 cm

Volume of solid cylindrical toy = $\frac{6468}{3} = 2156 = \pi(\text{radius of cylinder})^2(\text{height of cylinder})$

⇒ Radius of Cylinder = 7 cm

Radius of Solid Spherical toy = $\frac{21}{2} = 10.5 \text{ cm}$

Outer Radius of hollow cylindrical toy = 10.5 cm

Inner radius of hollow cylindrical toy = 7 × 2 - 10.5 = 3.5 cm

Toy	Radius	Height	Volume
Conical	21 cm	14 cm	6468
Solid Cylindrical	7 cm	14 cm	2156
Solid Spherical	10.5 cm		
Hollow Cylindrical	Inner = 3.5 cm, Outer = 10.5 cm	14 cm	
Hollow Spherical	Inner = 10.5 cm, Outer = 21 cm		

Let total number of toys = 100x

ATQ,

Number of solid spherical toys = 20x

Number of hollow cylindrical toys = 40x

ATQ,

$$40x - 20x = 20$$

$$\Rightarrow x = 1$$

Let Number of conical toys = $2y$

Number of hollow spherical toys = $5y$

Number of solid cylindrical toys = $3y$

ATQ,

$$2y + 5y + 3y = 100 - 40 - 20 = 40$$

$$\Rightarrow y = 4$$

Toy	Number of toys
Conical	8
Solid Cylindrical	12
Solid Spherical	20
Hollow Cylindrical	40
Hollow Spherical	20

34. (a): Space taken by one solid spherical toy = Volume of one solid spherical toy

$$= \frac{4}{3} \pi (10.5)^3 = 4851 \text{cm}^3$$

Total space taken by solid spherical toys

$$= 20 \times 4851 = 97020 \text{cm}^3$$

35. (e): Number of conical toys Neeraj have = 8

36. (b): Curved surface area of one hollow cylindrical toy

$$= 2\pi \times (3.5 + 10.5) \times 14 = 1232 \text{cm}^2$$

37. (c): Required Ratio = $\frac{21}{7} = \frac{3}{1}$

38. (d): Volume of one hollow cylindrical toy

$$= \pi \times 14 \times (10.5^2 - 3.5^2) = 4312$$

$$\text{Required difference} = 4312 - 2156 = 2156 \text{cm}^3$$

Previous Year Question

1. (b): Total unsold order of ice cream by shop E

$$= 400 \times \frac{15}{100} \times \frac{10}{100} = 6$$

Total unsold order of ice cream by shop D

$$= 400 \times \frac{20}{100} \times \frac{5}{100} = 4$$

$$\text{Required percentage} = \frac{6+4}{4} \times 100 = 50\%$$

2. (d): Total orders purchased by B = $400 \times \frac{20}{100} = 80$

$$\text{Total order sold by B} = 400 \times \frac{20}{100} \times \frac{75}{100} = 60$$

Total order of chocolate ice cream purchased by B

$$= 60 \times \frac{25}{100} \times \frac{3}{1} = 45$$

Total order of vanilla ice cream purchased by B =

$$60 \times \frac{15}{100} \times \frac{100}{75} = 12$$

So, total orders of strawberry purchased by B = $80 - (45 + 12) = 23$

3. (d): Total cost for shop D

$$= 400 \times \frac{20}{100} \times 200 = 16000 \text{ Rs.}$$

Total sold by shop D = 95 % of 20% of 400 = 76

Total selling price = $175 * (25\% \text{ of } 76) + 250$

$$*(75\% \text{ of } 76) = 175 * 19 + 250 * 57$$

$$= 3325 + 14250 = 17575$$

$$\text{Profit \%} = \frac{(17575 - 16000)}{16000} \times 100 \approx 10\%$$

4. (a): Unsold orders of ice cream for A

$$= 400 \times \frac{10}{100} \times \frac{40}{100} = 16$$

Unsold orders of ice cream for B

$$= 400 \times \frac{20}{100} \times \frac{25}{100} = 20$$

Unsold orders of ice cream for E

$$= 400 \times \frac{15}{100} \times \frac{10}{100} = 6$$

$$\text{Required average} = \frac{16+20+6}{3} = 14$$

5. (a): Total orders of ice cream purchased by shop

$$X = 400 \times \frac{20}{100} \times \frac{125}{100} = 100$$

Total unsold orders of ice cream by shop X

$$= 400 \times \frac{35}{100} \times \frac{20}{100} - 400 \times \frac{20}{100} \times \frac{5}{100} = 24$$

So, total sold orders of ice cream by shop X

$$= 100 - 24 = 76$$

6. (e): Required central angle = $\frac{35}{100} \times 360^\circ = 126^\circ$

7. (b): Total vacant seats in bus E = $15 \times \frac{40}{100} \times \frac{100}{40} = 15$

So, total vacant seats in bus A, B, C & D = $40 - 15$

$$= 25$$

Total number of vacant seats in D = $40 - (15 + 20$

$$\times \frac{40}{100} + 24 \times \frac{25}{100} + 15 \times \frac{40}{100}) = 5$$

8. (b): Total vacant seats in bus B = $24 \times \frac{25}{100} = 6$

Total booked seats in bus A = $20 \times \frac{60}{100} = 12$

$$\text{Required ratio} = 6 : 12 = 1 : 2$$

9. (d): Vacant seats in bus A = $20 \times \frac{40}{100} = 8$

Vacant seats in bus C = $15 \times \frac{40}{100} = 6$

$$\text{Required percentage} = \frac{8+6}{8} \times 100 = 25\%$$

10. (c): Total seats available in bus E = $24 \times \frac{75}{100} \times \frac{25}{18} \times \frac{8}{5}$

$$= 40$$

So, total seats available in bus D = $65 - 40 = 25$

$$\text{Required percentage} = \frac{20 \times \frac{40}{100} + 15 \times \frac{40}{100} + 25 \times \frac{20}{100}}{(20+15+25)} \times 100$$

$$= \frac{8+6+5}{60} \times 100 = 31 \frac{2}{3}\%$$

- 11. (b):** Let total seats in bus D = x
 So, total seats in bus E = (65 - x)
 ATQ -
 $(65 - x) \times \frac{3}{8} - x \times \frac{20}{100} = 10$
 $975 - 15x - 8x = 400$
 $23x = 575$
 $x = 25$
 So, required ratio = $25 \times \frac{80}{100} : (65 - 25) \times \frac{5}{8}$
 $= 20 : 25 = 4 : 5$
- 12. (a):** Required average = $\frac{20 \times \frac{60}{100} + 24 \times \frac{75}{100} + 15 \times \frac{60}{100}}{3}$
 $= \frac{12+18+9}{3} = 13$
- 13. (d):** Required average = $\frac{450+420+450}{3} = 440$
- 14. (a):** Total male participated from school - B & D together = $540 + 560 = 1100$
 Total female participated from school - A & C together = $450 + 500 = 950$
 Required difference = $1100 - 950 = 150$
- 15. (d):** Total male participated from school - B & C together = $540 + 720 = 1260$
 Total female participated from school - A & D together = $450 + 450 = 900$
 Required % = $\frac{1260-900}{900} \times 100 = 40\%$
- 16. (b):** Total students participated from school F = $\frac{140}{100} \times 650 + 420 \times \frac{32}{21}$
 $= 910 + 640 = 1550$
- 17. (b):** Total number of male students participated from all the five schools
 $= (650 + 540 + 720 + 560 + 680) = 3150$
- 18. (b):** Required sum = $(64 - 30) + (72 - 32) + (76 - 48)$
 $= 34 + 40 + 28 = 102$
- 19. (a):** Total people visited in park F
 $= (76 + 68) + 18 = 162$
 So, number of boys visited in park F
 $= 162 \times \frac{5}{9} = 90$
- 20. (c):** Required percentage
 $= \frac{30}{64} \times 100 = 46.875 \approx 47\%$
- 21. (b):** Required revenue = $24 \times 54 = 1296$ Rs.
- 22. (d):** Required percentage = $\frac{72-54}{54} \times 100$
 $= \frac{18}{54} \times 100 = 33\frac{1}{3}\% \approx 33\%$

- 23. (b):** Total items B sold by store on Monday and Friday together
 $= \frac{240}{48} \times 32 + \frac{340}{68} \times 22$
 $= 160 + 110$
 $= 270$
 Total items C sold by store in Wednesday & Thursday together
 $= \frac{420}{35} \times 20 + \frac{360}{24} \times 20$
 $= 240 + 300$
 $= 540$
 Required percentage = $\frac{540-270}{540} \times 100$
 $= \frac{270}{540} \times 100$
 $= 50\%$
- 24. (c):** Average number of items B sold by store on Tuesday & Thursday
 $= \frac{\frac{320}{40} \times 48 + \frac{360}{24} \times 56}{2}$
 $= \frac{384+840}{2} = 612$
 Average number of items A sold by store on Thursday & Friday
 $= \frac{360+340}{2}$
 $= \frac{700}{2} = 350$
 Required difference = $612 - 350 = 262$
- 25. (a):** Total items B sold by store on Sunday
 $= \frac{360}{24} \times 56 \times \frac{125}{100}$
 $= 1050$
 Total items C sold by store on Sunday
 $= \frac{340}{68} \times 10 \times \frac{400}{100}$
 $= 200$
 Total items B & items C sold by store on Sunday = $1050 + 200 = 1250$
- 26. (c):** Total items C sold on Wednesday = $\frac{420}{35} \times 20$
 $= 240$
 Total items C sold on Monday & Tuesday together
 $= \frac{240}{48} \times 20 + \frac{320}{40} \times 12$
 $= 100 + 96$
 $= 196$
 Required percentage = $\frac{240-196}{196} \times 100$
 $= \frac{44}{196} \times 100$
 $= 22\frac{22}{49}\%$
- 27. (b):** Required ratio = $\frac{\frac{240}{48} \times 100}{\frac{360}{24} \times 100}$
 $= \frac{500}{1500}$
 $= 1 : 3$

Solutions (28 – 32): Total number of female employee who represent A and B = $420 \times 2 = 840$

Let, Number of male employee who represent A = a

And, Number of male employee who represent B = b

ATQ,

$$a + b = 1620 \dots(i)$$

$$\frac{2}{3}a + \frac{2}{5}b = 840 \dots(ii)$$

On solving (i) & (ii)

$$a = 720, b = 900$$

Number of female employees who represent A

$$= \frac{2}{3} \times 720$$

$$= 480$$

Number of female employees who represent B

$$= \frac{2}{5} \times 900$$

$$= 360$$

$$\text{Total Female employee who represent C} = 480 \times \frac{125}{100} = 600$$

$$\text{Total male employee who represent C} = 360 \times \frac{4}{3} = 480$$

Companies	Male	Female
A	720	480
B	900	360
C	480	600

28. (a): Total employee who represent A = $720 + 480 = 1200$

$$\text{Required percentage} = \frac{1200 - 900}{900} \times 100 = 33\frac{1}{3}\%$$

29. (c): Total employee who represent B & C who do not have MBA degree

$$= (900 + 480) \times \frac{80}{100} + (360 + 600) \times \frac{75}{100}$$

$$= 1104 + 720$$

$$= 1824$$

30. (c): Required ratio = $\frac{(900+480)}{(480+600)} = 23 : 18$

31. (a): Required difference = $480 - 360 = 120$

32. (a): Required average = $\frac{360+600}{2} = 480$

33. (a): Required percentage = $\frac{40-32}{40} \times 100 = 20\%$

34. (c): Required sum = $(28 + 12) + (38 + 15) = 93$

35. (a): Required average = $\frac{50+32+38}{3} = 40$

36. (b): Let total videos shared by E = x

So, total photos shared by E = $(x + 4)$

ATQ -

$$x + x + 4 = 44$$

$$2x = 40$$

$$x = 20$$

37. (a): Total photos shared by B = $28 \times \frac{5}{14} = 10$

38. (e): Required average = $\frac{1}{3} \times \left(5,500 \times \frac{20+16+12}{100}\right) = 880$

39. (c): Required angle = $\frac{16}{100} \times 360^\circ = 57.6^\circ$

40. (e): Required number of students = $5,500 \times \frac{10+18}{100} = 1,540$

41. (b): Students appeared in shift III & IV together of the

$$\text{examination} = 5,500 \times \frac{(24+12)}{100} = 1,980$$

Students appeared in shift I of the examination

$$= 5,500 \times \frac{20}{100} = 1,100$$

$$\text{Required percentage} = \frac{1980-1100}{1100} \times 100 = 80\%$$

$$\text{Or, required percentage} = \frac{(24+12)-20}{20} \times 100$$

$$= 80\%$$

42. (a): Students appeared in shift IV & VI together of the

$$\text{examination} = 5,500 \times \frac{12+18}{100} = 1,650$$

Students appeared in shift II & III together of the

$$\text{examination} = 5,500 \times \frac{16+24}{100} = 2,200$$

$$\text{Required ratio} = \frac{1650}{2200} = 3:4$$

$$\text{Or required ratio} = \frac{(12+18)}{(16+24)} = 3 : 4$$

43. (e): Students appeared in shift I & VI together of the

$$\text{examination} = 5,500 \times \frac{20+18}{100} = 2,090$$

Students appeared in shift III & V together of the

$$\text{examination} = 5,500 \times \frac{10+24}{100} = 1,870$$

$$\text{Required difference} = 2090 - 1870 = 220$$

44. (b): Required number of students = $(700 \times 3) - (720 + 900) = 480$

45. (c): Number of girls in school - A & B together in

$$2000 = 450 + 180 = 630$$

Total number of students in school - B & C

$$\text{together in 2000} = 600 + 400 = 1000$$

$$\text{Required percentage} = \frac{1000-630}{1000} \times 100 = 37\%$$

46. (a): Required number of boys = $(720 - 360) +$

$$(360 - 180) + (450 - 270)$$

$$= 360 + 180 + 180$$

$$= 720$$

47. (b): Average number of students in school - A, B & C

$$\text{in 1999} = \frac{1}{3} \times (720 + 360 + 450) = 510$$

$$\text{Required percentage} = \frac{510}{600} \times 100 = 85\%$$

48. (d): Required ratio = $\frac{600-180}{400-120}$

$$= \frac{420}{280} = 3:2$$

49. (b): Total number of girls in school – A, B & C together in 1999 = $(360 + 180 + 270) = 810$
 Total number of girls in school – A, B & C together in 2000 = $(450 + 180 + 120) = 750$
 Required difference = $810 - 750 = 60$

50. (b): Required percentage = $\frac{36-33}{36} \times 100$
 $= \frac{3}{36} \times 100 = 8\frac{1}{3}\%$

51. (a): Required average = $\frac{36+27+33}{3} = 32$

52. (e): Required ratio = $18 : 22 = 9 : 11$

53. (b): Total passenger in C and E = $27 + 33 = 60$
 Required percentage = $\frac{60-36}{36} \times 100$
 $= \frac{24}{36} \times 100 = 66\frac{2}{3}\%$

54. (c): Required number of passengers = $18 + 27 + 22 = 67$

55. (d): Required difference = $(80 + 100) - (70 + 90) = 20$

56. (a): Total orders (all three items) received by R = $(80 + 100 + 30) = 210$
 Total orders (all three items) received by Q = $(40 + 70 + 90) = 200$
 Required percentage = $\frac{210-200}{200} \times 100 = 5\%$

57. (e): Total orders of item A & B received by P = $80 + 60 = 140$

Total orders of item B & C received by Q
 $= 70 + 90 = 160$
 Required ratio = $140 : 160 = 7 : 8$

58. (b): Average number of orders of item B received by Q & R = $\frac{70+100}{2} = 85$

Required percentage = $\frac{85}{80} \times 100 = 106\frac{1}{4}\%$

59. (c): Required sum = $80 + 60 + 50 = 190$

60. (d): Total toys sold on Monday = $128 + 120 = 248$
 Total toys sold on Wednesday = $130 + 125 = 255$
 Required difference = $255 - 248 = 7$

61. (d): Total Plastic toys sold on Tuesday and Friday
 $= 134 + 140 = 274$
 Total Wooden toys sold on Wednesday and Friday
 $= 130 + 130 = 260$
 Required percent = $\frac{274-260}{260} \times 100$
 $= \frac{14}{260} \times 100 = 5\frac{5}{13}\%$

62. (b): Required average = $\frac{134+125+140}{3} = \frac{399}{3} = 133$

63. (c): Total toys sold on Thursday = $146 + 124 = 270$
 total toys sold on Friday = $140 + 130 = 270$
 Required ratio = $\frac{270-270}{270} \times 100 = 0\%$

64. (e) Number of Wooden toys purchased by female on Wednesday = $\frac{7}{10} \times 130 = 91$



Data Sufficiency

In Data Sufficiency, a question, followed by some statements, is given. You are required to determine whether the data given in one or more statements is sufficient to answer the question. Then you have to answer the question based on the given options. Remember that it is enough to conclude that the data provided is sufficient to answer the given question or not. Do not waste time in trying to arrive at the final answer as it is not asked.

Steps in solving Data Sufficiency questions:

- (1) Find out whether the data given in the first statement is sufficient to answer the given question.
- (2) If the first statement is not sufficient to answer the question, move on to the second statement and determine whether the data given in the second statement is sufficient to answer the question.
- (3) If you are unable to find the answer using either of the statements alone, try to find out if the two statements combined together are sufficient to answer the question.
- (4) Select an answer according to the given options.

Strategies for solving Data Sufficiency questions:

- 1 Understand and memorise the Data Sufficiency answer choices: The answer choices for Data Sufficiency questions generally do not change. Understanding and then learning them will make attempting these questions easier. Let us understand the option statements.

	Given Option	Its Meaning
(A)	Statement 1 alone is sufficient to answer the question but statement 2 alone is not sufficient to answer the question.	Out of the given statement only statement 1 alone can answer the question.
(B)	Statement 2 alone is sufficient to answer the question but statement 1 alone is not sufficient to answer the question.	Out of the given statements only statement (2) alone can answer the question.
(C)	Both the statements taken together are sufficient to answer the question, but neither of the statements alone is sufficient to answer the question.	The question can be solved only if the data given in both the statements is used together. The question cannot be solved using either of the statements alone
(D)	Either statement by itself is sufficient to answer the question.	The question can be solved by using any one of the statements alone.
(E)	Statements (1) and (2) taken together are not sufficient to answer the question, requiring more data pertaining to the problem	The question cannot be solved even if we use the data given in both the statements together.

what does it mean that a statement is “sufficient”?

