2023-24
English Medium

SSC- MATHEMATICS

CHAPTERWISE
SOLVED PAPERS

Youth
Competition
Times

STAFF SELECTION COMMISSION

MATHEMATICS

SSC
2023-24

CGL (TIER I & II), CHSL (10+2),
CPO-SI, MTS, GD, Selection Post

CHAPTERWISE
Solved Papers

Computer
Based Test

CHAPTERWISE &
SUB TOPICWISE

10150+
OBJECTIVE
QUESTIONS

Include Chapterwise Presentation of 353 Online Question Papers (All Sets)

Staff Selection Commission

SSC

Maths

Chapterwise Solved Papers

(Computer Based Test)

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SECTION-1

SECTION-2

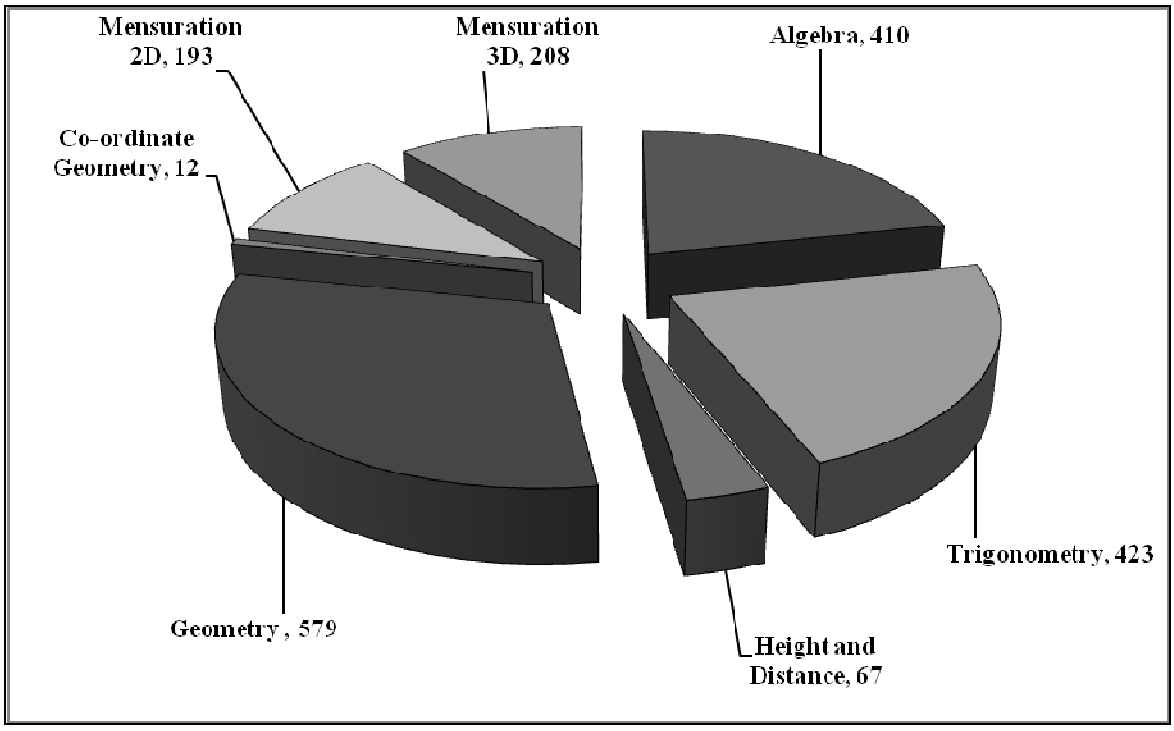
Analysis Chart of Question Papers of Various Previous Exam of SSC

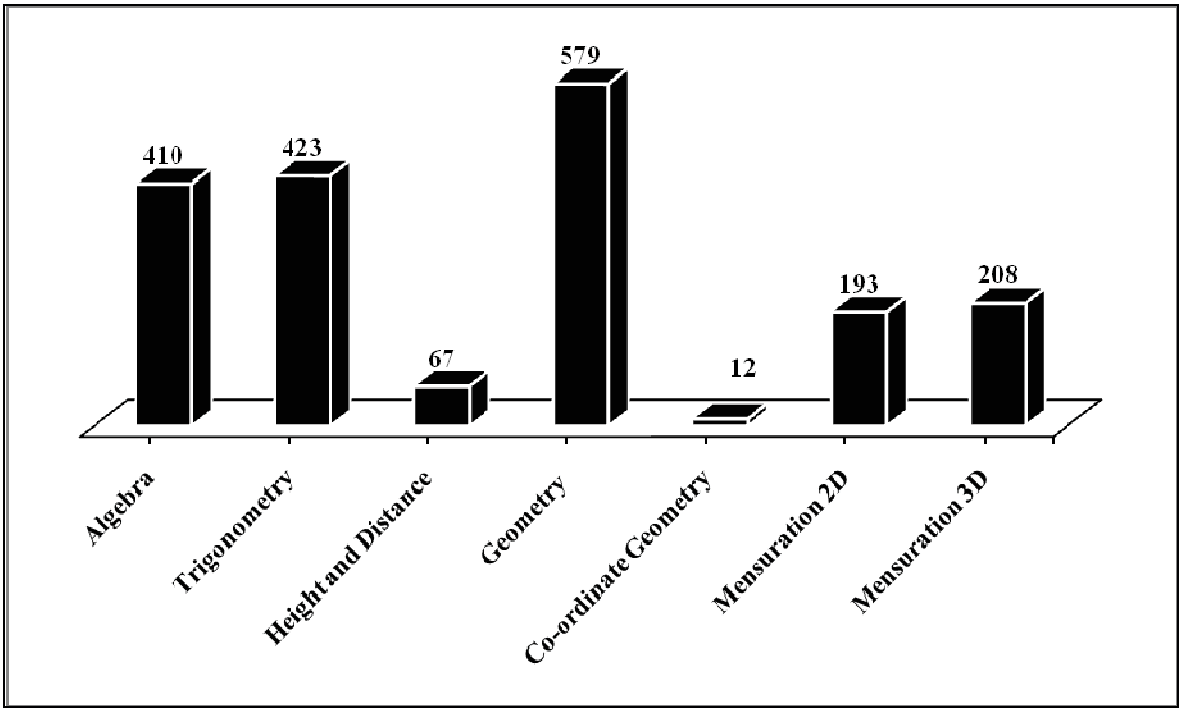
Sr. No.	Exam	Exam Year	Total Questions	Total Question of Maths
1.	SSC CGL	2022	21	21 × 25 = 525
2.	SSC CHSL	2022	42	42 × 25 = 1050
3.	SSC MTS	2021	42	42 × 25 = 1050
4.	SSC CPO-SI	2020	6	6 × 50 = 300
5.	SSC Selection Post Phase VIII (Graduate Level)	2020	4	4 × 25 = 100
6.	SSC Selection Post Phase VIII (H.S. Level)	2020	3	3 × 25 = 75
7.	SSC Selection Post Phase VIII (Matriculation Level)	2020	5	5 × 25 = 125
8.	SSC CGL (Tier-II)	2020	3	3 × 100 = 300
9.	SSC CHSL	2020	36	36 × 25 = 900
10.	SSC CGL (Tier-I)	2020	18	18 × 25 = 450
11.	SSC CPO-SI	2019	8	8 × 50 = 400
12.	SSC Selection Post Phase VII (Graduate Level)	2019	4	4 × 25 = 100
13.	SSC Selection Post Phase VII (H.S. Level)	2019	4	4 × 25 = 100
14.	SSC Selection Post Phase VII (Matriculation Level)	2019	4	4 × 25 = 100
15.	SSC CGL (Tier-II)	2019	3	3 × 100 = 300
16.	SSC CGL (Tier-I)	2019	22	22 × 25 = 550
17.	SSC MTS	2019	39	39 × 25 = 975
18.	SSC GD	2019	40	40 × 25 = 1000
19.	SSC CHSL	2019	25	25 × 25 = 625
20.	SSC CGL (Tier-II)	2017	7	7 × 100 = 700
21.	SSC MTS	2017	17	17 × 25 = 425
	Total		**353**	**10,150**

Note-Chapterwise compilation of total 10,150 questions of Quantitive Aptitude has been presented out of total 353 question papers of total 21 examinations conducted by Staff Selection Commission (SSC). Out of total 10150 questions asked from Quantitive Aptitude, total 5113 question of General Behevior have been removed and chapterwise compilation of 5037 questions of different types has been presented. In this book, every effort has been made by the Examination Special Committee to accommodate maximum variety of questions, so that examines can be made aware of the variety of questions asked by SSC.