‘Sufficient’ does not mean that a statement is right or true. It just means that the question can be solved using that statement.

(2) Assumptions are not allowed:

Do not use general knowledge to solve Data Sufficiency questions.

Let us understand this with an example.

Example: Is New York the most populated city in the US?

Statement 1: The capital of the US is the most populated city in the US.

Statement 2: New York is the capital.

In this case, if you choose option C i.e., “Both the statements taken together are sufficient to answer the question,” be careful, it is not given in statement 2 that New York is the capital of the US.

We can also see that statement 1 alone cannot answer the question, as it is not given that New York is the capital of the US.

However, universal facts like mathematical principles can be used, as they are not general knowledge stuff.

(3) Elimination method:

As you progress through each statement, you may eliminate options. Just solve for one of the statements and the job is half done.

if statement 1 is sufficient: Eliminate choices B, C and E which require (1) to be insufficient.

if statement 1 is insufficient: Eliminate choices A and D, which require (1) to be sufficient.

if statement 2 is sufficient: Eliminate choices A, C and E which require (2) to be insufficient.

if statement 2 is insufficient: Eliminate choices B and D, which require (2) to be sufficient.

(4) Analyze questions in terms of sufficiency:

Do not think in terms of "What is exact value?",

"is this true or false?" instead, review questions in terms of one question, "is there enough information to answer the question?"

Look at each statement and ask yourself if it provides enough information to arrive at a conclusion.

Basic knowledge of Arithmetic, Algebra, Geometry, Statistics and other topics of Mathematics is a prerequisite to understand this chapter. So, learn all the basic and necessary shortcut formulae related to above topics of Mathematics.

Solved Example

Direction (1 - 5): Each question below is followed by two Statements I and II. You have to determine whether the data given in the statements are sufficient for answering the question. You should use the data and your knowledge of Mathematics to choose between the possible answers.

Give answer

- (a) if the Statement I alone is sufficient to answer the question but the Statement II alone is not sufficient
- (b) if the Statement II alone is sufficient to answer the question but the Statement I alone is not sufficient
- (c) if both Statement I and II together are needed to answer the question
- (d) if either the Statement I alone or Statement II alone is sufficient to answer the question
- (e) if you cannot get the answer from the Statements I and II together but need even more data

1. What is the per cent profit earned by selling a car for Rs.640000?
 - I. The amount of profit earned on selling the car was Rs. 320000.
 - II. The selling price of the car was twice the cost price.

Sol. (d); We know that,

$$\text{Profit percent} = \left(\frac{\text{Profit}}{\text{CP}}\right) \times 100\% = \left(\frac{\text{SP} - \text{CP}}{\text{CP}}\right) \times 100\%$$

From statement I
 $\text{CP} = 640000 - 320000 = 320000$
 $\text{Profit \%} = \frac{320000 \times 100}{320000} = 100\%$

From statement II,

$$\text{CP} = \frac{\text{SP}}{2} = \frac{640000}{2} = 320000$$

$$\text{Profit \%} = \frac{320000}{320000} \times 100 = 100\%$$

Thus we can find the profit percent by statement I alone and statement II alone.

2. In how many days can B alone complete the work?
 - I. B and C together can complete the work in 8 days.
 - II. A and B together can complete the work in 12 days.

Sol. (e); We can't find the number of days taken by B alone to complete the work using both the statements together but need even more data.

3. What is the rate of interest percent per annum?
 - I. The amount doubles itself in 10 yr.
 - II. The simple interest accrued in 5 yr. is Rs.5000.

Sol. (e); From statement I

We cannot find R as we do not know the nature of interest, i.e. whether it is SI or CI.

From statement II,

$$\text{SI} = \frac{\text{PRT}}{100} \Rightarrow 5000 = \frac{\text{P} \times \text{R} \times 5}{100}$$

$$\therefore \text{PR} = 100000$$

Thus, we cannot find the value of R using statement I and II.

4. What is the speed of the car?
 - I. The car covers a distance of 135 km in 3 h.
 - II. The car covers a distance of 270 km in 6 h.

Sol. (d); We know that, speed of car

$$= \frac{\text{Distance covered by it}}{\text{Time taken by it}}$$

From Statement I

$$\text{Speed of car} = \frac{135}{3} = 45 \text{ km/h}$$

From Statement II

$$\text{Speed of car} = \frac{270}{6} = 45 \text{ km/h}$$

Thus, either only statement I alone or only statement II alone is sufficient to answer the question.

5. The ages of Pradumn and Gunit are in the ratio of 7 : 5. What is the age of Pradumn?

I. The ages of Pradumn and Nandini are in the ratio of 3 : 1.

II. After 7 yr, the ratio of Pradumn's and Aviral's ages will be 4 : 3.

Sol. (e); Given, $\frac{\text{Pradumn}}{\text{Nandini}} = \frac{7}{5}$

From Statement I

$$\frac{\text{Pradumn}}{\text{Nandini}} = \frac{3}{1}$$

$$\text{From statement II, } \frac{\text{Pradumn} + 7}{\text{Aviral} + 7} = \frac{4}{3}$$

From all the above three equation, we can't find the age of Pradumn.

Basic Questions

Direction (1): Each question below is followed by two Statements I and II. You have to determine whether the data given in the statements are sufficient for answering the question. You should use the data and your knowledge of Mathematics to choose between the possible answers.

- (a) if the Statement I alone is sufficient to answer the question but the Statement II alone is not sufficient
 (b) if the Statement II alone is sufficient to answer the question but the Statement I alone is not sufficient
 (c) if the Statement I and II together are needed to answer the question
 (d) if either the Statement I alone or Statement II alone is sufficient to answer the question
 (e) if you cannot get the answer from the Statement I and II together but need even more data

1. The ages of P and G are in the ratio of 7 : 5. What is the age of P?
 I. The age of P and N are in the ratio of 3 : 1
 II. After 7 yr, the ratio of ages of P and G will be 4 : 3.

Direction (2-6): Each of the following question is followed by two Statements.

Give answer

- (a) if Statement I alone is sufficient to answer the question
 (b) if Statement II alone is sufficient to answer the question
 (c) if both Statements I and II together are necessary to answer the question
 (d) if either the Statement I alone or Statement II alone is sufficient to answer the question
 (e) if both Statements I and II together are not sufficient to answer the question

2. Is b positive?
 I. $a + b$ is positive. II. $a - b$ is positive

3. In a general body election, 3 candidates p, q and r were contesting for a membership of the board. How many votes did each receive?

I. p received 17 votes more than q and 103 votes more than r.

II. Total votes cast were 1703.

4. Total marks obtained by P, Q, R and S in Mathematics is 360. How many marks did P secure in Mathematics?

I. P secured one-third marks of the total of Q, R and S.

II. Average marks obtained by Q and R are 20 more than that secured by S.

5. How many ice cubes can be accommodated in a container?

I. The length and breadth of the container is 20 cm and 15 cm, respectively.

II. The edge of the ice cube is 2 cm.

6. Sujata is the eldest daughter. What is the current age of her father?

I. Current age of Sujata is 25 yr. and current age of her sister Sangeeta is 20 yr.

II. Sangeeta's current age is one-third of father's age five years before.

Direction (7 - 20): Each question below is followed by two Statements I and II. You have to determine whether the data given in the statements are sufficient for answering the question. You should use the data and your knowledge of Mathematics to choose between the possible answers.

Give answer

- (a) if the Statement I alone is sufficient to answer the question but the Statement II alone is not sufficient.
 (b) if the Statement II alone is sufficient to answer the question but the Statement I alone is not sufficient.

- (c) if both Statement I and II together are needed to answer the question.
- (d) if either the Statement I alone or Statement II alone is sufficient to answer the question.
- (e) if you cannot get the answer from the Statements I and II together but need even more data.
7. What is Mini's present age?
- Mini is 3 yr. older than Priya.
 - The ratio between Priya's and Aishwary's age is 3 : 4, respectively.
8. How many marks did Anand get in Biology?
- Anand got 42 marks in English which were half the marks he got in Biology.
 - Anand's marks in Biology were 14% of the total marks he got in all the subjects together.
9. In how many days 14 men can complete a piece of work?
- If 18 women can complete the same piece of work in 24 days.
 - If 28 children can complete the same piece of work in 56 days.
10. How many people are computer experts in the organisation?

- Each computer expert must conduct atleast 3 programs related to computers.
- Organisation conducts 30 programs related to computers.

11. What is the product of X and Y?

- $Y = X - 28$
- $-42 - 12 = X$

12. What is the perimeter of the square?

- The measure of one of its sides is given.
- The measure of its diagonal is given.

13. When one ball is drawn at random from an urn containing 25 balls, what is the chance that it is red?

- The urn contains 10 yellow and 8 green balls.
- The urn contains all coloured balls.

14. What is the perimeter of the rectangle?

- The area of the rectangle is 252 sq. m.
- The ratio of length to breadth of the rectangle is 9 : 7, respectively.

15. What is the area of the circle?

- The breadth of a rectangle is three-fourth the radius of the circle.
- The radius of the circle is equal to the side of a square of area 144 sq cm.

Prelims Questions

Level - 1

Direction (1-5): Given below in each question there are two statements (I) and (II). You must determine; which statement is enough to give the answer of question. Also, there are five alternatives given, you have to choose one alternative as your answer of the questions:

- What is area of the rectangle.
 - Length is 50% more than breadth.
 - Perimeter of square is 48 cm and breadth of rectangle is equal to side of square.
 - only statement I
 - Only statement II
 - Both I and II together
 - Either I or II alone
 - Both statements together are not sufficient
- What is age of Rahul after 2 years.
 - Average age of Arun and Neeraj is 24 years and ratio of age of Rahul to Arun is 2 : 3.

- Neeraj is 4 years elder than Satish and ratio of age of Satish to Rahul is 1 : 2
 - only statement I
 - Only statement II
 - Both I and II together
 - Both statements together are not sufficient
 - Either I or II alone
- What is the speed of boat in still water when the upstream speed of boat is equal to the speed of stream?
 - Time required to cover certain distance upstream is 24 sec.
 - Time required to cover certain distance downstream is 8 sec.
 - only statement I
 - Only statement II
 - Both I and II together
 - Both together are not sufficient
 - Either I or II alone

4. Find out the length of train X given that speed of train X is 20 m/sec.
- I. Train X crosses another train Y moving in opposite direction in 6 sec and the speed of train Y is 50% more than the speed of train X.
 - II. Length of train Y is 50% less than length of train X.
- (a) Both I and II together
 - (b) Only statement I
 - (c) Only statement II
 - (d) Both I and II together are not sufficient
 - (e) Either I or II alone
5. What is the total strength of company Adda247.
- I. Ratio of male to female employees are 1 : 2
 - II. Total females are 280 and males are 50% of female.
- (a) Both I and II together
 - (b) Only statement I
 - (c) Only statement II
 - (d) Both I and II together are not sufficient
 - (e) Either I or II alone

Directions (6-10): Each of the following question is followed by two statements I, and II. You have to study the question and the statements and decide which of the statement(s) is/are necessary to answer the question.

- (a) Only Statement I alone.
 - (b) Only Statement II alone.
 - (c) Both Statements I and II together.
 - (d) Neither Statement I nor II is sufficient.
 - (e) Either Statement I or II alone.
6. What is the time taken by Saif to cover a distance of 100 km by car?
- I. Saif covers a distance of 100 km in 5 hours using bike.
 - II. speed of bike and that of car is in ratio 5:7.
7. In how much time can Deepika do the work alone?
- I. Kareena & Deepika can complete a piece of work in 10 days working together.
 - II. Madhuri and Kareena can complete the work in 6 days working together.
8. In how many ways can 4 boys and 5 girls be selected?
- I. there are 20 persons (boys + girls) in the group out of which 12 are boys.
 - II. the ratio of boys to girls in the group is 3:2.
9. What is the volume of conical tent?
- I. the height and radius of tent is in ratio 4:3, where sum of radius and height is 14m.
 - II. the slant height is 13 cm while radius is 5 cm.

10. Find the value of a and b?

I. $a:b = 3:2$

II. $a^3 - b^3 = 19$

Directions (11-15): The following questions are accompanied by two statements (1) and (2). You have to determine which statement(s) is/are sufficient/necessary to answer the questions.

11. Find the speed of the train?

Statement 1: the train can cross a platform of length 540 metres in 90 seconds.

Statement 2: the train can cross a man running in the direction of the train with the speed of 6 km/hr in 43.2 seconds.

- (a) Statement (1) alone is sufficient to answer the question but statement (2) alone is not sufficient to answer the question.
- (b) Statement (2) alone is sufficient to answer the question but statement (1) alone is not sufficient to answer the question.
- (c) Both the statements taken together are necessary to answer the question, but neither of the statements alone is sufficient to answer the question.
- (d) Statements (1) and (2) taken together are not sufficient to answer the question.
- (e) Either statement (1) or statement (2) by itself is sufficient to answer the question.

12. Find 40% of the fraction?

Statement 1: Numerator of the fraction is 40 % less than its denominator.

Statement 2: Difference between denominator and numerator of the fraction is 4 and denominator of fraction is greater than its denominator.

- (a) Statement (1) alone is sufficient to answer the question but statement (2) alone is not sufficient to answer the question.
- (b) Statement (2) alone is sufficient to answer the question but statement (1) alone is not sufficient to answer the question.
- (c) Both the statements taken together are necessary to answer the question, but neither of the statements alone is sufficient to answer the question.
- (d) Statements (1) and (2) taken together are not sufficient to answer the question.
- (e) Either statement (1) or statement (2) by itself is sufficient to answer the question.

13. What is the perimeter of a semi-circle?

Statement 1: The radius of the semicircle is equal to the half the side of a square

Statement 2: the area of the square is 3136 sq cm

- (a) Statement (1) alone is sufficient to answer the question but statement (2) alone is not sufficient to answer the question.
- (b) Statement (2) alone is sufficient to answer the question but statement (1) alone is not sufficient to answer the question.
- (c) Both the statements taken together are necessary to answer the question, but neither of the statements alone is sufficient to answer the question.
- (d) Statements (1) and (2) taken together are not sufficient to answer the question.
- (e) Either statement (1) or statement (2) by itself is sufficient to answer the question.

14. p men can complete a piece of work in 60 days. Find the value of p

Statement 1: 30 men can complete the same work in 80 days.

Statement 2: $(p+8)$ men can complete the work in 10 days less than the number of days required by p men

- (a) Statement (1) alone is sufficient to answer the question but statement (2) alone is not sufficient to answer the question.
- (b) Statement (2) alone is sufficient to answer the question but statement (1) alone is not sufficient to answer the question.
- (c) Both the statements taken together are necessary to answer the question, but neither of the statements alone is sufficient to answer the question.
- (d) Statements (1) and (2) taken together are not sufficient to answer the question.
- (e) Either statement (1) or statement (2) by itself is sufficient to answer the question.

15. Find respective ratio of time taken by the boat to travel 96 km upstream and 90 km in still water?

Statement 1: Speed of the boat in still water is 12 km/hr more than the speed of the stream.

Statement 2: The boat can go 90 km downstream and 60 km upstream in 10 hr.

- (a) Statement (1) alone is sufficient to answer the question but statement (2) alone is not sufficient to answer the question.
- (b) Statement (2) alone is sufficient to answer the question but statement (1) alone is not sufficient to answer the question.

- (c) Both the statements taken together are necessary to answer the question, but neither of the statements alone is sufficient to answer the question.
- (d) Statements (1) and (2) taken together are not sufficient to answer the question.
- (e) Either statement (1) or statement (2) by itself is sufficient to answer the question.

Directions (16-20): Each of the questions below consists of a question and two statements numbered I and II given below it. You have to decide whether the data provided in the statements are sufficient to answer the question. Read both the statements and give answer

- (a) if the data in statement I alone are sufficient to answer the question, while the data in statement II alone are not sufficient to answer the question.
- (b) if the data in statement II alone are sufficient to answer the question, while the data in statement I alone are not sufficient to answer the question.
- (c) if the data either in statement I alone or in statement II alone are sufficient to answer the question.
- (d) if the data in both statement I and II together are not sufficient to answer the question.
- (e) if the data in both statement I and II together are necessary to answer the question.

16. What is the speed of a boat in still water ?

- I. The boat covers a distance of 160 km in 8 hours while running upstream.
- II. It covers the same distance in 4 hours while running downstream.

17. How many boys are there in the class ?

- I. The number of girls is 25% of the number of boys.
- II. The ratio of the number of boys to that of girls is 5 : 7.

18. What is the value of a two-digit number ?

- I. The sum of the digits of the number is 13.
- II. The digit at the tens place is 160% of the digit at the units place.

19. What is the area of a square ?

- I. The diagonal of the square is $8\sqrt{2}$ m.
- II. The perimeter of the square is 32 m.

20. What is the speed of a train ?

- I. The train crosses a pole in 16 seconds.
- II. The train crosses a platform of equal length in 54 seconds.

Directions (21-25): Each of the following question is followed by two statements I, and II. You have to study the question and the statements and decide which of the statement(s) is/are necessary to answer the question.

- (a) Only Statement I alone.
- (b) Only Statement II alone.
- (c) Both Statements I and II together.
- (d) Neither Statement I nor II is sufficient.
- (e) Either Statement I or II alone.

21. What is the speed of train (in kmph)?

Statement I: the train crosses a person walking in same direction in 10 sec.

Statement II: the train crosses a 200 m long platform in 20 sec.

22. What is the probability of drawing 2 red balls?

Statement I: there are 4 red and 5 blue balls in the bag.

Statement II: there are 20 balls in the bag out of which 5 are yellow and rest are blue & red.

23. In how many days 12 men can finish the work?

Statement I: 15 women can complete the same work in 20 days.

Statement II: A man is 20% more efficient than a woman.

24. What is the rate of interest (per annum)?

Statement I: Rs. 2000 fetch an interest of Rs. 400.

Statement II: Rs. 2000 becomes Rs. 2420 in 2 years when invested at compound interest compounding annually.