Trend Analysis of Previous Year SSC Exams Papers
Through Pie Chart and Bar Graph

SECTION-1





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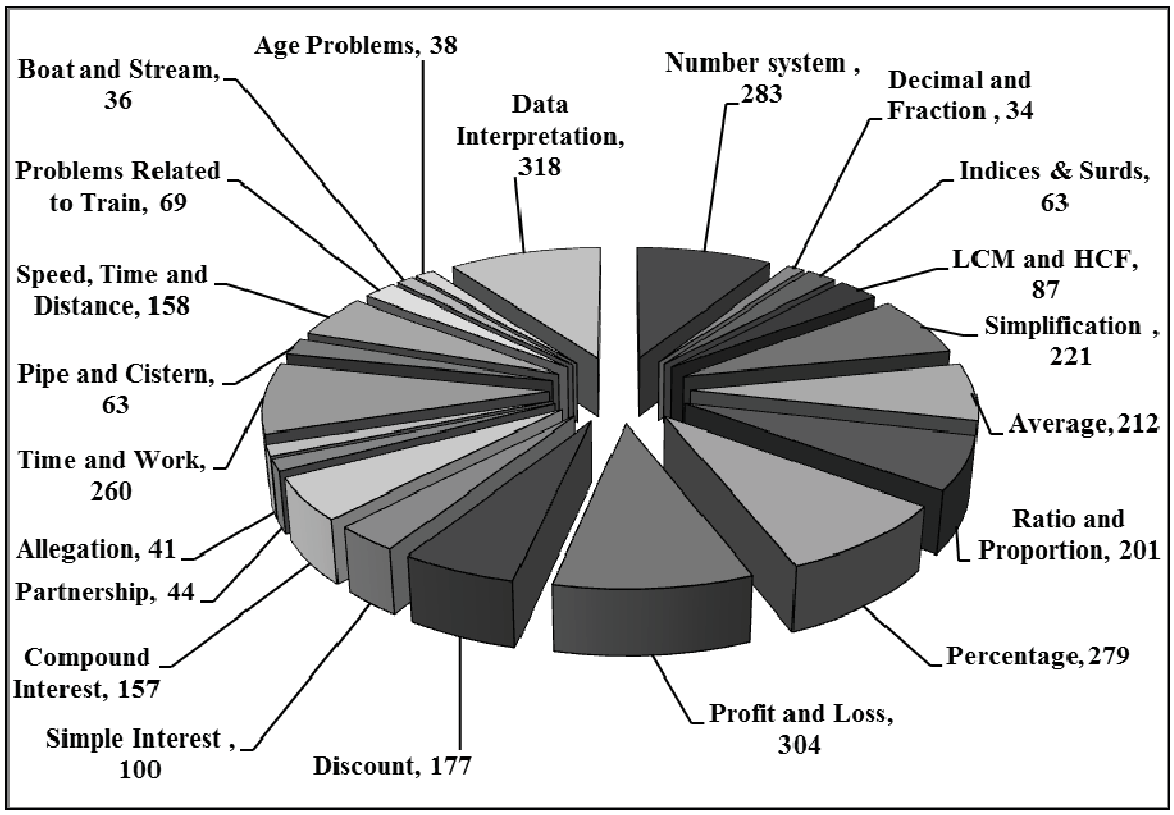
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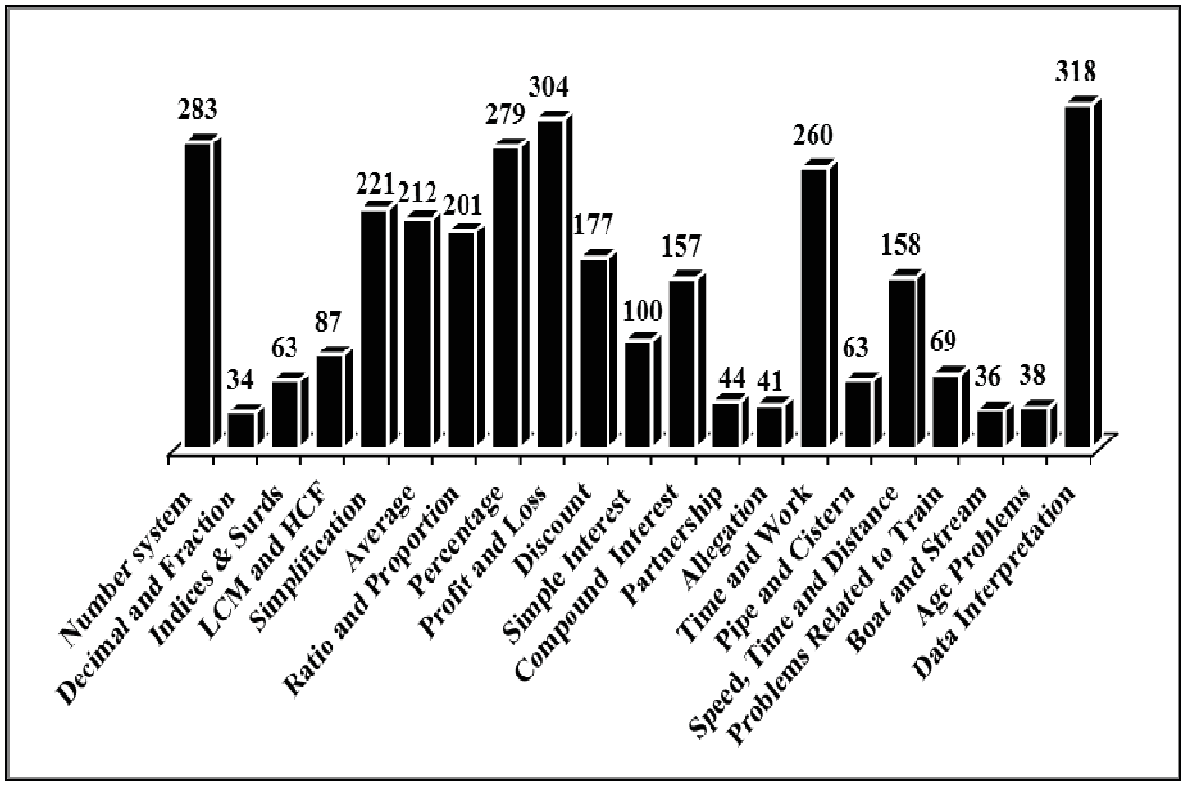
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01.