25. What is the average age of family?

Statement I: The age of Father is twice age of son who is 4 years elder to his sister whose age is half of her mother.

Statement II: The age of oldest person is 40 years and there are only 4 persons in the family.

Directions (26-30): The following questions are accompanied by two statements (I) and (II). You have to determine which statements(s) is/are sufficient/necessary to answer the questions.

- (a) Statement (I) alone is sufficient to answer the question but statement (II) alone is not sufficient to answer the question.
- (b) Statement (II) alone is sufficient to answer the question but statement (I) alone is not sufficient to answer the question.
- (c) Both the statements taken together are necessary to answer the question, but neither of the statements alone is sufficient to answer the question.
- (d) Either statement (I) or statement (II) by itself is sufficient to answer the question.
- (e) Statements (I) and (II) taken together are not sufficient to answer the question.

26. What will be the speed of boat in still water?

- I. Ratio of speed of boat in downstream to that of in upstream is 16 : 9.
- II. Boat covers 80 km in downstream in 2.5 hours.

27. What will be the area of square?

- I. Side of square is equal to breadth of rectangle, whose area and perimeter are 416 cm² and 84cm respectively and length is greater than breadth.
- II. Ratio of length to breadth of rectangle is 13 : 8.

28. Find value of R.

- I. Sameer invested Rs.5000 each at R% p.a. SI and R% p.a. CI respectively for 2 years. Total compound interest received is Rs. 112.5 more than total simple interest received by him.
- II. Anurag invested Rs.X at R% p.a. at SI for 2 years and Rs.4000 at (R+5)% p.a. at SI for 3 years. Total interest received by him is Rs.4200.

29. Find profit percentage earned by shopkeeper on selling the article.

- I. Ratio of cost price of an article to mark price of an article is 4 : 7 and ratio of discount allowed on article to profit earned on article is 49 : 11.
- II. Discount allowed on article is Rs.190 more than profit earned on the article.

30. Find profit share of C at the end of the year.

- I. A, B & C invested in a partnership business in the ratio 12 : 11 : 18 for 1 year. Difference between profit share of A & C at the end of the year is Rs.7800.
- II. C, D & F invested in a partnership business in the ratio 5 : 8 : 2 and period of investment of C, D & F is 6 months, 4 months & 12 months. Profit share of F at the end of the year is Rs.18720.

Direction (31-35): The following questions are accompanied by two statements I and II. You have to determine which statements(s) is/are sufficient/necessary to answer the questions.

- (a) Statement I alone is sufficient to answer the question but statement II alone is not sufficient to answer the questions.
- (b) Statement II alone is sufficient to answer the question but statement I alone is not sufficient to answer the question.
- (c) Both the statements taken together are necessary to answer the questions, but neither of the statements alone is sufficient to answer the question.
- (d) Either statement I or statement II by itself is sufficient to answer the question.
- (e) Statements I and II taken together are not sufficient to answer the question.

31. What is perimeter of triangle?
- Side of triangle is equal to side of square whose area is 196 cm^2 .
 - Side of triangle is equal to length of rectangle whose area is 484 cm^2 .
32. What is the speed of train A running in opposite direction of train B?
- Train B crosses a man standing in 10 sec. with 54 km/hr.
 - Length of train A is twice of length of train B.
33. What is age of veer after two years?
- Average of age of Abhimanyu & Kumar is 36 years and ratio of Kumar & Patel is 1 : 2.

- Age of Patel is two years more than age of veer & average age of Patel & Abhimanyu is 48 years.
34. What is the total strength of company A?
- No. of males in company A is 240 which is 20% more than no. of females in that company.
 - Ratio of male to female in company A is 6 : 5.
35. There are some Green and some White balls in a bag. Find there are how many white balls in the bag.
- Statement I:** Total number of balls in bag is five. If selecting two balls at random then probability of being at least one ball Green is $\frac{9}{10}$.
- Statement II:** Total number of balls in bag is five. If selecting two balls at random, then probability of being both balls white is $\frac{1}{10}$.

Level - 2

Directions (1-5): Following are the questions based on two statements and answer the following based on the given statements.

- What will be respective ratio of saving of Veer & Deepak.
Statement I. Income of Veer is 4% less than that of Sameer and also expenditure of Veer is 12.5% less than that of Sameer. Deepak spend $\frac{3}{5}$ th of his income.
Statement II. Sameer save Rs. 7000 & Veer save Rs. 7400. Income of Deepak is Rs. 1000 more than that of Sameer.
 (a) Only statement I is sufficient
 (b) Only statement II is sufficient
 (c) Statement I and II both together is sufficient
 (d) Either statement I or Statement II alone is sufficient
 (e) Neither statement I nor statement II is sufficient
- What will be cost price of article, which marked 40% above.
Statement I. If article sold 25% discount profit will be Rs. 50.
Statement II. If article sold two successive discounts of $14\frac{2}{7}\%$ and 10% profit will be Rs. 80.
 (a) Only statement I is sufficient
 (b) Either statement I or Statement II alone is sufficient
 (c) Statement I and II both together is sufficient
 (d) Only statement II is sufficient
 (e) Neither statement I nor statement II is sufficient
- A bag contains total 12 balls in which there are 5 green balls and rest are blue and red balls. What is difference between blue & red balls.
Statement I. If one ball taken out from bag probability of being either red or blue is $\frac{7}{12}$.

Statement II. If two balls taken out from bag probability of being either red or blue is $\frac{1}{6}$.

- Only statement II is sufficient
 - Either statement I or Statement II alone is sufficient
 - Statement I and II both together is sufficient
 - Only statement I is sufficient
 - Neither statement I nor statement II is sufficient
4. Side of square is 3.5 cm more than radius of circle. What will be area of square?
Statement I. Difference between circumference and diameter of circle is 45 cm.
Statement II. Radius of circle is 50% more than breadth of rectangle whose length is 15 cm. Ratio of circumference of circle & perimeter of rectangle is 3 : 2.
 (a) Only statement II is sufficient
 (b) Either statement I or Statement II alone is sufficient
 (c) Statement I and II both together is sufficient
 (d) Only statement I is sufficient
 (e) Neither statement I nor statement II is sufficient
5. What will be length of train A?
Statement I. Relative speed of train A & B is 10 meters/sec when both running in same direction and length of train B is 240 (Speed of train B is more than speed of train A).
Statement II. Train B cross a pole in 8 sec and cross train A in 12 sec running in opposite direction.
 (a) Only statement II is sufficient
 (b) Either statement I or Statement II alone is sufficient
 (c) Neither statement I nor statement II is sufficient
 (d) Only statement I is sufficient
 (e) Statement I and II both together is sufficient

Directions (6-9): The following questions are accompanied by two statements I and II. You have to determine which statement(s) is/are sufficient/necessary to answer the questions.

6. Average age of A, B, C and D is 29 years, what will be age of C.
- I.** Average age of A and D is 28 years.
II. B is 6 years older than C,
- (a) Only statement I is sufficient to give answer of the question
(b) Only statement II is Sufficient to give answer of the question
(c) Statements I & II together are sufficient to give answer of the question
(d) Either Statement I or II is sufficient to give answer of question
(e) Neither Statement I nor II is sufficient to give answer of question
7. What will be cost of painting the room
- I.** Sum of breadth and length of room is 28 meter and cost of painting per meter square is 24 Rs.
II. Difference between area of Ceiling and area of room is 448 sq meter
- (a) Only statement I is sufficient to give answer of the question
(b) Only statement II is Sufficient to give answer of the question
(c) Either statement I or II is sufficient to give answer of question
(d) Statements I & II together are sufficient to give answer of the question
(e) Neither statement I nor II is sufficient to give answer of question
8. If profit of B is Rs. 6000, then find the total profit.
- I.** C invested 60% more than B and A invested $6\frac{1}{4}\%$ less than C.
II. Ratio of time of investment of A, B and C is 4 : 6 : 5 respectively
- (a) Only statement I is sufficient to give answer of the question
(b) Only statement II is Sufficient to give answer of the question
(c) Statements I & II together are sufficient to give answer of the question
(d) Either statement I or II is sufficient to give answer of question
(e) Neither statement I nor II is sufficient to give answer of question
9. If A, B and C Complete a work together in $3\frac{9}{13}$ hours, then find time taken by C alone to complete time work?
- I.** Efficiency of B is 25% less than A and efficiency of C is two times of B.

- II.** Time taken by A & B alone to complete the work is 12 hours and 16 hours respectively.
- (a) Only statement I is sufficient to give answer of the question
(b) Only statement II is Sufficient to give answer of the question
(c) Statements I & II together are sufficient to give answer of the question
(d) Either statement I or II is sufficient to give answer of question
(e) Neither statement I nor II is sufficient to give answer of question

Directions (10-14): Each of the following question is followed by three statements I, II and III. You have to study the question and the statements and decide which of the statements is/are necessary to answer the question.

10. What is the exact value of P where $N = 2P347$?
- I.** N is a multiple of 3.
II. N is a multiple of 7.
III. N is a multiple of 9.
- (a) The data in statement I alone is sufficient.
(b) The data in statements I and II together is sufficient.
(c) The data in all the statements together is required.
(d) Any two of three statements are sufficient.
(e) either statement II or statement III alone can answer the question.
11. What is the exact value of $\frac{y^2}{x^2} + \frac{z^2}{y^2}$?
- I.** $2x = z$ **II.** $\frac{y}{x} - \frac{z}{y} = 6$ **III.** $y^2 = xz$.
- (a) Only Statement I is sufficient to answer.
(b) Statements II and III together are sufficient to answer.
(c) All statements together are required to answer.
(d) Statements I and II together are sufficient to answer.
(e) All statements together are not sufficient, more data is required.
12. How many people are there in the bus consisting male, female and transgender?
- I.** There are 20 males in the bus.
II. 30% of passengers are females.
III. The ratio of males to transgender is 5 : 2.
- (a) Statements I and II together can answer the question.
(b) Statements II and III together can answer the question.
(c) All the given three statements together are required to answer the question.
(d) Any two statements can answer.
(e) All three statements together are not sufficient to answer the question, more data is required.

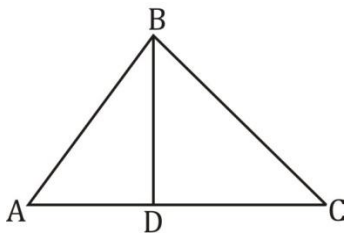
13. What is the ratio of the present age of Ajay and Akshay?
- 6 years ago, ratio of age of Ajay to Akshay is 3 : 4.
 - After 2 years, the younger one's age will be 85% of the older.
 - The sum of their ages is three less than twice the age of older.
- Only statements II and III together are sufficient.
 - Any two of them is sufficient.
 - Only statements I and II together are sufficient.
 - All statements are not sufficient to answer.
 - None of the above.

14. What is the probability of drawing a red ball from a bag containing red, blue and green balls?
- There are total 20 balls in the bag.
 - The ratio of red, blue and green balls is 5 : 3 : 2.
 - There are 10 red balls in the bag.
- Only Statement II is sufficient.
 - Only Statements I and II together are sufficient.
 - Only Statements II and III together are sufficient.
 - Any two of the three statements together.
 - All statements are required to answer.

Directions (15-19): The following questions are accompanied by two statements (I) and (II). You have to determine which statement(s) is/are sufficient/necessary to answer the questions.

15. Find the value of $9^{\frac{1}{x}} + 9^{\frac{1}{y}}$?
- The difference of inverse of x & y is $\frac{8}{3}$.
 - the multiplication of x & y is 3.
- Only I
 - Only II
 - Either I or II
 - Only I and II
 - None of the above
16. How many women are required to complete the work in 12 days.
- Efficiency of men are $\frac{2}{3}$ rd of efficiency of women.
 - 16 men can complete the same work in 10 days.
- Only I
 - Only II
 - Either I or II
 - Only I and II
 - None of the above

17. In the triangle ABC. Find $\angle ABD$?



- Given that $BC = CD$.
 - $\angle ABC - \angle BAC = 30^\circ$
- Only I
 - Only II
 - Either I or II
 - Only I and II
 - None of the above

18. What is the C.I. on a sum at the end of 3 years ?
- C.I. at the end of two years is Rs. 110.
 - Difference between CI and SI at the end of two year is Rs. 100 and rate percent is 10%.
- Only I
 - Only II
 - Either I or II
 - Only I and II
 - None of the above
19. Two trains X and Y starts from point A and B respectively towards each other. What is the distance between them when they start ?
- When both trains cross each other, time taken by train X to reach B is twice the time taken by train Y to reach A.
 - Distance between them after 60 min. is 800 km.
- Only I
 - Only II
 - Either I or II
 - Only I and II
 - None of the above

Directions (20-24): The following questions are accompanied by two statements (A) and (B). You have to determine which statement(s) is/are sufficient /necessary to answer the questions

- if the Statement 'A' alone is sufficient to answer the question but the Statement 'B' alone is not sufficient
 - if the Statement 'B' alone is sufficient to answer the question but the Statement 'A' alone is not sufficient
 - if both Statement 'A' and 'B' together are needed to answer the question
 - if either the Statement 'A' alone or Statement 'B' alone is sufficient to answer the question
 - if you cannot get the answer from both the Statements together
20. Find the value of $8y^2(y + 3x) + 8x^2(x + 3y)$
- Product of x and y is equal to 6
 - Sum of inverse of x and y is equals to $\frac{5}{6}$
21. If X, Y and Z together can complete the work in 8 days, find in how many days Y alone can complete the work?
- X and Y together can complete the work in 12 days while Z is 25% less efficient than 'X'.
 - Z is 50% more efficient than 'Y' who is 100% less efficient than 'X'.
22. What will be the speed of boat if A is the starting point and B is the destination point?
- Man go to a point B and come back to initial point A in total 12 hours while the ratio of speed of boat to speed of stream is 3 : 2.
 - Man reached at mid-point of A and B in 5 hour and then go to point B and come back to mid-point of A and B in total 6 hours while speed of stream is 10 km/hr.
23. Three numbers are co-prime to each other. Find the sum of these numbers?
- Product of first two number is 286 while the product of last two numbers is 470.
 - Sum of first two number is 35 while the sum of last two number is 57.

24. Find the sum of digits of given two-digit number?

- A. If we interchange the numbers then the new number formed is greater than the original number by 9.
- B. If we interchange the number then product of new number and original number is 1462.

Direction (25-29): Each question below is followed by two Statements [I] and [II]. You have to determine whether the data given in the statements are sufficient for answering the question. You should use the data and your knowledge of Mathematics to choose between the possible answers.

Give answer

- (a) if the Statement [I] alone is sufficient to answer the question but the Statement [II] alone is not sufficient
- (b) if the Statement [II] alone is sufficient to answer the question but the Statement [I] alone is not sufficient
- (c) if both Statement [I] and [II] together are needed to answer the question
- (d) if either the Statement [I] alone or Statement [II] alone is sufficient to answer the question
- (e) if you cannot get the answer from the Statements [I] and [II] together but need even more data

25. In how many days 8 women can complete the work?

- I. 10 men & 12 Women can finish the work in $1\frac{3}{7}$ days.
- II. 5 Men and 6 women can finish the work in $2\frac{6}{7}$ days.

26. What is the radius of the circle?

- I. Length of a rectangle is 10% more than the breadth. Area of rectangle is 440 cm^2 . Length of rectangle equals to circumference of circle.
- II. Circumference of circle is equal to side of square having area 484 cm^2

27. Ram sold an item. Find the M.P of the item?

- I. Ram gave two successive discounts is 20% & 5% on marked price. But after that take 25% more on discounted price as tax. Ram can earn 40 more if he sell the item at MP.
- II. Ram gave two successive discount of MP i.e., 15% & 20% whereas Ram kept M.P. 50% more than the C.P. of that item.

28. Find the amount invested by Jagriti?

- I. If jagriti invested half of the amount in Yes Bank at 5% for 3years and half the amount in Kotak Bank at 6% for 5 year, she got Rs 4500 as Simple Interest.
- II. Jagriti will get 2420 more if she will invest in a bank at 10% p.a. for 3 year at compound interest rather than 10% p.a. for 2 year in same bank at compound interest

29. What is the weight of Raju?

- I. There are four person Raju, Ramesh, Rajan, Rajguru. Average of weight of these four is 51.25. Average weight of Rajan and Rajguru is 47.5. Average weight of Ramesh & Rajguru is 57.5.
- II. In a class of 50 students having 30 kg as average weight If one students of weight 30 kg is replaced by Rajan then the average increases by 0.4.

Directions (30-34): The following questions are accompanied by two statements (I) and (II). You have to determine which statements(s) is/are sufficient/necessary to answer the questions.

- (a) Statement (I) alone is sufficient to answer the question but statement (II) alone is not sufficient to answer the question.
- (b) Statement (II) alone is sufficient to answer the question but statement (I) alone is not sufficient to answer the question.
- (c) Both the statements taken together are necessary to answer the question, but neither of the statements alone is sufficient to answer the question.
- (d) Either statement (I) or statement (II) by itself is sufficient to answer the question.
- (e) Statements (I) and (II) taken together are not sufficient to answer the question.

30. An article is marked 35% above its cost price, find the cost price of the article.

Statement I: Discount allowed on article is Rs.190 more than profit earned on the article.

Statement II: Ratio of selling price of the article to marked price of the article is 4 : 5.

31. Deepak is 20% less efficient than Dharam. Find efficiency of Shivam.

Statement I: Shivam and Dharam working together can complete a piece of work in $26\frac{2}{3}$ days and Deepak and Shivam working together an complete same piece of work in $28\frac{4}{7}$ days.

Statement II: Deepak is 60% less efficient than Shivam and Dharam working alone can complete a piece of work in 80 days.

32. Asif invested Rs.80000 across two schemes – A & B offering SI in the ratio 5 : 3 respectively. Find total interest earned by him.

Statement I: Rate of interest offered by scheme – B is twice of that of offered by scheme – A and period of investment in both schemes is 4 years.

Statement II: Interest received from scheme – B is Rs.6000 more than interest received from scheme – A.

33. Average of present age of Aman, Bhanu and Chaman is 34 years. Find present age of Chaman.

Statement I: Aman's present age is 100% more than Chaman's present age and ratio of Bhanu's age 6 years hence to Chaman's present age is 3: 2.