ALGEBRA

(I) Problems based on Linear Equations

1. If $2x + 3y - 5z = 18$, $3x + 2y + z = 29$ and $x + y + 3z = 17$, then what is the value of $xy+yz+zx$?

(a) 32 (b) 52
(c) 64 (d) 46

SSC CGL (Tier-II) 21-02-2018

Ans. (b) : Given,
$2x + 3y - 5z = 18$ ..... (i)
$3x + 2y + z = 29$ .....(ii)
$x + y + 3z = 17$ ..... (iii)
Multiplying by 5 in equation (ii) and adding it to equation (i),
$2x + 3y - 5z = 18$
$15x + 10y + 5z = 145$
$17x + 13y = 163$ ..... (iv)
Again, on multiplying by 3 in equation (ii) and subtracting it to equation (iii) get-
$8x + 5y = 70$ ..... (v)
By solving the equation (iv) and (v)
$x = 5, \quad y = 6$
On putting the value of $x = 5$ and $y = 6$ in equation (ii),
$15 + 12 + z = 29$
$\Rightarrow z = 2$
$\therefore xy + yz + zx = (5\times6) + (6\times2) + (2\times5)$
$= 30 + 12 + 10 = \boxed{52}$

2. If $a - b = 3$ and $a^3 - b^3 = 999$, then find the value of $a^2 - b^2$.

(a) 60 (b) 62
(c) 64 (d) 63

SSC CHSL 03/06/2022 (Shift- II)

Ans. (d) : $a - b = 3$
$a^3 - b^3 = 999$
$(a - b)[(a - b)^2 + 3ab] = 999$
$3[9 + 3ab] = 999$
$3ab = 333 - 9$
$ab = 108$
$(a + b)^2 = (a - b)^2 + 4ab$
$(a + b)^2 = 9 + 4 \times 108$
$(a + b)^2 = 441$
$a + b = 21$
$a^2 - b^2 = (a - b)(a + b)$
$= 3 \times 21 = 63$

3. If x, y, z are three integers such that $x + y = 8$, $y + z = 13$ and $z + x = 17$, then the value of $\frac{x^2}{yz}$ is:

(a) 1 (b) $\frac{18}{11}$
(c) 0 (d) $\frac{7}{5}$

SSC CGL (Tier-I)-2019–03/03/2020 (Shift-I)

Ans. (b) : Given, $x + y = 8$ ..... (1)
$y + z = 13$ ..... (2)
$z + x = 17$ ..... (3)
On adding the equation (i), (ii), and (iii)
$2(x+y+z) = 38$-------(iv)
$x + y + z = 19$
$\therefore x = 6, y = 2, z = 11$
$\therefore \frac{x^2}{yz} = \frac{36}{22} = \frac{18}{11}$

Trick:
Put, $a = 6, y = 2, z = 11$
$\therefore \frac{x^2}{y^2} = \frac{6^2}{2\times11} = \frac{18}{11}$

4. If $3x + 6y + 9z = \frac{20}{3}$, $6x + 9y + 3z = \frac{17}{3}$ and $18x + 27y - z = \frac{113}{9}$, then what is the value of $75x + 113y$?

(a) 163/3 (b) 143/6
(c) 218/9 (d) 311/3

SSC CGL (Tier-II) 9-3-2018

Ans. (a) :
$3x + 6y + 9z = \frac{20}{3}$.....(1)
$6x + 9y + 3z = \frac{17}{3}$.....(2)
$18x + 27y - z = \frac{113}{9}$.....(3)
On Multiplying by 3 in equation (iii) and adding it in equation (ii),
$54x + 81y - 3z + 6x + 9y + 3z = \frac{113}{3} + \frac{17}{3}$
$60x + 90y = \frac{130}{3}$
$6x + 9y = \frac{13}{3}$.....(4)
Multiplying by 3 in equation (2) and substracting it from equation 1,
$3x + 6y + 9z - 18x - 27y - 9z = \frac{20}{3} - 17$
$-15x - 21y = \frac{-31}{3}$
$15x + 21y = \frac{31}{3}$.....(5)
Multiplying by 5 and 2 in equation (4) and equation (5) respectively then subtracting equation (5) from equation (4).
$30x + 45y = \frac{65}{3}$

$$30x + 42y = \frac{62}{3}$$

$$\underline{- \quad - \quad -}$$

$$3y = 1$$

$$y = \frac{1}{3}$$

From equation (4),

$$6x + 3 = \frac{13}{3}$$

$$6x = \frac{13}{3} - 3$$

$$6x = \frac{4}{3}$$

$$x = \frac{2}{9}$$

$$\therefore 75x + 113y = 75 \times \frac{2}{9} + 113 \times \frac{1}{3}$$

$$= \frac{50}{3} + \frac{113}{3} = \frac{163}{3}$$

Trick:

$$\left(\text{eq}^{\text{n}}(\text{i}) + \text{eq}^{\text{n}}(\text{ii})\right) \times \frac{1}{3} + \text{eq}^{\text{n}}(\text{iii}) \times 4$$

$$\left(9x + 15y + 12z\right) \times \frac{1}{3} + \left(72x + 108y - 4z\right)$$

$$= \frac{37}{9} + \frac{452}{9}$$

$$75x + 113y = \frac{489}{9} = \frac{163}{3}$$

5. If $3x + 4y - 2z + 9 = 17$, $7x + 2y + 11z + 8 = 23$ and $5x + 9y + 6z - 4 = 18$, then what is the value of $x + y + z - 34$?

(a) –28 (b) –14
(c) –31 (d) –45

SSC CGL (Tier-II) 20-02-2018

Ans. (c) : $3x + 4y - 2z + 9 = 17$ ..... (i)
$7x + 2y + 11z + 8 = 23$ ..... (ii)
$5x + 9y + 6z - 4 = 18$ ..... (iii)
By adding the equation (i), (ii) and (iii)
$15x + 15y + 15z = 45$
$x + y + z = 3$
$\therefore x + y + z - 34$
$= 3 - 34 = -31$

6. If $x + 3y - \frac{2z}{4} = 6, x + \frac{2}{3}(2y + 3z) = 33$ and $\frac{1}{7}(x + y + z) + 2z = 9$, then what is the value of $46x + 131y$?

(a) 414 (b) 364
(c) 384 (d) 464

SSC CGL (Tier-II) 20-02-2018

Ans. (a) $x + 3y - \frac{2z}{4} = 6$
$4x + 12y - 2z = 24$ -------(i)
$x + \frac{2}{3}(2y + 3z) = 33$
$3x + 4y + 6z = 99$ --------(ii)
$\frac{1}{7}(x + y + z) + 2z = 9$
$x + y + z + 14z = 63$
$x + y + 15z = 63$ --------(iii)
From Equation (i) $\times \frac{21}{2}$ + Equation (ii) + Equation (iii),
$42x + 126y - 21z + 3x + 4y + 6z + x + y + 15z = 252 + 99 + 63$
$46x + 131y = 414$

7. If $3x + 4y - 11 = 18$ and $8x - 6y + 12 = 6$, then what is the value of $5x - 3y - 9$?

(a) 18 (b) –9
(c) –27 (d) –18

SSC CGL (Tier-II) 19-02-2018

Ans. (b) : $3x + 4y = 29$ ———— (i)
$8x - 6y = -6$
$4x - 3y = -3$ ———— (ii)
On solving the equation (i) and (ii),
$x = 3, y = 5$
$\therefore 5x - 3y - 9 = 15 - 15 - 9 = -9$

8. If $a + b + c = 7/12$, $3a - 4b + 5c = 3/4$ and $7a - 11b - 13c = -7/12$, then what is the value of $a + c$?

(a) 1/2 (b) 5/12
(c) 3/4 (d) 1/4

SSC CGL (Tier-II) 19-02-2018

Ans. (b) : $a + b + c = \frac{7}{12}$ .....(1)

$3a - 4b + 5c = \frac{3}{4}$ .....(2)

$7a - 11b - 13c = -\frac{7}{12}$ .....(3)

Multiplying by 4 in equation (1) then adding it in equation (2)

$$4a + 4b + 4c + 3a - 4b + 5c = \frac{7}{3} + \frac{3}{4}$$

$$7a + 9c = \frac{37}{12} \quad \text{.....(4)}$$

On multiplying by 11 in equation (1) then adding it in equation (3)

$$11a + 11b + 11c + 7a - 11b - 13c = \frac{77}{12} - \frac{7}{12}$$

$$18a - 2c = \frac{35}{6}$$

$$9a - c = \frac{35}{12} \quad \text{.....(5)}$$

On multiplying by 9 in equation (5) then adding it in equation (4),

$$81a - 9c + 7a + 9c = \frac{315}{12} + \frac{37}{12}$$

$$88a = \frac{352}{12}$$

$$a = \frac{1}{3}$$

From equation (5),

$$3 - c = \frac{35}{12}$$

$c = \frac{1}{12}$

thus $a + c = \frac{1}{3} + \frac{1}{12} = \frac{4+1}{12} = \frac{5}{12}$

9. If x–4y = 0 and x + 2y = 24, then what is the value of (2x + 3y)/(2x–3y) ?

(a) 9/5 (b) 11/5
(c) 13/7 (d) 9/7

SSC CGL (Tier-II) 18-02-2018

Ans. (b):
Given,
x – 4y = 0 ----------(i)
x + 2y = 24 ----------(ii)
On putting the value x = 4y in equation (ii)……
6y = 24
y = 4
∴ x = 16
As per question,

$$\frac{2x+3y}{2x-3y} = \frac{32+12}{32-12} = \frac{44}{20} = \frac{11}{5}$$

10. If 3x + 5y + 7z = 49 and 9x + 8y + 21z = 126, then what is the value of y?

(a) 4 (b) 2
(c) 3 (d) 5

SSC CGL (Tier-II) 17-2-2018

Ans. (c) : 3x + 5y + 7z = 49 _____(i)
9x + 8y + 21z = 126 _____(ii)
On multiplying by 3 in equation (i),
9x + 15y + 21z = 147 _____(iii)

From equation (iii) –Equation (ii)
7y = 21
y = 3

11. Cost of 8 pencils, 5 pens and 3 erasers is Rs. 111. Cost of 9 pencils, 6 pens and 5 erasers is Rs. 130. Cost of 16 pencils, 11 pens and 3 erasers is Rs. 221. What is the cost (in Rs.) of 39 pencils 26 pens and 13 erasers ?

(a) 316 (b) 546
(c) 624 (d) 482

SSC CGL (Tier-II) 21-02-2018

Ans. (b) : Let, the price of 1 pencil, 1 pen and 1 eraser are x, y and z respectively.
As per question,
8x + 5y + 3z = 111 ..... (i)
9x + 6y + 5z = 130 ..... (ii)
16x + 11y + 3z = 221..... (iii)
By adding equations (i), (ii) and (iii)
33x + 22y + 11z = 462 ..... (iv)
On dividing by 11,
3x + 2y + z = 42 ..... (v)
From equation (v) × 13
39x + 26y + 13z = = $\boxed{546}$

12. A man buys 2 apples and 3 kiwi fruits for ₹37. If he buys 4 apples and 5 kiwi fruits for ₹67, then what will be the total cost of 1 apple and 1 kiwi fruit?

(a) ₹20 (b) ₹18
(c) ₹15 (d) ₹28

SSC CHSL –17/03/2020 (Shift-II)

Ans. (c) : Let the cost price of an apple and a kiwi be x and y respectively.
As per question,
2x + 3y = 37.....(i)
4x + 5y = 67 .....(ii)
By solving the equation (i) and (ii),

4x	+	6y	=	74 {multiplying by 2 in equation (i)}
4x	+	5y	=	67
–		–		–
		y	=	7

From equation (i)–
2x + 3 × 7 = 37
2x = 16
x = 8
Hence, the cost price of an apple and a kiwi = 8 + 7 = ₹15

13. If (1.25) (1–6.4 × 10^{-5}) = 1.2496 + a, then a equals :

(a) 0.00032 (b) 0.0032
(c) 0.00016 (d) 0.0016

SSC CHSL (Tier-I) 11/07/2019 (Shift-II)

Ans. (a) : $(1.25)\left(1-6.4\times10^{-5}\right) = 1.2496 + a$

$$(1.25)\left(1-6.4\times\frac{1}{10^5}\right) = 1.2496 + a$$

$(1.25)(1-0.000064) = 1.2496 + a$
$1.25 \times 0.999936 = 1.2496 + a$
$1.24992 - 1.2496 = a$
$a = 0.00032$

14. If u + v = 84 and u – v = 4, then u : v is equal to?

(a) 11 : 10 (b) 10 : 11
(c) 10 : 9 (d) 9 : 10

SSC MTS 19/08/2019 (Shift-II)

Ans. (a) : Given,
u + v = 84 ——— (i)
u – v = 4 ——— (ii)
By solving the equation (i) and (ii)
2u = 88
$\boxed{u = 44}$
∴ v = 40
u : v = 44 : 40
= 11 : 10

15. The sum and difference of two numbers is 27 and 3 respectively. What is the ratio of two numbers?

(a) 5 : 3 (b) 2 : 1
(c) 4 : 7 (d) 5 : 4

SSC MTS 16/08/2019 (Shift-III)

Ans. (d) : Let the numbers are x and y respectively.
As per question,
x + y = 27 ———(i)
x – y = 3 ———(ii)
By solving the equations (i) and (ii)
x = 15, y = 12
Ratio of numbers x : y = 15 : 12 = 5 : 4

16. If the difference of two numbers is 7 and the difference of their squares is 203, then what is the smaller number?

(a) 10 (b) 9
(c) 12 (d) 11

SSC MTS 9-10-2017 (Shift-II)

Ans. (d) : Let the numbers are x and y
As per question,
$x-y = 7$ ---------- (i)
$x^2-y^2 = 203$
$(x+y)(x-y) = 203$
$7(x+y) = 203$
$x + y = 29$ .....(ii)
By solving the equation (i) and (ii)
$x = 18, y = 11$

(II) Problems based on Algebraic Identities

17. If $2x - y = 2$ and $xy = \frac{3}{2}$, then what is the value of $x^3 - \frac{y^3}{8}$?

(a) $\frac{9}{2}$ (b) $-\frac{5}{4}$
(c) $\frac{5}{2}$ (d) $\frac{13}{4}$

SSC CGL (Tier-II) 29/01/2022

Ans : (d) Given, $2x - y = 2$----------(i)
$xy = \frac{3}{2}$, $x^3 - \frac{y^3}{8} = ?$
On dividing by 2 and cubing both sides in eq^n, (i)
$\left(x - \frac{y}{2}\right)^3 = (1)^3$
$x^3 - \frac{y^3}{8} - 3 \times \frac{xy}{2} \times 1 = 1$
$x^3 - \frac{y^3}{8} = \frac{13}{4}$

18. If $x + \frac{16}{x} = 8$, then the value of $x^2 + \frac{32}{x^2}$ is:

(a) 24 (b) 16
(c) 20 (d) 18

SSC CGL (Tier-II)-2019–18/11/2020

Ans. (d) : $x + \frac{16}{x} = 8$ --------(Given)
$\because$ $x^2 - 8x + 16 = 0$
$(x-4)^2 = 0$
$x = 4$
Hence, $x^2 + \frac{32}{x^2}$
$= 4^2 + \frac{32}{4^2}$, $= 16 + \frac{32}{16}$
$= 16 + 2 = 18$

Trick:
Put, $x = 4$
$x + \frac{16}{x} = 8$(equation satisfies)
$\therefore x^2 + \frac{32}{x^2} = 16 + 2 = 18$

19. If $\left(5\sqrt{5}x^3 - 81\sqrt{3}y^3\right) \div \left(\sqrt{5}x - 3\sqrt{3}y\right) = (Ax^2 + By^2 + Cxy)$, then the value of $\left(6A + B - \sqrt{15}C\right)$ is?