Statement II: Sum of Aman's and Bhanu's present age is 78 years.

34. Ratio of length of train – A and train – B is 4 : 5. Find speed of train – A.

Statement I: Train – A can cross a 500m long platform in 28 seconds and train – A crosses train – B while running in same direction in 54 seconds.

Statement II: Train – B can cross a pole in 15 seconds.

Directions (35-38): The following questions are accompanied by two statements (A), (B). You have to determine which statements(s) is/are sufficient/necessary to answer the questions.

- (a) Statement A alone is sufficient to answer the question but statement B alone is not sufficient to answer the questions.
- (b) Statement B alone is sufficient to answer the question but statement A alone is not sufficient to answer the question.
- (c) Both the statements taken together are necessary to answer the questions.
- (d) Either statement A or statement B by itself is sufficient to answer the question.
- (e) Statements A and B taken together are not sufficient to answer the question.

35. What is the value of a two-digit number?

- A.** The sum of its digits is 12 and the difference of the squares of its digits is 48.
- B.** On reversing the digits of the original number, new number obtained is 36 less than the original number.

36. What is the perimeter of a rectangular plot?

- A.** The area of the plot is 2400 sq.metres and diagonal length of the garden is 50 metres.
- B.** Length is 50% more than the breadth of the plot.

37. A shopkeeper sells articles at a certain profit. Find the amount of profit if the profit is 20%.

- A.** If the cost price increases by Rs 100 and selling price remains the same, the profit percentage becomes 12.5%
- B.** Marked price is Rs 500 above the cost price and average of SP and Marked price is Rs 1900.

38. The compound interest earned on a certain amount in four years is Rs 432.10. What is the rate of interest?

- A.** The simple interest on the above amount for the same period with the same rate would have been Rs 400.
- B.** Difference between the compound interest and the simple interest on the above amount with the same rate of interest after 2 years is Rs 10.

Directions (39-43): Each of the following questions below consists of a question and two statements numbered I and II given. You have to decide whether the data provided in the statements is sufficient to answer the questions.

Give answer

- (a) If the data given in statement I alone is sufficient to answer the question while the data in statement II alone is not sufficient to answer the question.
- (b) If the data given in statement II alone is sufficient to answer the question while the data in statement I alone is not sufficient to answer the question.
- (c) If the data either in statement I alone or in statement II alone is sufficient to answer the question.
- (d) If the data in neither statement I nor II is sufficient to answer the question.
- (e) If the data in both statements I and II together is necessary to answer the question.

39. Find the cost price of article by shopkeeper on selling the article at Rs. 240 ?

- I.** If the article sold at 25% more the profit earned will be Rs. 40.
- II.** Marked price of article is Rs. 400 and profit% is equal to discount% and profit% is 40%.

40. Find the volume of right circular cone ?

- I.** Height of cone is 100% more than radius of cone.
- II.** Area of base of cone is 154 cm².

41. Find the value of $2^x \times 3^y$

- I.** Sum of value of x and y is 8.
- II.** Product of value of x & y is 7.

42. Find the speed of boat in still water?

- I.** Time taken by boat to cover 64 km in downstream is half the time taken by same boat to cover same distance in still water.
- II.** Speed of stream is 5 km/hr

43. In a box three types of balls are there, Black, Red and White. If no. of white balls is given then find out the probability of getting one white ball.

- I.** Probability of getting one Red ball is given.
- II.** Probability of getting one black ball is given.

Mains Questions

Directions (1-4): To answer the following questions, which of the information given in the Statements (A), (B), (C) and (D) or (1), (2), (3) and (4) below is/are necessary/sufficient?

1. A certain salesman's yearly income is determined by a base salary plus a commission on the sales he makes during the year. Did the salesman's base salary account for more than half of the salesman's yearly income last year? (Base salary is same for both years)
 1. If the amount of the commission had been 30 percent higher, the salesman's income would have been 10 percent higher last year.
 2. The difference between the amount of the salesman's base salary and the amount of the last year commission was equal to 50 percent of the salesman's base salary last year.
 - (a) Statement 1 is sufficient.
 - (b) Statement 2 is sufficient.
 - (c) Both the statements together are sufficient.
 - (d) Both the statements together are not sufficient.
 - (e) Both the statements are sufficient individually.
2. P, Q, R and S are four consecutive even integers. What is the value of the largest integer?
 - A. The average of the four numbers is the first prime number greater than 10.
 - B. The ratio between the largest and the smallest of the numbers is 7 : 4.
 - C. The squares of the sum of the smallest and the largest numbers is equal to the squares of the sum of the remaining two numbers.
 - (a) Any of them
 - (b) Any two of them
 - (c) C and either A or B
 - (d) Either A or B
 - (e) All statements are required
3. What is the sum of two numbers?
 - A. The bigger of these two numbers is 6 more than the smaller number.
 - B. 40% of the smaller number is equal to 30% of the bigger number.
 - C. The ratio between half of the bigger number and one-third of the smaller number is 2 : 1.
 - (a) Only B and C together are required
 - (b) Only A and B together are required
 - (c) Any two of A, B and C together are required
 - (d) All A, B and C together are required
 - (e) None of these

4. How many runs did Ramesh score in his 32nd match?
 - A. For the first 30 matches his average was 36.
 - B. His average run score till is 32nd match is 38.
 - C. The average till 31st match is greater than his average for 32nd match he has played.
 - (a) A and B together are sufficient
 - (b) A and C together are sufficient
 - (c) B and C together are sufficient
 - (d) All A, B and C together are necessary
 - (e) All A, B and C even together are not sufficient

Directions (5-7): The following questions are accompanied by three statements (A) or (I), (B) or (II), and (C) or (III). You have to determine which statement(s) is/are sufficient/necessary to answer the questions.

5. To find the temperature on Monday which of the following information is sufficient?
 - A. The average temperature for Monday, Tuesday and Wednesday was 38° C.
 - B. The average temperature for Tuesday, Wednesday and Thursday was 43° C.
 - C. The temperature on Tuesday and Thursday was 45° C each.
 - (a) Only A and B are sufficient
 - (b) Only B and C are sufficient
 - (c) A and either B or C are sufficient
 - (d) C and either A or B are sufficient
 - (e) All the three together are sufficient
6. What is the cost price of an article?
 - A. After allowing a discount of 15% on marked price the shopkeeper charges Rs 1020 for it.
 - B. If he had not allowed any discount, he would have had a profit of $47\frac{1}{17}\%$.
 - C. If he had allowed only 10% discount on marked price, he would have had $32\frac{6}{17}\%$ profit.
 - (a) Any two of them
 - (b) Only A and B together
 - (c) Only B and C together
 - (d) A and either B or C
 - (e) Only A.
7. A, B and C entered into a partnership. If the profit earned in the business is proportional to the investment and the period of investment then What is the profit of B if all of them invested the amount for one year and total profit is Rs. x.
 - A. A invested Rs. 1500 less than that of C.
 - B. B invested 2 times more than that of A. C invested 3 times more than that of A.
 - C. B invested 200 percent more than that of A and 25% less than that of C.

- (a) Any two of them
- (b) Either B or C alone
- (c) Any of them
- (d) All statements are required
- (e) None of these

Directions (8-9): The following questions are accompanied by three statements A, B and C. You have to determine which statement(s) is/are necessary/sufficient to answer the question.

8. In how many days a man and a woman can complete the work while working together?
- A. The ratio of the efficiency of a man and a woman is 1 : 3.
 - B. A man and a child can do $\frac{1}{3}$ rd work in 9 days and a child and a woman can do $\frac{2}{3}$ rd work in 12 days.
 - C. A woman can do $\frac{2}{3}$ rd of the work in 14 days.
- (a) Only A and C together
 - (b) Only B and C together
 - (c) Any two the three
 - (d) Question can't be answered even after using all the statements
 - (e) All statements are required
9. What is the staff strength of Company 'X'?
- A. Male and female employees are in the ratio of 2 : 3 respectively.
 - B. Of the officer employees 80% are males.
 - C. Total number of officers is 132.
- (a) A and C only
 - (b) B and either C or A only
 - (c) All A, B and C
 - (d) Any two of the three
 - (e) Question cannot be answered even with the information in all the three statements

Directions (10-12): The following questions are accompanied by three statements A, B and C. You have to determine which statement(s) is/are necessary/sufficient to answer the question.

10. A shopkeeper sells articles at a certain profit. Find out the amount of profit.
- A. Ratio of the selling price to the cost price of the articles is 5 : 4.
 - B. If the cost price increases by Rs.500, and selling price remains the same, the profit percentage is decrease by $13\frac{8}{9}$ percentage points.
 - C. If the marked price is kept at Rs.1000 above the cost price and a discount of 15% is given, then the profit percentage is decreased by $18\frac{3}{4}$ percentage points.

- (a) Only A and B together
- (b) A and either B or C
- (c) Only A and C together
- (d) All statements are required
- (e) None of these

11. Rinku borrowed an amount of Rs.5000 each from Milan and Rahul. What is the rate of interest?
- A. Rinku returned the amount of Rs.5400 after due date to Milan.
 - B. Rinku returned Rs.5900 to Rahul after due date.
 - C. Rinku returned the money to Milan by SI, whereas to Rahul by compound interest.
- (a) Only A and B together are sufficient
 - (b) Only B and C together are sufficient
 - (c) A, B and C together are necessary
 - (d) Either A and B together or B and C together are sufficient
 - (e) A, B and C even together are not sufficient
12. What is the speed of boat in still water?
- A. The boat can cover 45 km downstream distance in 3 hours.
 - B. Speed of the stream is one-fourth the speed of boat in still water.
 - C. The boat can cover 36 km upstream distance in 4 hours.
- (a) Only (A) and (C) together
 - (b) All the three together
 - (c) Only (A) and (B) together
 - (d) Questions can't be answered even after using all the information
 - (e) Any two of the three together

Directions (13-15): The following questions are accompanied by three statements A, B and C. You have to determine which statement(s) is/are necessary/sufficient to answer the question.

13. In how many days 3 men, 2 women and 3 children can complete the work while working together?
- A. 3 men are as efficient as 4 women.
 - B. 2 women and 5 children can do $\frac{2}{3}$ rd work in 12 days.
 - C. Ratio of the efficiencies of a man and a child is 2:1.
- (a) All the three together are not sufficient
 - (b) All the three together
 - (c) Only B and C together
 - (d) Only A and B together
 - (e) Any two of the three together

- 14.** Find out the length of train A.
- A.** Train A crosses another train B moving in the opposite direction in 10 sec.
- B.** Ratio of the speeds of trains A and B is 1 : 2.
- C.** Length of train B is 25% more than that of train A.
- (a) All the three together are not sufficient
 (b) Only A and C together
 (c) All the three together
 (d) Only A and B together
 (e) Only B and C together

- 15.** Find area of a rectangle.
- A.** Length and breadth of the rectangle are in the ratio of 4 : 3.
- B.** Sum of the lengths of diagonals of the rectangle is 50 m.
- C.** Area of a square is 1225 m^2 , whose perimeter is twice the perimeter of the rectangle.
- (a) Only A and B together
 (b) Only A and C together
 (c) All the three together
 (d) Any two of the three together
 (e) Either A and B together or A and C together

Directions (16-18): The following questions are accompanied by three statements A, B and C. You have to determine which statement(s) is/are necessary/sufficient to answer the question.

- 16.** Find lateral surface area of a cylinder.
- A.** Volume of a cone with base same as that of the cylinder and height 30 cm is equal to volume of the cylinder.
- B.** Circumference of base of the cylinder is 132 cm.
- C.** Volume of the cylinder is 13860 cm^3 .
- (a) Only A and B together
 (b) Only A and C together
 (c) All the three together
 (d) Any two of the three together
 (e) Either A and B together or A and C together

- 17.** There are some red, blue and green balls in bag. What is the probability of getting a red ball if one ball is selected at random?
- A.** Ratio of number of green and blue balls in the bag is 4 : 3.
- B.** If we add 2 more red balls in the bag, the numbers of red balls will be equal to the number of green balls.
- C.** Sum of number of green and blue balls is twice the number of red balls in the bag.

- (a) C alone
 (b) Either C alone or A and B together
 (c) Any two of the three together
 (d) Only A and B together
 (e) All the three together

- 18.** What is the cost price of an article?
- A.** Selling price of 6 articles is equal to the cost price of 7 such articles.
- B.** If the shopkeeper had allowed a discount of Rs.40 on the original selling price, he would have had 10% profit.
- C.** If he had sold the article at $14\frac{2}{7}\%$ less than the original selling price, he would have had no profit or loss.
- (a) Only A and B together
 (b) All the three together are not sufficient
 (c) Either A and B together or B and C together
 (d) Only B and C together
 (e) Any two of three together

Directions (19-20): The following questions are accompanied by three statements A, B and C. You have to determine which statement(s) is/are necessary/sufficient to answer the question.

- 19.** What is the 10th term of an arithmetic progression?
- A.** Seventh term of the AP is 32 more than the third term of the AP.
- B.** The average of first five terms of the AP is 20.
- C.** The sum of third and fifth terms of the AP is 56.
- (a) Only A and B together
 (b) Only A and C together
 (c) Only B and C together
 (d) Any two of the three together
 (e) All the three together
- 20.** What is the rate of interest per annum?
- A.** Difference between compound interest and simple interest for 2 years on the same amount at same rate of interest is Rs.60.
- B.** Simple interest for five years on the same amount at the same rate is one-fourth of the principal amount.
- C.** Compound interest for three years on Rs.16000 at the same rate is Rs.2522.
- (a) Only B alone
 (b) Only C alone
 (c) Only A alone
 (d) Any one of the three alone
 (e) Either B alone or C alone

Previous Year Question

Directions (1-5): The following questions are accompanied by two statements (I) and (II). You have to determine which statements(s) is/are sufficient/necessary to answer the questions.

- (a) Statement (I) alone is sufficient to answer the question but statement (II) alone is not sufficient to answer the question.
- (b) Statement (II) alone is sufficient to answer the question but statement (I) alone is not sufficient to answer the question.
- (c) Both the statements taken together are necessary to answer the question, but neither of the statements alone is sufficient to answer the question.
- (d) Either statement (I) or statement (II) by itself is sufficient to answer the question.
- (e) Statements (I) and (II) taken together are not sufficient to answer the question.
1. Let t be total number of balls in a bag. Balls are of 3 colors - black, white and red. Find t .
 - (I) when one ball is drawn then Probability of getting a black ball is $\frac{1}{6}$, a red ball is $\frac{1}{6}$ & a white ball is $\frac{2}{3}$.
 - (II) If one white ball is lost and a ball is drawn, then probability of not getting a white ball is $\frac{8}{23}$.
 2. Shivam and Deepak invested in a partnership business in the ratio of 4 : 5. Find the profit share of Shivam.
 - (I) Shivam invested Rs.12000 and period of investment of Shivam and Deepak is 10 months and 4 months respectively.
 - (II) Ratio of period of investment of Shivam and Deepak is 5 : 2 and Deepak's profit share is Rs.12000 less than Shivam's profit share.
 3. Calculate the marked price of item?
 - (I) Shopkeeper marked the article 80% above its cost price and shopkeeper earned Rs.100 profit on the article.
 - (II) Ratio of marked price and discount allowed on the article is 3 : 1.
 4. Calculate the rate of interest.
 - (I) Pankaj earned Rs.4500 as interest, when he invested Rs.6000.
 - (II) Pankaj invested equal amount at SI and at CI. After 2 years, CI received by Pankaj is Rs.90 more than the SI received by Pankaj.
 5. Find the volume of cylinder.
 - (I) Curved surface area of cylinder is 1760 cm^2 and total surface area of cylinder is 70% more than its curved surface area.
 - (II) Volume of cylinder is twice of that of cone. Radius of cylinder and cone is equal and ratio of height of cylinder to that of cone is 2 : 3. Height of cone is 30 cm.

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Direction (6-10): Following are the questions based on two statements and answer the following based on the given statements.

6. C alone can complete the work in 15 days. In what time C and A together can complete the whole work.

Statement I. A is 25% more efficient than B and B alone can complete the work in 20 days

Statement II. Difference between the time taken by A alone and B alone to complete the work is $22\frac{1}{2}$ days and time taken by C alone to finish the work is 10% more than the time taken by A and B together to complete the work.

 - (a) Statement I alone is sufficient to answer the question while statement II alone is not sufficient to answer the question
 - (b) Statement II alone is sufficient to answer the question while statement I alone is not sufficient to answer the question
 - (c) Both statements I and II together are required to answer the question.
 - (d) Either the statement I alone or Statement II alone is sufficient to answer the question
 - (e) Question cannot be answered from any of the given statements or from both the statements.
7. Side of square is 'a' cm. Find the value of 'a' ?

Statement I. Square is inscribed in a circle C1. Radius of circle C1 is 21cm.

Statement II. Circle C2 is inscribed in the square. Radius of circle C2 is 28cm.

 - (a) Statement I alone is sufficient to answer the question while statement II alone is not sufficient to answer the question
 - (b) Statement II alone is sufficient to answer the question while statement I alone is not sufficient to answer the question
 - (c) Both statements I and II together are required to answer the question.
 - (d) Either the statement I alone or Statement II alone is sufficient to answer the question
 - (e) Question cannot be answered from any of the given statements or from both the statements.
8. A boat covers 35 km in upstream and 35km in downstream in total 4 hours. In what time it will cover 50km upstream?

Statement I. Sum of upstream and downstream speed of the boat is 36km/h

Statement II. Speed of water current is 20% of speed of boat in still water.