(a) 10 (b) 15
(c) 9 (d) 12

SSC CGL (TIER-I)-2018 – 04.06.2019 (Shift-I)

Ans. (d) :
$\frac{5\sqrt{5}x^3 - 81\sqrt{3}y^3}{\sqrt{5}x - 3\sqrt{3}y} = Ax^2 + By^2 + Cxy$
$\boxed{a^3 - b^3 = (a-b)(a^2 + b^2 + ab)}$
$\frac{\left(\sqrt{5}x - 3\sqrt{3}y\right)\left(5x^2 + 27y^2 + 3\sqrt{15}xy\right)}{\left(\sqrt{5}x - 3\sqrt{3}y\right)} = Ax^2 + By^2 + Cxy$
$5x^2 + 27y^2 + 3\sqrt{15}xy = Ax^2 + By^2 + Cxy$
By comparing the coefficient of x^2, y^2 and xy, we get-
$A = 5, B = 27, C = 3\sqrt{15}$
$6A + B - \sqrt{15}C = 30 + 27 - \sqrt{15} \times \sqrt{15} \times 3$
$= 57 - 45 = 12$

20. If $x + 2y = 10$ and $2xy = 9$, then one of the value of $x - 2y$ is:

(a) 8 (b) 6
(c) 10 (d) 12

SSC CHSL 10/06/2022 (Shift- II)

Ans. (a) : Given that -
From formula -
$(a + b)^2 - (a - b)^2 = 4ab$
$(10)^2 - (x - 2y)^2 = 4 \times 9$
$100 - 36 = (x - 2y)^2$
$64 = (x - 2y)^2$
$\therefore x - 2y = 8$
Hence, option (a) is correct.

21. If $4x - 3y = 12$ and $xy = 5$, then find the value of $\frac{16x^2 + 9y^2}{8}$

(a) 33 (b) 18
(c) 3 (d) 44

SSC CGL (Tier-I) 21/04/2022 (Shift-III)

Ans : (c) $4x - 3y = 12$
On squaring both side
$16x^2 + 9y^2 - 24xy = 144$
$16x^2 + 9y^2 = 144 - 120$ (divide by 8 on both side)
$16x^2 + 9y^2 = 24$
$\frac{16x^2 + 9y^2}{8} = 3$

22. If $\left(x+\frac{1}{x}\right)=\frac{11}{5}$, what is the value of $\left(x^3+\frac{1}{x^3}\right)$?

(a) $4\frac{6}{125}$ (b) $5\frac{101}{125}$

(c) $10\frac{81}{125}$ (d) $17\frac{31}{125}$

SSC CHSL 26/05/2022 (Shift- III)

Ans. (a) : Given,

$x+\frac{1}{x}=\frac{11}{5}, \quad x^3+\frac{1}{x^3}=?$

We know that : -

If $x+\frac{1}{x}=a$, then $x^3+\frac{1}{x^3}=a^3-3a$

$\because$ a = 11/5

$\therefore \; x^3+\frac{1}{x^3}\Rightarrow\left(\frac{11}{5}\right)^3-3\times\frac{11}{5}$

$\Rightarrow\frac{1331}{125}-\frac{33}{5}\Rightarrow\frac{1331-825}{125}$

$\Rightarrow\frac{506}{125}=\boxed{4\frac{6}{125}}$

23. If $x+\frac{1}{x}=-2\sqrt{3}$, what is the value of $x^5+\frac{1}{x^5}$?

(a) $-178\sqrt{3}$ (b) $-182\sqrt{3}$

(c) $182\sqrt{3}$ (d) $-180\sqrt{3}$

SSC CHSL 24/05/2022 (Shift- III)

Ans. (a) : Given,

$x+\frac{1}{x}=-2\sqrt{3}$ ------- (i)

$x^5+\frac{1}{x^5}=?$

On cubing both sides of equation (i), we get-

$$x^3+\frac{1}{x^3}+3.x.\frac{1}{x}\left(x+\frac{1}{x}\right)=-8\times3\sqrt{3}$$

$$x^3+\frac{1}{x^3}-6\sqrt{3}=-24\sqrt{3}$$

$$\Rightarrow \quad x^3+\frac{1}{x^3}=-18\sqrt{3} \text{ ..... (ii)}$$

Again on squaring both sides of equation (i), we get-

$x^2+\frac{1}{x^2}+2=12$

$\Rightarrow\; x^2+\frac{1}{x^2}=10$.....(iii)

$\because$ We know that,

$x^5+\frac{1}{x^5}=\left(x^3+\frac{1}{x^3}\right)\left(x^2+\frac{1}{x^2}\right)-\left(x+\frac{1}{x}\right)$

From equation (i), (ii) & (iii), we get-

$x^5+\frac{1}{x^5}=\left(-18\sqrt{3}\right)(10)-\left(-2\sqrt{3}\right)$

$=-180\sqrt{3}+2\sqrt{3}$

$=-178\sqrt{3}$

$\Rightarrow\; x^5+\frac{1}{x^5}=-178\sqrt{3}$

24. If $\left(a+\frac{1}{a}+3\right)=6$ where a is a non-zero real number, then find the value of $a^2+\frac{1}{a^2}$.

(a) 3 (b) 47

(c) 49 (d) 7

SSC CGL (Tier-I) 21/04/2022 (Shift-III)

Ans : (d) $\left(a+\frac{1}{a}+3\right)=6$

$a+\frac{1}{a}=3$

On squaring both sides

$a^2+\frac{1}{a^2}+2\times a\times\frac{1}{a}=3^2$

$a^2+\frac{1}{a^2}=9-2$

$a^2+\frac{1}{a^2}=7$

25. If $a^2 + b^2 = 65$ and $ab = 8$, $a > b > 0$, then find the value of $a^2 - b^2$.

(a) 72 (b) 63

(c) 65 (d) 53

SSC CGL (Tier-I) 21/04/2022 (Shift-II)

Ans : (b) Given ,

$a^2+b^2 = 65$, $ab = 8$, $a^2-b^2 = ?$

Put , a= 8, b= 1

$a^2 - b^2 = 8^2 - 1^2$

$= 64-1 = 63$

26. If $x^4 + x^{-4} = 194$, $x > 0$ then the value of $(x-2)^2$ is?

(a) 6 (b) 3

(c) 2 (d) 1

SSC CGL (TIER-I)-2018 – 04.06.2019 (Shift-I)

Ans. (b) $x^4+\frac{1}{x^4}=194$

On adding 2 in both side

$$x^4+\frac{1}{x^4}+2=194+2$$

$$\left(x^2+\frac{1}{x^2}\right)^2=196$$

$$\Rightarrow \quad x^2+\frac{1}{x^2}=14$$

On adding 2 in both sides

$$x^2+\frac{1}{x^2}+2=14+2$$

$$\left(x+\frac{1}{x}\right)^2 = 16$$

$\Rightarrow \quad x+\frac{1}{x} = 4$

$x^2 + 1 = 4x$

$x^2 - 4x + 1 = 0$

On adding 3 in both sides

$x^2 - 4x + 1 + 3 = 3$

$x^2 - 4x + 4 = 3$

$\boxed{(x-2)^2 = 3}$

27. The expression $(a + b - c)^3 + (a - b + c)^3 - 8a^3$ is equal to:

(a) 6a (a–b+c) (c–a–b) (b) 3a (a+b–c) (a–b+c)

(c) 6a(a+b–c) (a– b+c) (d) 3a (a–b+c) (c–a–b)

SSC CGL (Tier-I)-2019 – 03/03/2020 (Shift-II)

Ans. (a) : $(a+b-c)^3 + (a-b+c)^3 - 8a^3$

$= (a+b-c)^3 + (a-b+c)^3 + (-2a)^3 = 0$

$\because A + B + C = a + b - c + a - b + c - 2a = 0$

$\therefore A^3 + B^3 + C^3 = 3ABC$

$\therefore (a+b-c)^3+(a-b+c)^3+(-2a)^3 = 3(a+b-c)\times(a-b+c)\times(-2a)$

$= 6a\,(a-b+c)\,(c-a-b)$

Trick:

$a = b + c = 1$

Taken,

$(a + b - c)^3 + (a - b + c)^3 - (2a)^3 = -6$

From option (a)

$6a\,(a - b + c)\,(c - a - b) = -6$ equation satisfy

28. If $x^4 - 79x^2 + 1 = 0$, then the value of $x + x^{-1}$ can be:

(a) 9 (b) 5

(c) 7 (d) 8

SSC CGL (Tier-I) 21/04/2022 (Shift-II)

Ans : (a) $x^4 - 79x^2 + 1 = 0$

On dividing by x^2 on both sides

$x^2 - 79 + \frac{1}{x^2} = 0$, $x^2 + \frac{1}{x^2} = 79$

Add 2 on both sides,

$x^2 + \frac{1}{x^2} + 2 = 79 + 2$

$\left(x+\frac{1}{x}\right)^2 = 81$, $x + \frac{1}{x} = 9$

29. If $a^3+3a^2+9a = 1$, then what is the value of $a^3 + (3/a)$?

(a) 31 (b) 26

(c) 28 (d) 24

SSC CGL (Tier-II) 17-2-2018

Ans. (c) : $a^3 + 3a^2 + 9a = 1$

$a^2 + 3a + 9 = \frac{1}{a}$

Multiplying by (a–3) in both side

$(a - 3)(a^2 + a \times 3 + 3^2) = \frac{1}{a} \times (a - 3)$

$a^3 - 3^3 = \frac{a}{a} - \frac{3}{a}$

$a^3 + \frac{3}{a} = 1 + 27 = 28$

30. If $5x - \frac{1}{4x} = 6, x > 0$, then find the value of $25x^2 - \frac{1}{16x^2}$.

(a) $6\sqrt{41}$ (b) 36

(c) $\sqrt{246}$ (d) $6\sqrt{31}$

SSC CGL (Tier-I) 21/04/2022 (Shift-I)

Ans : (a) Given–

$5x - \frac{1}{4x} = 6 \text{-----(i)}$

From formula $(a + b)^2 = (a - b)^2 + 4ab$

$\therefore \left(5x+\frac{1}{4x}\right)^2 = \left(5x-\frac{1}{4x}\right)^2 + 4\times 5x \times \frac{1}{4x}$

$\Rightarrow \left(5x+\frac{1}{4x}\right)^2 = \left(5x-\frac{1}{4x}\right)^2 + 5$

$\Rightarrow \left(5x+\frac{1}{4x}\right)^2 = (6)^2 + 5$

$\left(5x+\frac{1}{4x}\right) = \sqrt{41} \text{-----(ii)}$

$\therefore 25x^2 - \frac{1}{16x^2} = \left(5x-\frac{1}{4x}\right)\left(5x+\frac{1}{4x}\right)$

$= 6\sqrt{41}$ $\{\text{from eq}^n \text{ (i) \& (ii)}\}$

31. If $x + y + z = 2$, $xy + yz + zx = -11$, and $xyz = -12$, then what is the value of $x^3 + y^3 + z^3$?

(a) 36 (b) 38

(c) 40 (d) 42

SSC CGL (Tier-I) 13/04/2022 (Shift-III)

Ans : (b) Given,

$x + y + z = 2$, $xy + yz + zx = -11$, $xyz = -12$

$x^3 + y^3 + z^3 - 3xyz = (x + y + z)\,[(x + y + z)^2 - 3\,(xy + yz + zx)]$

$x^3 + y^3 + z^3 - 3 \times (-12) = 2[4 + 33]$

$x^3 + y^3 + z^3 = 74 - 36$

$x^3 + y^3 + z^3 = 38$

32. If $2\sqrt{2}x^3 - 3\sqrt{3}y^3 = (\sqrt{2}x - \sqrt{3}y)(Ax^2 - Bxy + Cy^2)$, then the value of $(A^2+B^2+C^2)$ is:

(a) 16 (b) 11

(c) 19 (d) 18

SSC CGL (Tier-I) 13/04/2022 (Shift-II)

Ans : (c)

$2\sqrt{2}x^3 - 3\sqrt{3}y^3 = \left(\sqrt{2}x - \sqrt{3}y\right)\left(Ax^2 - Bxy + Cy^2\right)$

$\left(\sqrt{2}x - \sqrt{3}x\right)\left(2x^2 + \sqrt{6}xy + 3y^2\right) = \left(\sqrt{2}x - \sqrt{3}y\right)\left(Ax^2 - Bxy + Cy^2\right)$

$Ax^2 - Bxy + Cy^2 = \left(2x^2 + \sqrt{6}xy + 3y^2\right)$

$A = 2,\ B = -\sqrt{6},\ C = 3$

$A^2 + B^2 + C^2 = 2^2 + 6 + 3^2$

$= 4 + 6 + 9$

$= 19$

33. If a + b + c = 11 and ab + bc + ca = 28, then find the value of $a^3 + b^3 + c^3 - 3abc$.

(a) 1639 (b) 407
(c) 2255 (d) 1093

SSC CGL (Tier-I) 19/04/2022 (Shift-III)

Ans. (b) $a + b + c = 11,\ ab + bc + ca = 28$

$a^3 + b^3 + c^3 - 3abc = (a + b + c)[(a + b + c)^2 - 3(ab + bc + ca)]$

$a^3 + b^3 + c^3 - 3abc = 11(121 - 84)$

$a^3 + b^3 + c^3 - 3abc = 11 \times 37$

$a^3 + b^3 + c^3 - 3abc = 407$

34. If $a^2 + b^2 + 49c^2 + 18 = 2(b + 28c - a)$, then the value of $(2a - b + 7c)$ is:

(a) 5 (b) –3
(c) –4 (d) 1

SSC CGL (Tier-I) 19/04/2022 (Shift-II)

Ans. (d) Given,

$a^2 + b^2 + 49c^2 + 18 = 2(b + 28c - a)$

$a^2 + b^2 + 49c^2 + 18 = 2b + 56c - 2a$

$(a^2 + 2a + 1) + (b^2 - 2b + 1) + (49c^2 - 56c + 16) = 0$

$(a + 1)^2 + (b - 1)^2 + (7c - 4)^2 = 0$

$a + 1 = 0,\ b - 1 = 0,\ 7c - 4 = 0$

$a = -1,\ b = 1,\ c = \frac{4}{7}$

$\therefore (2a - b + 7c) = 2 \times (-1) - (1) + 7 \times \frac{4}{7} = 1$

35. If $x + y + z = 7$, $xy + yz + zx = 8$, then what is the value of $x^3 + y^3 + z^3 - 3xyz$?

(a) 200 (b) 150
(c) 125 (d) 175

SSC CGL (Tier-I) 19/04/2022 (Shift-I)