 - (a) Statement I alone is sufficient to answer the question while statement II alone is not sufficient to answer the question

- (b) Statement II alone is sufficient to answer the question while statement I alone is not sufficient to answer the question
- (c) Both statements I and II together are required to answer the question.
- (d) Either the statement I alone or Statement II alone is sufficient to answer the question
- (e) Question can not be answered from any of the given statements or from both the statements.
9. A train crosses a platform of twice of its length in 48seconds. Find the speed of train?
Statement I. Train crosses a man walking at a speed of 4m/s in the same direction as the direction of the train in 20 seconds
Statement II. After covering half of the platform, due to fault in the engine it covers remaining distance at a speed of which is 60% of its initial speed.
- (a) Statement I alone is sufficient to answer the question while statement II alone is not sufficient to answer the question
- (b) Statement II alone is sufficient to answer the question while statement I alone is not sufficient to answer the question
- (c) Both statements I and II together are required to answer the question.
- (d) Either the statement I alone or Statement II alone is sufficient to answer the question
- (e) Question cannot be answered from any of the given statements or from both the statements.
10. Let x be total number of balls in a bag. Balls are of three different colors i.e. black, white and red. Calculate $(x-1)$.
Statement I. Probability of getting a black ball is $\frac{1}{6}$, a red ball is $\frac{1}{6}$ & a white ball is $\frac{2}{3}$.
Statement II. If one white ball is lost, probability of not getting a white ball is $\frac{8}{23}$ and initial number of white balls in bag is less than 27.
- (a) Statement I alone is sufficient to answer the question but statement II alone is not sufficient to answer the question.
- (b) Statement II alone is sufficient to answer the question but statement I alone is not sufficient to answer the question.
- (c) Both the statements taken together are necessary to answer the questions, but neither of the statements alone is sufficient to answer the question.
- (d) Either statement I or statement II by itself is sufficient to answer the question.
- (e) Statements I and II taken together are not sufficient to answer the question.

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Direction (11): These questions are based on the information given below.

Choose (A), if the question can be answered by using statement I alone but not by using II alone.

Choose (B), if the question can be answered by using statement II alone but not by using I alone.

Choose (C), if the question can be answered by using any one of the two statements alone.

Choose (D), if the question can be answered by using both the statement together but not by either statement alone.

Choose (E), If the question can not be answered by using both of the statements.

11. Four friends P, Q, R and S got the top four ranks in a competitive examination, but P did not get the first, Q did not get the second, R did not get the third and S did not get the fourth rank. Who secured which rank?

I. Neither P nor S were among the first 2.

II. Neither Q nor R was third or fourth.

Direction (12-13): Each of these questions is followed by information in Statements I, II and III. You have to study the questions and statements and decide which of the statements is/are necessary to answer the questions.

12. What is the capacity of the cylindrical tank?

I. Radius of the base is half of its height.

II. Area of the base is 616 sq m.

III. Height of the cylinder is 28 m.

(a) I and II (b) II and III (c) I and III

(d) I, II and III (e) Any two of the three

13. What is the two-digit number?

I. Number obtained by interchanging the digit is more than the original number by 9.

II. Sum of the digits is 7.

III. Difference between the digits is 1.

(a) I and III

(b) I and II

(c) II and III

(d) II and either I or III

(e) Any two of I, II and III

Direction (14): Follow the given instructions. Each item has a question followed by two statements.

(a) if the question can be answered with the help of Statement I alone

(b) if the question can be answered with the help of Statement II alone

(c) if the question can be answered with the help of both the statements but not with the help of either statement itself

(d) if the question cannot be answered even with the help of both the statements.

(e) If the question can be answered by using either of the statements.

14. The average of three quotation for a particular item is 120. Is the highest quotation less than or equal to 139?
- The lowest quotation is 90.
 - One of the quotations is 125.

Direction (15–18): Each examples are followed by two statements I and II giving certain data. Answer each example using the following instructions.

- if the question can be answered by using Statement I alone but not by using II alone
 - if the question can be answered by using Statement II alone but not by using Statement I
 - if the question can be answered by using either Statement I or II alone
 - if the question can be answered by using both the statements together but not by either Statement I or II alone
 - if the question cannot be answered by Statements I and II even taken together
15. X, Y and Z are three consecutive odd numbers (not necessarily in this order). What is the sum of these numbers?
- The difference between Y and Z is 4.
 - One-third of X is 33.

16. If ten men take 6 h to do a piece of work, then how long will 5 boys take to do the same work?
- A boy works at $\frac{3}{4}$ the rate of a man.
 - 5 men and 5 boys take 10 h to do the work.

Direction (17–18): Each question below is followed by two Statements I and II. You have to determine whether the data given in the statements are sufficient for answering the question. You should use the data and your knowledge of Mathematics to choose between the possible answers.

Give answer

- if the Statement I alone is sufficient to answer the question but the Statement II alone is not sufficient
 - if the Statement II alone is sufficient to answer the question but the Statement I alone is not sufficient
 - if both Statement I and II together are needed to answer the question
 - if either the Statement I alone or Statement II alone is sufficient to answer the question
 - if you cannot get the answer from the Statements I and II together but need even more data
17. What is the three digit number?
- The three digit number is divisible by 9.
 - The first and third digit is 6.
18. What is the two digit number?
- The sum of the digits is 6.
 - The digit in the ten's place is double the digit in the unit's place.

Direction (19–25): Each question below is followed by two Statements I and II. You have to determine whether the data given in the statements are sufficient for answering the question. You should use the data and your knowledge of Mathematics to choose between the possible answers.

Give answer

- if the Statement I alone is sufficient to answer the question but the Statement II alone is not sufficient
 - if the Statement II alone is sufficient to answer the question but the Statement I alone is not sufficient
 - if both Statement I and II together are needed to answer the question
 - if either the Statement I alone or Statement II alone is sufficient to answer the question
 - if you cannot get the answer from the Statements I and II together but need even more data
19. What is the Jyoti's annual income?
- Jyoti's monthly income is Rs. 8500 more than Amit's monthly income.
 - Rohit's monthly income is Rs. 3.5 thousand which is half Amit's monthly income.
20. What is the rate of interest per cent per annum?
- An amount of Rs. 14350 gives a simple interest of Rs. 11480 in 4 yr.
 - An amount doubles itself in 5 yr. at simple interest.
21. What is the profit earned by selling a watch for Rs. 15675?
- The cost price of 5 such watches is equal to selling price of 4 such watches.
 - 25% profit is earned by selling each watch.
22. What is the salary of B, in a group of A, B, C and D whose average salary is Rs. 62880?
- Total of the salaries of A and C is exact multiple of 8.
 - Average of the salaries of A, C and D is Rs. 61665.
23. The profit earned by a company in 2009 was Rs. 10000. What was the profit earned in 2008?
- In 2009, the income was 30% more than in 2008.
 - The expenditure in 2009 was 10% less than in 2008.
24. What is the salary of C, in a group of A, B, C, D and E whose average salary is Rs. 48250?
- C's salary is 1.5 times B's salary.
 - Average salary of A and B is Rs. 23500.
25. What is Nikita's share in the profit of Rs. 50000 earned in the business run by her in partnership with Sharmila?
- Nikita invested an amount 150% of the amount invested by Sharmila.
 - The amount invested by Sharmila is two-third of the amount invested by Nikita.

Solutions

Basic Questions

1. **(b)**; From statement I, we can't conclude the age of P.
From II, Let age of P = $7x$
Age of G = $5x$
 $\frac{7x+7}{5x+7} = \frac{4}{3} \Rightarrow 21x + 21 = 20x + 28$
 $x = 7 \Rightarrow$ Age of P = $7 \times 7 = 49$
 \therefore Hence statement II alone is sufficient to answer the question.
2. **(e)**; From statement I, b can be either negative or positive. Also from statement II, b can be either negative or positive, hence we cannot find out the answer.
3. **(c)**; From statement I
 $p = q + 17$ and $p = r + 103$
from statement II
 $P + Q + R = 1703 \Rightarrow 3P = 1823 \Rightarrow P = 607.67$
So, value of p , q and r can be found out by combining both the statement.
Note: figure are faulty as number of votes cannot be fraction but statements yield results.
4. **(a)**; From statement I, $P = \frac{1}{3}(Q + R + S)$
and we know that, $P + Q + R + S = 360$
Hence, the marks of P can be determined.
Therefore, statement I alone is sufficient.
from statement II, we cannot say anything.
5. **(e)**; Even after combining both the statements, the volume of container cannot be determined as height of the container is not given. Hence, number of ice cubes that can be accommodated cannot be determined.
6. **(c)**; On combining both the statements we get,
Sujata's father age 5 year before = $3 \times$ (sangeeta's current age)
 $= 3 \times 20 = 60$
Sujata's father current age = $60 + 5 = 65$
Hence both the statement required to answer the question.
7. **(e)**; From statement I, Mini = Priya + 3
from statement II, Priya : Aishwarya = 3 : 4
Clearly, age of Mini cannot be found by both of the given statement together and need even more data.
8. **(a)**; From statement I
Marks in Biology = $2 \times$ Marks in English
 $= 2 \times 42 = 84$
From statement II, we can't find the marks in Biology as we don't know total marks scored by Anand in all the subjects.
Hence, only statement I alone sufficient to answer the question.
9. **(e)**; We can't find the answer as we don't know the capacity of men. In statement I and II, we are given about the capacity of women and children not about men.
10. **(e)**; From statement I, each computer expert may conduct 3 or more programs. Here, we don't know the exact number of programs conducted by each computer expert. So we can't answer the question even with the help of statement II.
11. **(c)**; We can find the value of x and y using both the statements together.
12. **(d)**; Perimeter of square can be known, if either a side or a diagonal is known. Thus, statement I alone or statement II alone is sufficient to answer the question.
13. **(e)**; We can't find the chance of getting a red ball because we don't know the number of red balls.
14. **(c)**; From statement II \Rightarrow length : breadth = 9 : 7
length = $9x$ and breadth = $7x$
From statement I $\Rightarrow 9x \times 7x = 252$
From this equation, we can find the value of x and then length and breadth and then perimeter.
15. **(b)**; From statement II
Radius of circle = $\sqrt{144} = 12$
Required area = $\pi r^2 = \frac{22}{7} \times 12 \times 12$ sq. cm.

Prelims Solutions

Level - 1

1. (c): **From I**

Let breadth (b) be x cm

$$\therefore \text{length } (\ell) = \frac{150}{100} \times x = 1.5x \text{ cm}$$

From II

Perimeter of square (4a) = 48 cm

$$\therefore \text{side of square } (a) = 12 \text{ cm}$$

$$\ell = 12 \times 1.5 = 18 \text{ cm}$$

$$\therefore \text{Area of rectangle} = \ell \times b = 18 \times 12 = 216 \text{ cm}^2$$

Can be answered from I & II both

2. (c): **From I**

Total age of Arun & Neeraj
= 48 years

From II

Let age of Satish be x years

age of Neeraj = (x + 4) years

age of Rahul = 2x years

then, age of Arun = 3x years

ATQ,

$$\frac{3x+x+4}{2} = 24 \text{ years}$$

$$x = 11 \text{ years}$$

$$\text{age of Rahul 2 years later} = 2 \times 11 + 2 = 24 \text{ years}$$

Can be answered from I & II together

3. (d): Let speed of boat in still water be x m/s

& speed of stream = y m/s

Atq,

$$x - y = y$$

$$x = 2y$$

From I & II

Let, distance be d m

$$(x - y) \times 24 = (x + y) \times 8$$

$$24y = 24y$$

\therefore cannot be answered from I & II together

4. (a): Speed of train X = 20 m/sec

Let length of train X be x m

From II

length of train Y = 0.5 x m

From I

Speed of train Y = $20 \times 1.5 = 30$ m/sec

From I & II

$$\frac{x+0.5x}{6} = 30 + 20$$

$$x = 200 \text{ m}$$

5. (c): **From II**

Female = 280

$$\text{Male} = 280 \times \frac{50}{100} = 140$$

$$\therefore \text{total strength} = 420$$

Can be answered from II only

6. (c): **From I**, speed of bike = $\frac{100}{5} = 20 \frac{\text{km}}{\text{hr}}$

From II,

$$\text{Speed ratio } \frac{\text{bike}}{\text{car}} = \frac{5}{7}$$

Speed of car = 28 kmph

$$\text{Time taken} = \frac{100}{28} = 3 \frac{4}{7} \text{ hour}$$

So, both statement I and II together is sufficient.

7. (d): **From I**, Let time taken by Kareena alone and Deepika alone to complete the work be K days & D days respectively.

ATQ,

$$\frac{1}{K} + \frac{1}{D} = \frac{1}{10}$$

From II, Let time taken by Kareena alone and Madhuri alone to complete the work be K days & M days respectively.

ATQ,

$$\frac{1}{K} + \frac{1}{M} = \frac{1}{6}$$

From both, we cannot determine the time taken by Deepika when working alone.

So, neither statement I nor II is sufficient.

8. (a): **From I**, Boys = 12 Girls = 20 - 12 = 8

$$\text{No. of ways} = {}^{12}C_4 \times {}^8C_5 = 27720$$

From II, boys : girls = 3:2

No other information provided.

So, only statement I alone is sufficient.

9. (e): let height, slant height and radius of tent be h, l, and r cm respectively.

$$\text{From I, } \frac{h}{r} = \frac{4}{3}$$

$h + r = 14$; from here we can determine values of h and r and then we can find volume of tent.

$$\text{From II, } l = \sqrt{r^2 + h^2}$$

From here, value of h can be determined then we can find volume of tent.

So, either statement I or II alone is sufficient.

10. (c): **From I**, $\frac{a}{b} = \frac{3}{2}$

$$\text{From II, } a^3 - b^3 = (a - b)(a^2 + b^2 + ab) = 19$$

On combining I & II:

$$(3x - 2x)((3x)^2 + (2x)^2 + (3x)(2x)) = 19$$

$$\Rightarrow x = 1$$

$$\text{Hence, } a = 3 \text{ \& } b = 2$$

So, both statements I & II together are sufficient.

11. (c): Let length of train be L meters and speed of train be S km/hr

$$\text{From statement 1, } L + 540 = S \times \frac{5}{18} \times 90$$

$$L = 25S - 540 \dots\dots (1)$$

$$\text{From statement 2, } L = (S - 6) \times \frac{5}{18} \times 43.2$$

$$L = (S - 6) \times 12 \dots\dots (2)$$

From (1) and (2), we get

$$25S - 540 = (S - 6) \times 12$$

$$25S - 540 = 12S - 72$$

$$25S - 12S = 540 - 72$$

$$13S = 468$$

$$S = 36 \text{ km/hr}$$

So, both the statements taken together are necessary to answer the question, but neither of the statements alone is sufficient to answer the question.

12. (a): From statement 1: Let denominator of fraction be p

$$\text{Fraction} = \frac{\left(\frac{p \times 60}{100}\right)}{p}$$

$$\text{Fraction} = \frac{6}{10} = \frac{3}{5}$$

$$\text{Reqd value} = \frac{40}{100} \times \frac{6}{10} = \frac{24}{100} = \frac{6}{25}$$

From statement 2:

$$\text{Fraction} = \frac{p-4}{p}$$

Required value can't be determined

Hence, statement (1) alone is sufficient to answer the question but statement (2) alone is not sufficient to answer the question.

13. (c): Perimeter of a semi circle = $\pi r + 2r$

From statement 1 and statement 2

$$\text{Side of the square} = \sqrt{3136} = 56 \text{ cm}$$

$$\text{Radius} = \frac{56}{2} = 28 \text{ cm}$$

$$\text{Perimeter of the semicircle} = \left(\frac{22}{7} \times 28 + 2 \times 28\right) \text{ cm}$$

$$= 88 + 56 = 144 \text{ cm}$$

Hence, both the statements taken together are necessary to answer the question, but neither of the statements alone is sufficient to answer the question.

14. (e): From statement 1:

$$\text{Required number of men}(p) = \frac{30 \times 80}{60} = 40$$

From statement 2: According to the question

$$p \times 60 = (p + 8) \times 50$$

$$60p = 50p + 400$$

$$10p = 400$$

$$P = 40$$

Hence, either statement (1) or statement (2) by itself is sufficient to answer the question.

15. (c): Let speed of boat in still water is x km/hr and speed of stream = y km/hr

From statement 1: $x = y + 12$

$$\text{And from statement 2: } \frac{90}{x+y} + \frac{90}{x-y} = 10$$

From (1) and (2), we get

$$\frac{90}{(y+12+y)} + \frac{60}{y+12-y} = 10$$

$$\frac{90}{2y+12} + \frac{60}{12} = 10$$

$$\frac{90}{2y+12} = 5$$

$$y = \frac{6}{2} = 3 \text{ km/hr}$$

$$x = 12 + 3 = 15 \text{ km/hr}$$

$$\text{Required ratio} = \frac{96}{15-3} : \frac{90}{15}$$

$$= \frac{96}{12} : \frac{90}{15} = 8 : 6 = 4 : 3$$

So, both the statements taken together are necessary to answer the question, but neither of the statements alone is sufficient to answer the question.

16. (e): From I and II.

Let the speed of the boat be U_b and that of the stream be U_s

$$\therefore \text{Speed upstream} = U_b - U_s = \frac{160}{8} = 20 \dots (i)$$

$$\text{Speed downstream} = U_b + U_s = \frac{160}{4} = 40 \dots (ii)$$

From (i) and (ii), we get

$$U_b = 30 \text{ km/hr}$$

$$U_s = 10 \text{ km/hr}$$

17. (d): From I.

$$G = \frac{25}{100} B$$

$$B = 4G$$

From II.

$$\frac{B}{G} = \frac{5}{7}$$

$\therefore 7B = 5G$. Hence both are not sufficient to answer the question.

18. (e): From I and II.

Let the number be $10x + y$.

$$\text{Now, } x + y = 13 \dots (i)$$

$$\therefore x = \frac{160}{100} y = \frac{8}{5} y \dots (ii)$$

From (i) and (ii), we get

$$x = 8, y = 5$$

$$\therefore \text{Number} = 85$$

19. (c): From I

$$\text{Area of square} = \frac{1}{2} (d)^2$$

$$= \frac{1}{2} (8\sqrt{2})^2 = \frac{1}{2} \times 64 \times 2 = 64 \text{ m}^2$$

From II

$$\text{Perimeter of the square} = 32 \text{ m}$$

$$\text{Side} = \frac{32}{4} = 8 \text{ m}$$

$$\therefore \text{Area of the square} = (8)^2 = 64 \text{ cm}^2$$

Hence the question can be answered either from statement I or from statement II.

20. (d):From I. The length of the train is not given. So, we can't find the answer.

From II. In this statement the length of the train is not definite. So we can't find the answer.