Ans. (d) Given, $x + y + z = 7,\ xy + yz + zx = 8$

Now,

$x^3 + y^3 + z^3 - 3xyz = (x + y + x)[(x + y + z)^2 - 3(xy + yz + zx)]$

$= 7[49 - 3 \times 8]$

$= 7 \times 25$

$= 175$

36. If $\sqrt{x} - \frac{1}{\sqrt{x}} = \sqrt{3}$, then what is the value of $x^4 + \frac{1}{x^4}$?

(a) 531 (b) 7
(c) 623 (d) 527

SSC CGL (Tier-I) 18/04/2022 (Shift-III)

Ans. (d) From question,

$\sqrt{x} - \frac{1}{\sqrt{x}} = \sqrt{3}$

On squaring both sides,

$\left(\sqrt{x} - \frac{1}{\sqrt{x}}\right)^2 = \left(\sqrt{3}\right)^2$

$\Rightarrow x + \frac{1}{x} - 2 \times \sqrt{x} \times \frac{1}{\sqrt{x}} = 3$

$\Rightarrow x + \frac{1}{x} = 3 + 2$

$\Rightarrow x + \frac{1}{x} = 5$

Again, on squaring both sides

$\left(x + \frac{1}{x}\right)^2 = 5^2$

$x^2 + \frac{1}{x^2} + 2 = 25$

$\Rightarrow x^2 + \frac{1}{x^2} = 23$

Again, squaring on both sides

$\left(x^2 + \frac{1}{x^2}\right)^2 = (23)^2$

$\Rightarrow x^4 + \frac{1}{x^4} + 2 = 529$

$\therefore x^4 + \frac{1}{x^4} = 527$

37. If $2\sqrt{2}x^3 - 3\sqrt{3}y^3 = \left(\sqrt{2}x - \sqrt{3}y\right)\left(Ax^2 - Bxy + Cy^2\right)$, then the value of $\sqrt{\left(A^2 + B^2 + C^2\right)}$ is:

(a) $\sqrt{19}$ (b) $\sqrt{11}$
(c) $\sqrt{17}$ (d) $\sqrt{21}$

SSC CGL (Tier-I) 18/04/2022 (Shift-II)

Ans. (a) $2\sqrt{2}x^3 - 3\sqrt{3}y^3 = \left(\sqrt{2}x - \sqrt{3}y\right)\left(Ax^2 - Bxy + Cy^2\right)$,

$\left(\sqrt{2}x - \sqrt{3}y\right)\left(2x^2 + \sqrt{6}xy + 3y^2\right) = \left(\sqrt{2}x - \sqrt{3}y\right)\left(Ax^2 - Bxy + Cy^2\right)$

$\left(2x^2 + \sqrt{6}xy + 3y^2\right) = \left(Ax^2 - Bxy + Cy^2\right)$

On comparing,

$A = 2,\ B = -\sqrt{6},\ C = 3$

$\sqrt{\left(A^2 + B^2 + C^2\right)} = \sqrt{2^2 + \left(-\sqrt{6}\right)^2 + (3)^2} = \sqrt{4 + 6 + 9} = \sqrt{19}$

38. If $a^2 + b^2 + 49c^2 + 18 = 2(b - 28c - a)$, then the value of $(a - b - 7c)$ is:

(a) 4 (b) 3
(c) 2 (d) 1

SSC CGL (Tier-I) 18/04/2022 (Shift-II)

Ans. (c) $a^2 + b^2 + 49c^2 + 18 = 2(b - 28c - a)$

$(a + 1)^2 + (b - 1)^2 + (7c + 4)^2 = 0$

$a = -1,\ b = 1,\ c = -4/7$

Now, $(a - b - 7c) = \left(-1 - 1 + 7 \times \frac{4}{7}\right) = (-2 + 4) = 2$

39. If $\left(x^2 + \frac{1}{x^2}\right) = 23$, $x > 0$ What is the value of $\left(x^3 + \frac{1}{x^3}\right) = ?$

(a) 140 (b) 110
(c) –110 (d) –140

SSC CGL (Tier-I) 18/04/2022 (Shift-I)

Ans. (b) $\left(x^2 + \frac{1}{x^2}\right) = 23$

On adding 2 both sides,

$x^2 + \frac{1}{x^2} + 2 = 23 + 2$

$= \left(x + \frac{1}{x}\right)^2 = 5^2$

$x + \frac{1}{x} = 5$

On cubing both sides

$$x^3 + \frac{1}{x^3} + 3 \times 5 = 125$$

$\therefore x^3 + \frac{1}{x^3} = (5)^3 - 3 \times 5 = 125 - 15 = 110$

40. If x + y + z = 18, xyz = 81 and xy + yz +zx = 90, then the value of $x^3 + y^3 + z^3 + xyz$ is:

(a) 1321 (b) 1296
(c) 1225 (d) 1250

SSC CGL (Tier-I) 13/04/2022 (Shift-I)

Ans. (b) Given,
x + y +z = 18, xyz = 81, xy + yz + zx = 90
From the formula,
$x^3 + y^3 + z^3 - 3xyz = (x + y + x)\,[(x + y + z)^2 - 3(xy + yz + zx)]$

$x^3 + y^3 + z^3 - 3xyz = 18\left[(18)^2 - 3(90)\right]$

$x^3 + y^3 + z^3 + xyz = 18(324 - 270) + 4xyz$

$= 18 \times 54 + 4 \times 81$

$= 972 + 324$

$x^3 + y^3 + z^3 + xyz = 1296$

41. If $a^2 + b^2 + c^2 = 6.25$ and (ab + bc + ca) = 0.52, what is the value of (a+b+c), if (a + b + c) < 0?

(a) ± 2.7 (b) – 2.7
(c) – 2.8 (d) ± 2.8

SSC CGL (Tier-I) 11/04/2022 (Shift-III)

Ans. (b) Given,
$a^2 + b^2 + c^2 = 6.25$
ab + bc + ca = 0.52
Let a + b + c = y
On squaring on both sides,
$a^2 + b^2 + c^2 + 2(ab + bc + ca) = y^2$
$6.25 + 2 \times (0.52) = y^2$
$6.25 + 1.04 = y^2$
$y^2 = 7.29$
$y = \pm \sqrt{7.29}$
If a + b + c < 0
Then, a + b + c = –2.7

42. If x + y + 3 = 0, then find the value of $x^3 + y^3 - 9xy + 9$.

(a) –18 (b) –36
(c) 18 (d) 36

SSC CGL (Tier-I) 11/04/2022 (Shift-I)

Ans. (a) x + y + 3 = 0
x + y = –3
On cubing both sides
$(x + y)^3 = -3^3$
$x^3 + y^3 + 3xy(x + y) = -27$
$x^3 + y^3 + 3xy(-3) = -27$
$x^3 + y^3 - 9xy = -27$
$x^3 + y^3 - 9xy + 9 = -27 + 9 = -18$

43. If $(4x + 2y)^3 + (4x - 2y)^3 = 16(Ax^3 + Bxy^2)$, then what is the value of $\frac{1}{2}\left(\sqrt{A^2 + B^2}\right)$?