21. (d):let train speed be T m/s and man speed be M m/s, length of train be l m

From Statement I, $\frac{1}{T+M} = 10$

From statement II, $\frac{l+200}{T} = 20$

We cannot determine the values of T,M,l using both the equations. We need more data.

So, Neither Statement I nor II is sufficient to answer the question.

22. (a):From statement I, required probability = $\frac{4C_2}{9C_2} = \frac{1}{6}$

From Statement II, we don't know no. of red balls.

Statement I alone is sufficient to answer

23. (c):From Statements I & II,

Efficiency ratio (Man:Woman = 6:5)

Time taken by 12 men = $15 \times 20 \times 5 = T \times 12 \times 6$

$T = \frac{125}{6}$ days

Both Statements I and II together is sufficient to answer

24. (b):From Statement I, period of investment is not given so we cannot find rate of interest

From Statement II, 2420

= $2000 \left(1 + \frac{R}{100}\right)^2$ where R is rate of interest

R = 10%

Only Statement II alone is sufficient to answer the question.

25. (c):From Statement I & II, only 4 persons i.e. Father, Mother, Son & Daughter having ages F,M,S & D years respectively.

F = 40 years

S = 20 years, D = 16 years, M = 32 years

Required average = $\frac{40+32+20+16}{4} = 27$ years

Both Statements I and II together is sufficient to answer

26. (c):From I & II:

Let speed of boat in still water & speed of stream be 'x km/hr.' & 'y km/hr.' respectively.

ATQ,

$x + y = \frac{80}{2.5}$

$x + y = 32$... (i)

And,

$\frac{x+y}{x-y} = \frac{16}{9}$... (ii)

Put value of (i) in (ii):

$\frac{32}{x-y} = \frac{16}{9}$

$x - y = 18$... (iii)

On solving (i) & (iii), we get:

$x = 25$ km/hr.

So, both statements together are sufficient to answer the question.

27. (a):From I

Let length & breadth of rectangle be 'l cm' & 'b cm' respectively.

ATQ,

$l \times b = 416$ (i)

And $2(l + b) = 84$

$l + b = 42$ (ii)

From (ii)

$l^2 + b^2 + 2lb = 1764$

And $l^2 + b^2 + 2lb - 4lb = 1764 - 4 \times 416$

$l - b = \pm 10$

As, $l > b$

So, $l - b = 10$ (iii)

From (ii) and (iii)

$l = 26$ cm and $b = 16$ cm

So, area of square = $(16)^2$

= 256 cm²

From II. Let length & breadth of rectangle be '13x cm' & '8x cm' respectively

We can't solve it further

So, only statement I is sufficient to answer the question.

28. (a):From I:

$5000 \left[\left(1 + \frac{R}{100}\right)^2 - 1 \right] - \frac{5000 \times R \times 2}{100} = 112.5$

$\Rightarrow 5000 \left[\frac{R^2 + 200R}{10000} \right] - 100R = 112.5$

$\Rightarrow 0.5 R^2 + 100R - 100R = 112.5$

$\Rightarrow 0.5R^2 = 112.5$

$\Rightarrow R^2 = 225$

$\Rightarrow R = 15\%$

From II:

$\frac{X \times R \times 2}{100} + \frac{4000 \times (R+5) \times 3}{100} = 4200$

$\frac{2RX}{100} + \frac{12000R + 60000}{100} = 4200$

This equation can't be solved.

Hence, statement I alone is sufficient to answer the question.

29. (a):From I

Let cost price and mark price of an article be Rs.4x and Rs.7x respectively.

And let discount allowed on article and profit earned on article be Rs.49y and Rs.11y respectively.

ATQ,

$$4x + 11y = 7x - 49y$$

$$3x = 60y$$

$$x = 20y$$

$$\text{So, required profit\%} = \frac{11y}{4x} \times 100$$

$$= \frac{11}{4 \times 20} \times 100$$

$$= 13.75\%$$

From II.

Let C.P = Rs. a

Let M.R.P. = Rs. b

Let profit = Rs. p

ATQ

$$a + p = b - p - 190$$

$$b - a = 2p + 190$$

We can't solve it further.

So, both statement I is sufficient to answer the question.

30. (d): From I:

Let total profit be Rs. P

Profit sharing ratio of A, B & C = 12 : 11 : 18

ATQ,

$$\frac{(18-12)}{41} \times P = 7800$$

$$\frac{6P}{41} = 7800$$

$$P = 1300 \times 41$$

$$= \text{Rs.} 53300$$

$$\text{So, profit share of C} = \frac{18}{41} \times 53300$$

$$= \text{Rs.} 23400$$

From II:

Let amount invested by C, D & F be Rs.5x, Rs.8x & Rs.2x respectively.

So, profit sharing ratio of C, D & F

$$= (5x \times 6) : (8x \times 4) : (2x \times 12)$$

$$= 30x : 32x : 24x$$

$$= 15 : 16 : 12$$

Now, let total profit be Rs. P

ATQ,

$$\frac{12}{12+16+15} \times P = 18720$$

$$P = \text{Rs.} 67080$$

$$\text{So, profit share of C} = \frac{15}{15+16+12} \times 67080$$

$$= \text{Rs.} 23400$$

Hence, statement I alone or statement II alone is sufficient to answer the question.

31. (e): From I.

Let side of square be a cm.

$$\text{Side of triangle} = a = \sqrt{196} = 14 \text{ cm.}$$

Perimeter of triangle can't be find as it is not given which type of triangle it is.

From II.

Since any information about length/breadth is not given therefore we cannot find answer from II.

32. (e): From I & II.

$$\text{Speed of train B} = 54 \times \frac{5}{18} = 15 \text{ m/sec.}$$

$$\text{Length of train B} = 15 \times 10 = 150 \text{ m.}$$

$$\text{Length of train A} = 150 \times 2 = 300 \text{ m.}$$

Let speed of train A be x m/sec & time taken to cross train B is t sec.

$$x + 15 = \frac{150+300}{t}$$

There are two variables x & t in a single equation. Therefore both statement are not sufficient.

33. (c): Let age of Abhimanyu be y year

$$\text{Age of Abhimanyu \& Kumar together} = 36 \times 2 = 72 \text{ years.}$$

Let age of Kumar be x year & patel be 2x year.

ATQ, From I & II.

$$x + y = 72 \text{ (i)}$$

$$2x + y = 96 \text{ (ii)}$$

Solving (i) & (ii)

$$x = 24 \text{ years.}$$

$$\text{age of veer after two years} = 24 \times 2 - 2 + 2 = 48 \text{ years.}$$

34. (a): From I.

$$\text{No. of males} = 240$$

$$\text{No. of females} = 200$$

$$\text{Total strength} = 200 + 240 = 440$$

From statement I can be answered.

35. (d): From I

Let number of white balls be x

$$\text{Green balls} = 5 - x$$

Probability of being at least one ball Green

$$\Rightarrow \frac{{}^x C_1 {}^{5-x} C_1 + {}^{5-x} C_2}{{}^5 C_2} = \frac{9}{10}$$

$$\frac{x(5-x) + \frac{(5-x)(4-x)}{2}}{10} = \frac{9}{10}$$

$$x = 2$$

From II

Let number of White balls be x

$$\text{Total} = 5$$

Probability of being both balls white is $\frac{1}{10}$

$$\Rightarrow \frac{{}^x C_2}{{}^5 C_2} = \frac{1}{10}$$

$$\frac{x(x-1)}{20} = \frac{1}{10}$$

$$x = 2$$

So, either statement I or II is sufficient to give the answer of the question.

Level - 2

1. (c): From I -

Let income of Sameer = $25x$

So, income of Veer = $25x \times \frac{96}{100} = 24x$

Let expenditure of Veer = $7y$

So, expenditure of Sameer = $8y$

Deepak spend $\frac{3}{5}$ th of his income.

From II -

Saving of Sameer = 7000 Rs.

Saving of Veer = 7400

And, Income of Deepak is Rs. 1000 more than that of Sameer

From I & II -

$$\frac{(25x-7000)}{(24x-7400)} = \frac{8y}{7y}$$

$$17x = 10200$$

$$x = 600 \text{ Rs.}$$

Income of Deepak = $25 \times 600 + 1000 = 16000$ Rs.

Saving of Deepak = $\frac{2}{5} \times 16000 = 6400$ Rs.

Respective ratio of saving of Veer & Deepak = $7400 : 6400 = 37 : 32$

So, Statement I & II together is sufficient to give answer of the question.

2. (b): Let cost price = $100x$

Marked price = $140x$

From I -

$$140x \times \frac{75}{100} - 100x = 50$$

$$5x = 50$$

$$x = 10 \text{ Rs.}$$

Cost price = 1000 Rs.

Statement I alone is sufficient.

From II -

$$(140x \times \frac{6}{7} \times \frac{90}{100}) - 100x = 80$$

$$8x = 80$$

$$x = 10 \text{ Rs.}$$

Cost price = 1000 Rs.

Statement II alone is sufficient.

So, either statement I or II alone is sufficient to give answer of the question.

3. (a): Given, number of green balls = 5

So, let total number of blue balls = x

So, number of red balls = $(7 - x)$

From I -

$$\frac{x}{12} + \frac{7-x}{12} = \frac{7}{12}$$

So, we can't determine value of x from statement I

From II -

$$\frac{x(x-1)}{12 \times 11} + \frac{(7-x)(6-x)}{12 \times 11} = \frac{1}{6}$$

$$2x^2 - 14x + 42 = 22$$

$$2x^2 - 14x + 20 = 0$$

$$2x^2 - 10x - 4x + 20 = 0$$

$$2x(x-5) - 4(x-5) = 0$$

$$x = 2, 5$$

From II alone we can determine the difference between blue & red balls in the bag.

So, only statement II alone is sufficient to give answer of the question.

4. (b): Let radius of circle = r cm

So, side of square = $r + 3.5$ cm

From I -

$$2 \times \frac{22}{7} \times r - 2r = 45$$

$$r = 10.5 \text{ cm}$$

side of square = $10.5 + 3.5 = 14$ cm

Area of square = 196 cm^2

Statement I alone is sufficient to give answer.

From II -

Let breadth of rectangle = $2x$

So, radius of circle will be = $3x$

ATQ -

$$\frac{2 \times \frac{22}{7} \times 3x}{2(2x+15)} = \frac{3}{2}$$

$$x = 3.5 \text{ cm}$$

Radius of circle = 10.5 cm

side of square = $10.5 + 3.5 = 14$ cm

Area of square = 196 cm^2

So, either statement I or Statement II alone is sufficient.

5. (e): From I -

Difference between speed of train A & B = 10 meters/sec

And, length of train B = 240 meters

From I, we can't determine

From II -

Train B cross pole in 8 sec

And train B cross train A in 12 sec

From II, we can't determine

From I & II -

$$\text{Speed of train B} = \frac{240}{8} = 30 \text{ meters/sec}$$

$$\text{Speed of train A} = 30 - 10 = 20 \text{ meters/sec}$$

Let length of train A = L meters

$$\text{So, } (30 + 20) = \frac{240+L}{12}$$

$$L = 600 - 240$$

$$L = 360 \text{ meters}$$

So, Statement I and II both together sufficient to give answer of the questions

6. (c): Total age of A, B, C and D = $29 \times 4 = 116$ years

From I-

Total age of A and D = $28 \times 2 = 56$ years

From II-

Let age of C = x years

So, age of B will be = (x + 6) years

From I & II together

$$116 - 2x - 6 = 56$$

$$2x = 54$$

$$x = 27 \text{ years}$$

so, both statements are required to answer

7. (e): let length, breadth & height of the room be l cm, b cm, & h cm respectively

From I -

$$\text{Given, } l + b = 28$$

Painting per square meter of room = 24 Rs.

From II -

$$2(l + b) \times h + 2lb - lb = 448$$

$$2(l + b) \times h + lb = 448$$

Since, we have 3 unknowns while equations are 2 so we cannot find exact values.

So, neither of the two statements is sufficient, more data is required.

8. (c): **From I-**

Let investment of

$$B = \text{Rs. } 5x$$

$$\text{So, investment of C} = \text{Rs. } 8x \text{ and investment of A} \\ = \text{Rs. } 7.5x$$

From II -

Time period of A, B and C be 4t years, 6t years and 5t years

From I & II-

Profit ratio of A, B and C

$$= (7.5x \times 4t) : (5x \times 6t) : (8x \times 5t)$$

$$= 3 : 3 : 4 \text{ or } 3a : 3a : 4a$$

$$\text{Given, } 3a = 6000 \text{ Rs}$$

$$a = 2000 \text{ Rs.}$$

$$\text{So, total profit} = 10a \times 2000 = 20000 \text{ Rs.}$$

So, both statements are required to answer

9. (d): **From I-**

Let efficiency of A = 4x units/day

So, efficiency of B & C will be 3x units/day & 6x units /day respectively

$$\text{Total work} = \frac{48}{13} \times (4x + 3x + 6x) = 48x \text{ units}$$

$$\text{C alone} = \frac{48x}{6x} = 8 \text{ hours}$$

From II -

$$\text{C alone} = \frac{13}{48} - \frac{1}{12} - \frac{1}{16} = \frac{13-4-3}{48} = \frac{6}{48} = 8 \text{ hours.}$$

So, either of the two statements is sufficient to answer

10. (e): **From Statement I:**

N is multiple of 3 so sum of digits should be multiple of 3.

$16 + P$ is a multiple of 3.

$\Rightarrow P$ would be 2, 5, 8.

From Statement II:

N is multiple of 7.

Only possible value of P is 5.

From Statement III:

N is multiple of 9. So sum of digits should be multiple of 9.

$16 + P$ is multiple of 9.

Only value of P is 2.

So, either Statement II or Statement III alone is sufficient.

11. (d): **Statement II:**

On squaring

$$\frac{y^2}{x^2} + \frac{z^2}{y^2} - 2\left(\frac{y}{x}\right)\left(\frac{z}{y}\right) = 36$$

$$\frac{y^2}{x^2} + \frac{z^2}{y^2} - 2\left(\frac{z}{x}\right) = 36$$

Combining Statements I and II:

$$\frac{z}{x} = 2$$

$$\frac{y^2}{x^2} + \frac{z^2}{y^2} - 2(2) = 36$$

$$\frac{y^2}{x^2} + \frac{z^2}{y^2} = 40$$

Statements I and II together can answer the question.

12. (c): **Statement I:** Males = 20

Statement II: Females = 30% of total passengers

Statement III: Males : Transgender = 5 : 2

Combining all the statements

$$\text{Transgender} = \frac{20}{5} \times 2 = 8$$

$$\text{Males} + \text{Transgender} = 28$$

$$\text{Females} = \frac{30}{100} (\text{Males} + \text{Females} + \text{Transgender})$$

$$\frac{70}{100} \text{Females} = \frac{30}{100} (\text{Males} + \text{Transgender})$$

$$\text{Females} = \frac{30 \times 28}{70} = 12$$

$$\text{Total passengers} = 20 + 12 + 8 = 40.$$

All three statements together are required to answer the question.

13. (e): Let present age of Ajay is x years while that of Akshay is y years.

$$\text{From Statement I: } \frac{x-6}{y-6} = \frac{3}{4}$$

$$4x - 24 = 3y - 18$$

$$4x = 3y + 6 \dots(i)$$

From Statements II:

It is not known who is younger among Ajay & Akshay.

From Statement III:

Again, it is not known who is older.

From Statement I and II:

$$x + 2 = \frac{85}{100}(y + 2)$$

$$20x + 40 = 17y + 34$$

$$20x = 17y - 6 \quad \dots(ii)$$

On solving (i) & (ii), we get:

$$15y + 30 = 17y - 6$$

$$2y = 36$$

$$y = 18 \text{ yrs.}$$

$$x = 15 \text{ yrs.}$$

$$\text{Required ratio} = x : y = 5 : 6$$

From Statement I and III:

$$x + y = 2y - 3$$

$$x = y - 3 \quad \dots(iii)$$

On solving (i) & (iii), we get:

$$4y - 12 = 3y + 6$$

$$y = 18 \text{ yrs.}$$

$$x = 15 \text{ yrs.}$$

$$\text{Required ratio} = x : y = 5 : 6$$

Either Statement I and II or Statement I and III can answer the question.

- 14. (d):** From Statement I: Total balls = 20
From Statement II: R : B : G = 5 : 3 : 2
From Statement III: Red balls = 10

From Statement I and II:

$$P(\text{red}) = \frac{10}{20} = \frac{1}{2}$$

From Statement II and III:

$$\text{red balls} = 10$$

$$\Rightarrow \text{total balls} = \frac{10}{5} \times 10 = 20$$

$$P(\text{red}) : \frac{10}{20} = \frac{1}{2}$$

From Statement I and III:

$$P(\text{red}) = \frac{10}{20} = \frac{1}{2}$$

Any two of three can answer the question.

- 15. (e):** From I & II

$$\frac{1}{x} \sim \frac{1}{y} = \frac{8}{3}, xy = 3$$

But it is not given that either x is greater or y

\therefore we cannot determine.

- 16. (d):** From I

$$2 \text{ men} = 3 \text{ women}$$

From II

16 men can complete the work in 10 days

\therefore From I and II no. of women can be find.

- 17. (d):** From I & II

$$\angle DBC = \angle CDB$$

$$\angle CDB = \angle DAB + \angle ABD$$

$$\angle ABD = \angle CDB - \angle DAB$$

$$\angle ABD = \angle DBC - \angle DAB$$

$$\angle ABD = (\angle ABC - \angle ABD) - \angle DAB$$

$$2\angle ABD = \angle ABC - \angle DAB \quad (\angle DAB = \angle BAC)$$

$$2\angle ABD = 30$$

$$\therefore \angle ABD = 15^\circ.$$

- 18. (b):** From I

Sum cannot be find out as rate is not given.

From II

$$\text{Difference} = \frac{PR^2}{100^2} \left[\begin{matrix} P \rightarrow \text{Sum} \\ R \rightarrow \text{Rate} \end{matrix} \right]$$

$$P = \text{Rs. } 10,000$$

\therefore CI can be find out.

- 19. (e):** From I & II

Cannot be determined even after both statement.

- 20. (c):** From A) $x \times y = 6$

From B)

$$\frac{1}{x} + \frac{1}{y} = \frac{5}{6}$$

$$\Rightarrow x + y = 5$$

Hence, from statement (A) and (B) we conclude that

$$\text{If } x = 2 \text{ then } y = 3$$

$$\text{If } x = 3 \text{ then } y = 2$$

\Rightarrow Both statement 'A' and 'B' are needed to answer the question.

- 21. (d):** Let X, Y and Z can complete the work alone in 'x', 'y' and 'z' respectively

$$\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = \frac{1}{8} \quad \dots (i)$$

From (A)

$$\frac{1}{x} + \frac{1}{y} = \frac{1}{12} \quad \dots (ii)$$

$$\text{And, } z = \frac{4}{3}x \quad \dots (iii)$$

From (i), (ii) and (iii) question can be solved

\Rightarrow From statement (A) question can be solved

From (B)

$$Z = \frac{2}{3}y = \frac{4}{3}x \quad \dots (iv)$$

From (i) and (iv) question can be solved

\Rightarrow From statement (B) question can be solved.

\therefore Either (A) or (B) is sufficient to answer the question.

- 22. (b):** Let distance between A and B = x

Speed of boat = a

Speed of stream = b

From A)

$$\frac{a}{b} = \frac{3}{2} \quad \dots (i)$$

$$\text{and, } 12 = \frac{x}{a-b} + \frac{x}{a+b} \quad \dots (ii)$$

On solving (i) and (ii)

$$b = \frac{10}{3}a$$

From (B) Man cover 0.5 x in upstream in 5 hours.

After that man cover 0.5x (in upstream) and 0.5x (in downstream) in 6 hours.

\Rightarrow Man covers 0.5x (in downstream) in 1 hour

\Rightarrow Man covers x (in downstream) in 2 hours

And, Man covers x (in upstream) in 10 hours

Now, $\frac{x}{a-b} = 10 \dots$ (iii)

and $\frac{x}{a+b} = 2 \dots$ (iv)

On solving (iii) and (iv)

We got

$$\frac{a}{b} = \frac{3}{2}$$

$$\Rightarrow \text{Speed of boat} = \frac{3}{2} \times 10 = 15\text{km}$$

From only statement (B) we can solve the question.

23. (a): Let the number are x, y and z.

From A)

$$x \times y = 286 = 2 \times 13 \times 11 \dots$$
 (i)

$$y \times z = 770 = 7 \times 11 \times 5 \times 2 \dots$$
 (ii)

'11' and '2' common in (i) and (ii), so if all the three numbers are co-prime numbers then y should be $11 \times 2 = 22$.

$$\Rightarrow x = 13, y = 22, z = 35$$

From B)

$$x + y = 35$$

$$y + z = 57$$

Question can't be solved by using only statement (B)

\Rightarrow Only statement (A) is sufficient to answer the question.

24. (b): Let the number is '10x + y'

From A)

$$10y + x - 10x - y = 9$$

$$\Rightarrow y - x = 1$$

From B)

$$(10x + y)(10y + x) = 1462 = 2 \times 17 \times 43$$

$$(10x + y)(10y + x) = 34 \times 43$$

\Rightarrow '34' or '43' is the previous number and interchanged number is '43' or '34'

$$\text{Sum of digits} = 3 + 4 = 7$$

Only (B) is sufficient to answer the question.

25. (e): From statement [I]

$$10M + 12W \text{ takes } \frac{10}{7} \text{ days to complete the work}$$

From statement [II]

$$5M + 6W \text{ can complete the work in } \frac{20}{7} \text{ days}$$

Both the equations is same so, we can't solve the question by using both [I] and [II]

\therefore Hence, Neither statement [I] nor statement [II] is sufficient to answer the question.

26. (d): From statement [I]

$$L = 1.1 B$$

$$LB = 440 \Rightarrow 1.1B.B = 440$$

$$\Rightarrow B^2 = 400$$

$$\Rightarrow B = 20 \text{ cm}$$

$$\Rightarrow L = 22 \text{ cm}$$

$$L = 2\pi r$$

$$22 = 2 \times \frac{22}{7} \times r \Rightarrow r = 3.5 \text{ cm}$$

From statement [II]

$$\text{Area of square, } a^2 = 484$$

$$A = 22$$

According to question

$$2\pi r = 22$$

$$2 \times \frac{22}{7} \times r = 22$$

$$r = 3.5 \text{ cm}$$

\therefore Hence, Either statement [I] alone or statement [II] alone is sufficient to answer the question.

27. (a): From Statement [I]

$$MP = x$$

$$\text{After two successive discounts} = \frac{80}{100} \times \frac{95}{100} \times x = 0.76x$$

$$\text{Final S.P after taking tax} = \frac{125}{100} \times 0.76x$$

$$= 0.95x$$

According to question

$$MP - SP = 40$$

$$x - 0.95x = 40$$

$$0.05x = 40$$

$$x = 800$$

From statement [II]

$$\text{Let, } MP = x$$

$$S.P = \frac{85}{100} \times \frac{80}{100} \times x$$

$$= 0.68x$$

As, any value is not given so we can't find out the M.P.

\therefore Hence, Statement [I] alone is sufficient to answer the question but the Statement [II] alone is not sufficient

28. (d): From statement [I]

Let total amount = x

$$\frac{x}{2} \times \frac{5 \times 3}{100} + \frac{x}{2} \times \frac{6 \times 5}{100} = 4500$$

$$\frac{x}{2} \left[\frac{15}{100} + \frac{30}{100} \right] = 4500$$

$$x = 20,000$$

From statement [II]

$$2420 = x \left[1 + \frac{10}{100} \right]^3 - x \left[1 + \frac{10}{100} \right]^2$$

$$2420 = x \times 1.1^3 - x \times 1.1^2$$

$$2420 = 1.331x - 1.21x$$

$$0.121x = 2420$$

$$x = 20,000$$

\therefore Hence, Either statement [I] alone or statement [II] alone is sufficient to answer the question.

29. (c): From statement [I]

$$\text{Raju} + \text{Ramesh} + \text{Rajan} + \text{Rajguru} = 51.25 \times 4 = 205 \dots$$
 (i)

$$\text{Rajan} + \text{Rajguru} = 47.5 \times 2 = 95 \dots$$
 (ii)

Ramesh + Rajguru = $57.5 \times 2 = 115$..(iii)
 From statement [II]
 Let Rajan weight = x
 Weight of 50 students = 30×50
 = 1500 kg
 Weight after one students replaced by Rajan =
 $1500 - 30 + x$
 $30.4 \times 50 = 1470 + x$
 $1520 - 1470 = x$
 $x = 50$
 Rajan Weight = 50 kg
 From Statement [I] and [II]
 Rajan weight = 50 kg
 Rajguru weight = $95 - 50 = 45$ kg
 Ramesh weight = $115 - 45 = 70$ kg
 Raju weight = $205 - 50 - 45 - 70 = 40$ kg
 \therefore Hence, Both Statement I and II together are needed to answer the question

30. (c): Let cost price of the article be Rs.100x.
 So, marked price of the article = $100x \times \frac{135}{100} =$
 Rs. 135x
 and let selling price of the article be Rs.y.
From I:
 ATQ,
 $(135x - y) - (y - 100x) = 190$
 $135x - y - y + 100x = 190$
 $235x - 2y = 190$ _____ (i)
From II:
 $\frac{y}{135x} = \frac{4}{5}$
 $\Rightarrow y = 108x$ _____ (ii)
 On solving (i) & (ii), we get:
 $x = 10$
 So, cost price of the article = Rs.100x
 = Rs. 1000
 Hence, both statements taken together are necessary to answer the question.

31. (a): Let efficiency of Dharam be '5x units/day'.
 So, efficiency of Deepak = $5x \times \frac{80}{100}$
 = '4x units/day'
 Now, let efficiency of Shivam be 'y units/day'.
From I:

Days	Efficiency	Total work
Shivam + Dharam $\frac{80}{3}$	15 units/day	400 units (L.C.M.)
Shivam + Deepak $\frac{200}{7}$	14 units/day	

So,
 $5x + y = 15$ _____ (i)
 $4x + y = 14$ _____ (ii)
 On solving (i) & (ii), we get:
 $x = 1, y = 10$
 So, efficiency of Shivam = 10 units/day

From II:
 ATQ,
 $y \times \frac{40}{100} = 4x$
 $y = 10x$
 Total work = $80 \times 5x = 400x$ units
 Hence, statement I alone is sufficient to answer the question.

32. (c): Amount invested by Asif in scheme - A
 = $80000 \times \frac{5}{8} =$ Rs. 50000
 Amount invested by Asif in scheme - B
 = $80000 \times \frac{3}{8} =$ Rs. 30000
From I & II:
 Let rate of interest offered by scheme - B be 2R% p.a.
 So, rate of interest offered by scheme - A
 = $2R \times \frac{1}{2} = R\%$ p.a.
 ATQ,
 $\frac{30000 \times 2R \times 4}{100} - \frac{50000 \times R \times 4}{100} = 6000$
 $\Rightarrow 2400R - 2000R = 6000$
 $400R = 6000$
 $R = 15\%$
 So, total interest received by Asif
 = $\frac{30000 \times 2 \times 15 \times 4}{100} + \frac{50000 \times 15 \times 4}{100}$
 = 36000 + 30000
 = Rs. 66000
 So, both statements together are necessary to answer the question.

33. (d): Let present age of Aman, Bhanu and Chaman be 'x years', 'y years' & 'z years' respectively.
 So, $x + y + z = 34 \times 3$
 $x + y + z = 102$ _____ (i)
From I:
 $x = z \times \frac{200}{100}$
 $x = 2z$ _____ (ii)
 And, $\frac{y+6}{z} = \frac{3}{2}$
 $2y + 12 = 3z$
 $2y = 3z - 12$
 $y = \frac{3z-12}{2}$ _____ (iii)
 On solving (i), (ii) & (iii), we get:
 $z = 24$ years
From II:
 $x + y = 78$ _____ (iv)
 On solving (i) & (iv), we get:
 $z = 24$ years
 Hence, either statement I alone or statement II alone is sufficient to answer the question.

34. (c): Let length of train - A & train - B be '4x' & '5x' meters respectively.

From I & II:

Let speed of train - A & train - B be 'V₁ m/sec' & 'V₂ m/sec' respectively.

$$\text{ATQ, } \frac{4x+500}{28} = V_1 \text{ (i)}$$

$$\text{And, } \frac{4x+5x}{54} = V_1 - V_2 \text{ (ii)}$$

Put value of (i) in (ii):

$$\frac{9x}{54} = \frac{4x+500}{28} - V_2$$

$$\Rightarrow V_2 = \frac{x+125}{7} - \frac{x}{6}$$

$$V_2 = \frac{6x+750-7x}{42}$$

$$V_2 = \frac{750-x}{42} \text{ (ii)}$$

$$\text{And, } \frac{5x}{15} = V_2$$

$$V_2 = \frac{x}{3} \text{ (iii)}$$

On solving (ii) & (iii), we get:

$$x = 50$$

Put value of x in (i):

$$\frac{200+500}{28} = V_1$$

$$\Rightarrow V_1 = 25 \text{ m/sec}$$

Hence, both statements taken together are necessary to answer the question.

35. (c): Let the unit and tens digits be x and y respectively

Original number = 10y+x

$$\text{From A: } x + y = 12$$

$$\text{And } x^2 - y^2 = 48 \text{ or } y^2 - x^2 = 48$$

From B:

$$10y+x - (10x+y) = 36$$

From A and B together, it can be solved

36. (a): Let length and breadth of the rectangular plot be x m and y m respectively.

From A:

$$x \times y = 2400 \text{ sq m}$$

$$\text{and } d = \sqrt{x^2 + y^2} = 50 \text{ m}$$

$$\text{From B: } x : y = 3 : 2$$

From A, we can determine the value of length and breadth and then can find perimeter.

37. (d): Let CP be Rs 100x

Then SP = 120x

$$\text{From A: New CP} = \text{Rs } (100x + 100)$$

$$\text{Profit percentage} = \frac{120x - (100x + 100)}{100x + 100} \times 100 = 12.5$$

$$x = 15$$

$$\text{Profit} = \text{Rs. } 300$$

From B:

$$\text{Marked price} = \text{Rs } (100x + 500)$$

ATQ

$$(100x + 500) + 120x = 3800 \Rightarrow x = 15$$

$$\text{profit} = \text{Rs } 300$$

So, either A or B is sufficient.

$$\mathbf{38. (d):} P \left(1 + \frac{R}{100}\right)^4 - P = 432.1$$

$$\text{From A: } \frac{P \times R \times 4}{100} = 400$$

$$\text{From B: } \frac{PR^2}{100^2} = 10$$

So, from either of the given statements we can find the required value.

39. (c): From I

Let C.P. of article be Rs. x.

$$\frac{125}{100} \times 240 - x = 40$$

$$x = 300 - 40 = \text{Rs } 260$$

From II

Since profit% & discount% is given and S.P. & marked price is given.

∴ cost price can be determined.

∴ Either from I or II.

40. (e): From I & II

$$\text{Area of base of cone } (\pi r^2) = 154$$

$$\therefore \pi r^2 = 154$$

$$r^2 = 49$$

$$\therefore r = 7 \text{ cm}$$

$$\therefore \text{height (h)} = 7 \times 2 = 14 \text{ cm.}$$

$$\text{Volume} = \frac{1}{3} \pi r^2 h$$

$$= \frac{1}{3} \times \frac{22}{7} \times 7 \times 7 \times 14 = \frac{2156}{3} \text{ cm}^3$$

41. (e): From I & II

$$x + y = 8 \text{ ... (i)}$$

$$xy = 7$$

$$(x - y)^2 = (x + y)^2 - 4xy$$

$$(x - y)^2 = (8)^2 - 4 \times 7$$

$$(x - y)^2 = 36$$

$$x - y = 6 \text{ ... (ii)}$$

$$\therefore x = 7 \text{ \& } y = 1$$

$$\text{Or } x = 1 \text{ \& } y = 7$$

42. (e): From I & II

Let speed of boat in still water be x km/hr and speed of stream be y km/hr.

$$\frac{64}{x+y} = \frac{1}{2} \frac{64}{x} \Rightarrow x = y = 5 \text{ km/hr}$$

43. (e): Given no. of white ball

Let → a

From I let probability → $\frac{x}{y}$

Let no. of red ball → px, total balls → py

From II → Let probability = $\frac{s}{t}$

Let no. of black ball = qs, total balls = qt

From I & II

$$px + a + qs = qt = py$$

we know the values of x, y, s, t and a so we can find the value of p and q

So probability of white ball found = $\frac{a}{qt}$ or $\frac{a}{py}$

∴ I & II together are sufficient to answer the question

Mains Solutions

- 1. (e);** Let salesman's base salary be Rs. B, and last year commission be C
Then total salary,
 $T = B + C$ (i)
From (1)
 $1.1T = B + 1.3C$ (ii)
From (2)
 $B - C = \frac{50}{100}B$
 $\Rightarrow B = 2C$
Using (1) and (2) individually we can find the answer
- 2. (d);** A \rightarrow first prime no. greater than 10 is 11.
Numbers are 8, 10, 12 and 14
B \rightarrow smallest no. = $4x$
Largest no. = $7x$
 $7x = 4x + 6$
numbers are 8, 10, 12, 14
C \rightarrow Let numbers be $x-3, x-1, x+1, x+3$
 $(x-3+x+3)^2 = (x-1+x+1)^2$
 $\Rightarrow x^2 = x^2$
Using A or B, we can find the answer.
- 3. (e);** Let smaller no. be x and larger no. be y .
A $\rightarrow y = x + 6$
B $\rightarrow \frac{40}{100}x = \frac{30}{100}y$ or, $\frac{y}{x} = \frac{4}{3}$
C $\rightarrow \frac{y/2}{x/3} = \frac{2}{1}$
Or, $\frac{y}{x} = \frac{4}{3}$
So from A and either B or C we can find the answer.
- 4. (e);** A \rightarrow Runs scored till 30 matches = $30 \times 36 = 1080$
B \rightarrow Runs scored till 32 matches = $32 \times 38 = 1216$
C \rightarrow nothing can be inferred
More information required.
- 5. (e);** A) $M + T + W = 38 \times 3 = 114$
B) $T + W + Th = 43 \times 3 = 129$
C) $T = Th = 45$
All the three together are sufficient
- 6. (d);** Let the marked price is M and cost price is C.
A) $0.85M = 1020$
 $M = 1200$
B) $M = \frac{25}{17}C$
C) $0.9M = \frac{22.5}{17}C$
A and either B or C.
- 7. (b);** We can get ratio of investment from either statement B alone or C alone so profit of B can be determined from option b
- 8. (c);** A \rightarrow If the no. of days taken by a man and that taken by a woman is 'm' and 'w' respectively, then
 $\frac{m}{w} = \frac{1}{3}$
B $\rightarrow \frac{1}{m} + \frac{1}{c} = \frac{1}{27}$
And
 $\frac{1}{c} + \frac{1}{w} = \frac{1}{18}$ where 'c' is the no. of days taken by a child
C $\rightarrow w = 21$
hence, the question can be solved using any of the two statements.
- 9. (e);** We cannot find because there is no information regarding strength of non-officer employees.
- 10. (b);** A \rightarrow Profit percent = 25%
B \rightarrow Let CP = x ,
SP = $1.25x$
New CP = $x + 500$
Profit percentage = $\frac{1.25x - (x+500)}{x+500} \times 100 = \frac{100}{9}$
 $x = 4000$
Profit = 1000 Rs.
C \rightarrow C.P. = x
S.P. = $0.85(x + 1000)$
 $\frac{0.85x + 850 - x}{x} \times 100 = 25 - \frac{75}{4}$
 $x = 4000$
Profit = $(5000 - 4000) = 1000$ Rs.
So A and either B or C are sufficient.
- 11. (e);** As we don't know the time for which Rinku borrowed the amount, so the rate of interest can't be determined
- 12. (e);** Let the speed of boat in still water and speed of stream be x and y respectively.
St A $\rightarrow \frac{45}{x+y} = 3 \Rightarrow x + y = 15$
St B $\rightarrow y = \frac{1}{4}x \Rightarrow x = 4y$
St C $\rightarrow \frac{36}{x-y} = 4 \Rightarrow x - y = 9$
So, any two of the three statements are sufficient to answer the question.
- 13. (b);** Let the per day efficiencies of a man, a woman and a child are 'M', 'W' and 'C' respectively.
A $\rightarrow 3M = 4W \Rightarrow \frac{M}{W} = \frac{4}{3}$
B $\rightarrow 2W + 5C = \frac{2}{3} \times \frac{1}{12} \Rightarrow 2W + 5C = \frac{1}{18}$
C $\rightarrow \frac{M}{C} = \frac{2}{1}$
Hence, the question can be answered by using all the three statements together.

14. (a); A → Train A crosses another train B moving in the opposite direction in 10 sec.
 ∴ Time taken = 10 sec
 B → Ratio of the speeds of trains A and B = 1 : 2
 ∴ Let the speeds of trains A and B be x and $2x$ m/sec respectively.
 C → Length of train B is 25% more than that of train A.
 ∴ Let the lengths of trains A and B be $4y$ and $5y$ meters respectively.
 From all the three statements,
 Relative speed = $x + 2x = 3x$
 Sum of lengths of trains = $4y + 5y = 9y$
 Time taken = $\frac{\text{Sum of lengths of trains}}{\text{Relative speed}}$
 $\Rightarrow 10 = \frac{9y}{3x}$
 Hence, the question cannot be answered even by using all the three statements together.

15. (d); A → Let the length and breadth of the rectangle be $4x$ and $3x$ respectively.
 B → Sum of the lengths of diagonals of the rectangle = 50 m
 Rectangle's diagonals are always equal.
 $\Rightarrow d = 25 \text{ m} = \sqrt{\text{Length}^2 + \text{Breadth}^2}$
 C → Area of a square = 1225 m^2
 Edge of the square = 35 m
 Perimeter of the square = $4 \times 35 = 140 \text{ m}$
 Perimeter of the rectangle
 $= \frac{1}{2} \times \text{Perimeter of the square}$
 $= 70 \text{ m} = 2(\text{Length} + \text{Breadth})$
 Hence, the question can be answered by using any two of the three statements together.

16. (d); A → Cone has same base as that of the cylinder (same radius) and height 30 cm.
 Volume of cone = Volume of cylinder
 $\Rightarrow \frac{1}{3} \times \pi \times (r_{\text{cone}})^2 \times h_{\text{cone}} = \pi \times (r_{\text{cylinder}})^2 \times h_{\text{cylinder}}$
 $\Rightarrow \frac{1}{3} \times h_{\text{cone}} = h_{\text{cylinder}} \quad (\because r_{\text{cone}} = r_{\text{cylinder}})$
 $\Rightarrow h_{\text{cylinder}} = 10 \text{ cm}$
 B → Circumference of base of the cylinder = 132 cm
 $\Rightarrow 2 \times \pi \times r_{\text{cylinder}} = 132 \text{ cm}$
 $\Rightarrow r_{\text{cylinder}} = 21 \text{ cm}$
 C → Volume of cylinder = 13860 cm^3
 $\Rightarrow \pi \times (r_{\text{cylinder}})^2 \times h_{\text{cylinder}} = 13860 \text{ cm}^3$
 Radius and height of the cylinder can be obtained from any two statements.
 Hence, the question can be answered by using any two of the three statements together.

17. (a); A → Let the number of green and blue balls in the bag be $4x$ and $3x$ respectively.
 B → Numbers of red balls + 2 = Number of green balls
 $\Rightarrow R + 2 = G$

C → Number of green balls + Number of blue balls
 $= 2 \times \text{Number of red balls}$
 $\Rightarrow G + B = 2R$
 Probability of getting a red ball
 $= \frac{\text{Number of red balls}}{\text{Total number of balls}} = \frac{R}{G + B + R} = \frac{R}{3R}$
 From statements A and B,
 Number of red balls = Number of green balls - 2
 $= 4x - 2$
 Probability of getting a red ball
 $= \frac{\text{Number of red balls}}{\text{Total number of balls}} = \frac{4x - 2}{4x + 3x + 4x - 2} = \frac{4x - 2}{11x - 2}$
 Hence, C alone is sufficient to answer the question.

18. (c); A → $6 \times \text{SP} = 7 \times \text{CP}$
 $\Rightarrow \text{CP} = \frac{6}{7} \text{ of SP}$
 B → $\text{SP} - 40 = \text{CP} + 10\% \text{ of CP}$
 $\Rightarrow \text{SP} - 40 = 1.1 \text{ of CP}$
 C → $(100 - 14\frac{2}{7})\% \text{ of SP} = \text{CP}$
 $\Rightarrow \text{CP} = \frac{6}{7} \text{ of SP}$
 Hence, either A and B together or B and C together are sufficient to answer the question.

19. (d); Let the first term and common difference of the AP be a and d respectively.
 A → $A_7 = 32 + A_3$
 $\Rightarrow a + 6d = 32 + a + 2d$
 $\Rightarrow 4d = 32$
 $\Rightarrow d = 8$
 B → $\frac{A_1 + A_2 + A_3 + A_4 + A_5}{5} = 20$
 $\Rightarrow a + a + d + a + 2d + a + 3d + a + 4d = 100$
 $\Rightarrow 5a + 10d = 100$
 $\Rightarrow a + 2d = 20$
 C → $A_3 + A_5 = 56$
 $\Rightarrow a + 2d + a + 4d = 56$
 $\Rightarrow 2a + 6d = 56$
 $\Rightarrow a + 3d = 28$
 Hence, the question can be answered by using any two of the three statements together.

20. (e); A → CI for 2 years - SI for 2 years = Rs.60
 $\Rightarrow \left(P \left(1 + \frac{R}{100} \right)^2 - P \right) - \frac{P \times R \times 2}{100} = 60$
 $\Rightarrow P \left(\frac{R}{100} \right)^2 = 60$
 B → SI for 5 years = $\frac{1}{4}P$
 $\Rightarrow \frac{P \times R \times 5}{100} = \frac{1}{4}P$
 $\Rightarrow R = 5\% \text{ p.a.}$
 C → CI for 3 years on Rs.16000 = Rs.2522
 $\Rightarrow \left(16000 \left(1 + \frac{R}{100} \right)^3 - 16000 \right) = 2522$
 $\Rightarrow R = 5\%$
 Hence, the question can be answered by using either statement B alone or statements C alone.

Previous Year Question

1. (c); Let number of black, red and white balls be a, b & c respectively.

From I:

ATQ,

$$\frac{a}{a+b+c} = \frac{1}{6}$$

$$\Rightarrow 5a = b + c \dots(i)$$

$$\text{And, } \frac{b}{a+b+c} = \frac{1}{6}$$

$$\Rightarrow 5b = a + c \dots(ii)$$

$$\text{And, } \frac{c}{a+b+c} = \frac{2}{3}$$

$$\Rightarrow c = 2a + 2b \dots(iii)$$

On solving (i), (ii) & (iii), we get:

$$a : b : c = 1 : 1 : 4$$

From II:

ATQ,

$$\frac{c-1}{a+b+c-1} = \frac{15}{23}$$

$$\Rightarrow 8c = 15a + 15b + 8$$

From I & II:

Let a, b & c be x, x & 4x respectively.

$$\Rightarrow 32x = 15x + 15x + 8 \Rightarrow x = 4$$

Hence, t = 24

So, **statement I & II** together are necessary to answer the question.

2. (b); **From I:**

$$\text{Amount invested by Deepak} = 12000 \times \frac{5}{4}$$

$$= \text{Rs.15000}$$

Profit sharing ratio of Shivam to that of Deepak =

$$(12000 \times 10) : (15000 \times 4)$$

$$= 2 : 1$$

From II:

Let amount invested by Shivam and Deepak be Rs.4x and Rs.5x respectively.

And let period of investment of Shivam and Deepak be 5y months and 2y months respectively.

Now, profit sharing ratio of Shivam to that of Deepak = (4x × 5y) : (5x × 2y) = 2 : 1

Now, let total profit be Rs.P.

ATQ,

$$\frac{2-1}{3} \times P = 12000$$

$$\Rightarrow P = \text{Rs.36000}$$

$$\text{Hence, profit share of Shivam} = \frac{2}{3} \times 36000 = \text{Rs.24000}$$

Hence, **statement II** alone is sufficient to answer the question.

3. (c); **From I:**

Let cost price of the article be Rs.100x.

$$\text{So, marked price of the article} = 100x \times \frac{180}{100}$$

$$= \text{Rs.180x}$$

$$\text{And selling price of the article} = \text{Rs.}(100x + 100)$$

From II:

Let marked price and discount allowed on the article be Rs.3y and Rs.y respectively.

From I & II:

$$3y = 180x$$

$$\Rightarrow y = 60x$$

ATQ,

$$100x + 100 = 180x - 60x$$

$$\Rightarrow x = 5$$

So, marked price of the article = 180x

$$= \text{Rs.900}$$

Hence, **statements I and II** together are sufficient to answer the question.

5. (e); Let rate of interest be R% p.a.

From I:

Let period of investment be t years.

ATQ,

$$\text{(if sum is invested at SI); } \frac{6000 \times t \times R}{100} = 4500$$

$$\Rightarrow tR = 75$$

$$\text{(if sum is invested at CI); } 6000 \left(1 + \frac{R}{100}\right)^t = 10500$$

From II:

Let amount invested by Pankaj at SI and at CI be Rs.100x

ATQ,

$$\left(P \left(\left(1 + \frac{R}{100}\right)^2 - 1 \right) \right) - \left(\frac{P \times R \times 2}{100}\right) = 90$$

$$\Rightarrow PR^2 = 900000$$

Hence, **statements I and II** together are not sufficient to answer the question.

5. (a); **From I:**

Let radius and height of cylinder be r cm and h cm respectively.

ATQ,

$$2\pi rh = 1760$$

$$\Rightarrow rh = 280 \dots(i)$$

$$\text{And, } 2\pi r(r + h) = \frac{170}{100} \times 1760$$

$$\Rightarrow r^2 + rh = 476 \dots(ii)$$

On solving (i) & (ii), we get:

$$r = 14, h = 20$$

$$\text{Hence, volume of cylinder} = \pi r^2 h = 12320 \text{ cm}^3$$

From II:

$$\text{Height of cylinder} = 30 \times \frac{2}{3} = 20 \text{ cm}$$

ATQ,

$$\pi r^2 \times 20 = 2 \times \frac{1}{3} \pi r^2 \times 30$$

It can't be solved further.

Hence, **statement I** alone is sufficient to answer the question.

6. (d); From I -

Ratio of efficiency of A to B is 5 : 4
So,
Ratio of time taken by A : B is 4 : 5
From I we can calculate the time taken by A alone to complete the work
Hence statement I alone is sufficient to answer the question

From II -

From II we can say that either A takes more time than B or vice versa.

Let A takes $(x + \frac{45}{2})$ days and B takes x days. So, time taken by A and B together to complete the work will be = $15 \times \frac{10}{11}$ days

$$\text{ATQ, } \frac{2}{2x+45} + \frac{1}{x} = \frac{11}{150}$$

from here x can be calculated and we can find the value of time taken by A alone to complete the work.

We can find the answer from either statement I alone or statement II alone.

7. (d); From I -

Radius of circle C1 is half the diagonal of square. So, we can find side of square from statement I alone.

From II - Diameter of circle C2 is equal to side of square. So, we can find side of square from statement II alone.

Hence, Either statement I alone or statement II alone is sufficient to answer the question.

8. (d); It is given that $\frac{35}{x-y} + \frac{35}{x+y} = 4$

From I - We get the value of x from first statement so on putting the value of x in the above equation we obtain value of y.

So, we can find the value of required time from statement I alone.

From II - $\frac{x}{y} = \frac{5}{1}$

On putting the value of x/y in the equation we obtain value of x and y.

So from statement II alone we can find the value of the required time.

So, from each statement individually we can find the value of required time.

9. (a); Let length of train be x meter so length of platform will be 2x meter

So, speed of train (in m/s) = $\frac{3x}{48}$

From I - ATQ, $\frac{x}{\frac{3x}{48} - 4} = 20$

So, x can be calculated from I and hence speed of train can be calculated.

From II - Statement II gives information only about percentage decrease in speed. We can not calculate speed of train because no information is given about time.

So statement I alone is sufficient to answer the question while statement II alone is not sufficient to answer the question.

10. (b); From I -

Probability of getting a black ball is = $\frac{1}{6}$

Let there are 'a' black balls & '6a' total balls

Similarly red balls = 'a'

Probability of getting a white ball = $\frac{2}{3} = \frac{4}{6}$

There will be 4a white balls.

x = 6a

But it can't be solved further.

From II -

Probability of getting a white balls = $1 - \frac{8}{23} = \frac{15}{23}$

Let here 15 m white balls and 23 m total remaining balls after 1 white ball is lost

And $23m + 1 = x$

15m + 1 is initial number of white balls

15 m is multiple of 15, it could be

15, 30, 45....

But it is given that initial number is less than 27.

Therefore initial number of balls is $15m + 1 = 16$ balls, and now 15 balls are remaining. Hence $23m = x - 1$

Put m=1

x=24 balls

Hence it can be answered from (ii) alone.

11. (c); Using A $\rightarrow \begin{matrix} Q \rightarrow 1 \\ R \rightarrow 2 \\ S \rightarrow 3 \\ P \rightarrow 4 \end{matrix}$: we get solution

Using B $\rightarrow \begin{matrix} Q \rightarrow 1 \\ R \rightarrow 2 \\ S \rightarrow 3 \\ P \rightarrow 4 \end{matrix}$: we get solution

Thus we get the solution either A or B

12. (e); From statements I and III

h = 28m, then $r = \frac{28}{2} = 14m$

$\pi r^2 h = \frac{22}{7} \times 14 \times 14 \times 28$

= $22 \times 28 \times 28$

From statements II and III

Area = $\pi r^2 = 616 \text{ sqm}$, h = 28m

Q Capacity = Area \times h = $\pi r^2 h$

= $(616 \times 28) \text{ m}^3$

From statements I and II,

Capacity = $\left[616 \times 2 \times \sqrt{\frac{616}{\pi}} \right] \text{ m}^3$

So, capacity of cylindrical tank can be found by using any two of the three statements.

- 13. (d);** Let the number = $10y + x$
 From statement I,
 $(10x + y) - (10y + x) = 9$
 $x - y = 1$
 From statement II, $x + y = 7$
 From statement III, $x - y = 1$
 So, II and either I or III is necessary.
- 14. (c);** Q Average money = 120 Rs.
 \therefore The sum of all three quotation = 360 Rs.
 (According to the statement I)
 \therefore Sum of remaining two = Rs. $(360 - 90)$
 = Rs. 270
 If one of them is rs. 125 according to the statements II
 So, both statements are necessary to given, the answer.
- 15. (d);** From II, $\frac{1}{3}$ of $x = 33$ $x = 99$
 From Statement I, Y and Z are first and third number (or third and first numbers), respectively as their difference is 4. So, these two numbers are $99 - 2$ and $99 + 2$, Hence, we can find the sum of these number by using both the statements together
- 16. (c);** From statement I
 $1 \text{ boy} = \frac{3}{4} \text{ man} \Rightarrow 5 \text{ boys} = \frac{3}{4} \times 5 \text{ man} = \frac{15}{4} \text{ man}$
 10 man take 6 h to do the work. So, $\frac{15}{4}$ boys which is equal to $\frac{15}{4}$ man can take $\frac{10 \times 6 \times 4}{15}$ days to do work.
 \therefore Statement I alone is sufficient
 From statement II
 10 men can complete the work in 6 h. So, 5 man can complete the work in 60 h.
 Hence, statement II alone is sufficient.
- 17. (c);** From statement II, Number = 6, $x, 6$
 But from statement I, it must be divisible by 9.
 $\therefore x = 6$ (using divisibility rule of 9)
- 18. (c);** From statement II
 Let digit at units place = x
 Then, digit at ten's place = $2x$
 From statement I, $x + 2x = 6 \Rightarrow 3x = 6 \Rightarrow x = 2$
 Hence, we can find the number using both the statements together.
- 19. (c);** From statement II, Rohit's monthly income = Rs. 3.5 thousand = Rs. 3500
 Amit's monthly income = $2 \times 3500 = 7000$ Rs.
 From statement I, Jyoti's monthly income = Rs. $(7000 + 8500)$ (using statement II) = 15500 Rs.
 Thus, both the statements together are sufficient to answer the question
- 20. (d);** From statement I, $SI = \frac{P \times R \times T}{100}$
 $11480 = \frac{14350 \times R \times 4}{100} \Rightarrow R = 20\%$
 From statement II, $P = \frac{P \times R \times 5}{100} \Rightarrow R = 20\%$
 Thus, statement I alone or statement II alone is enough to answer the question.
- 21. (d);** Using statement I
 Profit percent = $\left(\frac{5-4}{4} \times 100\right)\% = 25\%$
 $\therefore 125\%$ of cp = 15675
 $\Rightarrow CP = \frac{15675 \times 100}{125} = 12540$
 \therefore Profit = SP - CP = $15675 - 12540 =$ Rs. 3135
 Similarly, we can find the profit using statement II. So, either statement I or statement II is sufficient to answer
- 22. (b);** Total salary of A, B, C and D = $4 \times 62880 =$ Rs. 251520
 From statement II, we can find the total salary of A, C, and D and subtracting if from above value, we can get the salary of B. Also, nothing can be said about the salary of B, using statement I alone.
- 23. (e);** Since, we don't know the income and expenditure of the company in 2009, therefore we can't find the income and expenditure of the company in 2008 even by using the given statement and thus we can't find the profit of the company in 2008.
- 24. (e);** From statement I, $C = 1.5 B$
 From statement II
 $A + B = 2 \times 23500 = 47000$ Rs.
 Thus, we can't find the salary of c even using both the statements together.
- 25. (d);** From statement I, Ratio of investment of Nikita and Sharmila = $150\% : 100\% = 3 : 2$
 From statement II, Ratio of investment of Nikita and Sharmila = $1 : \frac{2}{3} = 3 : 2$
 \therefore Nikita's share = $\frac{3}{5} \times 50000 =$ Rs. 30000
 Thus either statement I alone or statement II alone is sufficient to answer the question.