(a) 8 (b) 3
(c) 5 (d) 7

SSC CGL (Tier-I) 11/04/2022 (Shift-II)

Ans. (c) $(4x + 2y)^3 + (4x - 2y)^3 = 16(Ax^3 + Bxy^2)$
$64x^3 + 8y^3 + 24xy(4x + 2y) + 64x^3 - 8y^3 - 24xy(4x - 2y) = 16(Ax^3 + Bxy^2)$
$128x^3 + 96xy^2 = 16(Ax^3 + Bxy^2)$
$16(8x^3 + 6xy^2) = 16(Ax^3 + Bxy^2)$
On comparing both sides
A = 8 B = 6
Then,
$\frac{1}{2}\left(\sqrt{A^2 + B^2}\right) = \frac{1}{2}\left(\sqrt{8^2 + 6^2}\right) = 5$

44. If $x = 4 + \sqrt{15}$, What is the value of $\left(x^2 + \frac{1}{x^2}\right)$?

(a) 48 (b) 54
(c) 72 (d) 62

SSC CGL (Tier-I) 11/04/2022 (Shift-III)

Ans. (d) Given,

$x = 4 + \sqrt{15}$

$\frac{1}{x} = \frac{1}{4 + \sqrt{15}} = \frac{1}{4 + \sqrt{15}} \times \frac{4 - \sqrt{15}}{4 - \sqrt{15}} = 4 - \sqrt{15}$

$x + \frac{1}{x} = 4 + \sqrt{15} + 4 - \sqrt{15}$

$x + \frac{1}{x} = 8$

On squaring both sides

$x^2 + \frac{1}{x^2} + 2 \times x \times \frac{1}{x} = 64$

$x^2 + \frac{1}{x^2} = 62$

45. If $x + \frac{1}{x} = 3, x \neq 0$, then the value of $x^7 + \frac{1}{x^7}$ is:

(a) 749 (b) 843
(c) 746 (d) 849

SSC CGL (Tier-II) 03/02/2022

Ans : (b) $x + \frac{1}{x} = 3$

$x^3 + \frac{1}{x^3} = 3^3 - 3 \times 3 = 18$

Again,

$x + \frac{1}{x} = 3$

On squaring both sides

$x^2 + \frac{1}{x^2} = 7$

On squaring both sides

$x^4+\frac{1}{x^4}=7^2-2=47$

$x^7+\frac{1}{x^7}=\left(x^3+\frac{1}{x^3}\right)\left(x^4+\frac{1}{x^4}\right)-\left(x+\frac{1}{x}\right)$

$=(18)(47)-3$

$=846-3=843$

46. If $x^2 - 3x + 1 = 0$, then the value of $\frac{\left(x^4+\frac{1}{x^2}\right)}{\left(x^2+5x+1\right)}$ is:

(a) $\frac{9}{4}$ (b) $\frac{27}{8}$

(c) $\frac{5}{2}$ (d) 2

SSC CGL (Tier-II) 03/02/2022

Ans : (a) $x^2-3x+1=0$

$x\left(x-3+\frac{1}{x}\right)=0$

$x+\frac{1}{x}=3$

On cubing both sides,

$x^3+\frac{1}{x^3}+3\times3=27$

$x^3+\frac{1}{x^3}=3^3-9=18$

$\frac{x^4+\frac{1}{x^2}}{x^2+5x+1}$

$\frac{x\left(x^3+\frac{1}{x^3}\right)}{x\left[\left\{x+\frac{1}{x}\right\}+5\right]}$

$\frac{18}{3+5}=\frac{9}{4}$

47. If $a + b = 8$, $ab = 10$, then the value of $a^3 + b^3$ is:

(a) 312 (b) 215

(c) 272 (d) 111

SSC CGL (Tier-II) 29/01/2022

Ans : (c) Given

$a + b = 8$

$ab = 10$

$a^3 + b^3 = ?$

we know that,

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

$= (8)[(8)^2 - 3 \times 10]$

$= 8[64-30]$

$= 8\times34 = 272$

48. If $a + b + c = 1$, $ab + bc + ca = -22$ and $abc = -40$, then what is the value of $a^3 + b^3 + c^3$?

(a) 67 (b) –53

(c) –51 (d) 27

SSC CGL (Tier-II) 29/01/2022

Ans : (b) Given,

$a + b + c = 1$

$ab + bc + ca = -22$

$abc = -40$

$a^3 + b^3 + c^3 = ?$

$\because a^3 + b^3 + c^3 - 3abc = (a + b + c)[(a + b + c)^2 - 3(ab + bc + ca)]$

$a^3 + b^3 + c^3 + 120 = (1)[(1)^2 + 3(22)]$

$= 1 \times 67$

$\Rightarrow a^3 + b^3 + c^3 = 67 - 120$

$\Rightarrow a^3 + b^3 + c^3 = -53$

49. If $27x^3 - 64y^3 = (Ax + By)(Cx^2 + Dy^2 - Exy)$, then value of $(A - B + C - D + E)$ will be:

(a) –12 (b) 18

(c) 15 (d) –20

SSC CHSL 09/08/2021 (Shift-I)

Ans. (a) : $27x^3 - 64y^3 = (Ax+By)(Cx^2+Dy^2-Exy)$---(Given)

$(3x-4y)(9x^2+16y^2+12xy) = (Ax+By)(Cx^2+Dy^2-Exy)$

On comparing both sides, we get,

$A = 3, B = -4, C = 9, D = 16, E = -12$

Hence

$A - B + C - D + E = 3+4+9-16+(-12)$

$= 16 - 16 - 12$

$= -12$

50. If $(3x + 2y)^3 + (3x - 2y)^3 = 3kx(3x^2 + 4y^2)$, then the value of k will be:

(a) 18 (b) 9

(c) 3 (d) 6

SSC CHSL 09/08/2021 (Shift-I)

Ans. (d) : $(3x + 2y)^3 + (3x - 2y)^3 = 3kx(3x^2 + 4y^2)$

$\because \quad a^3 + b^3 = (a+b)(a^2-ab+b^2)$

So,

$(3x+2y+3x-2y)[(3x+2y)^2+(3x-2y)^2-(3x+2y)(3x-2y)] = 3kxy(3x^2+4y^2)$

$6x[(9x^2+4y^2)\times2-(9x^2-4y^2)] = 3kx(3x^2+4y^2)$

$6x[18x^2 + 8y^2 - 9x^2+4y^2] = 3kx(3x^2+4y^2)$

$6x[9x^2+12y^2] = 3kx(3x^2+4y^2)$

$3\times6x(3x^2+4y^2) = 3kx(3x^2+4y^2)$

$6x = kx$

$k = 6$

51. If $x + 2y = 19$ and $x^3 + 8y^3 = 361$, then xy is equal to:

(a) 57 (b) 56

(c) 55 (d) 58

SSC CHSL 09/08/2021 (Shift-I)

Ans. (a) : $x + 2y = 19$ ...(i)

$x^3 + 8y^3 = 361$ ...(ii)

On cubing both sides of equation (i),

$x^3 + 8y^3 + 6xy(x+2y) = 6859$

By equation (i) and (ii),

$361 + 6xy(19) = 6859$

$6xy \times 19 = 6859 - 361 = 6498$

$xy = \frac{6498}{114} = 57$

52. If $x^2+4y^2+3z^2+\frac{19}{4}=2\sqrt{3}(x+y+z)$, then the value of (x – 4y + 3z) is:

(a) $\frac{\sqrt{3}}{3}$ (b) $2\sqrt{3}$

(c) $\sqrt{3}$ (d) $\frac{\sqrt{3}}{2}$

SSC CHSL 05/08/2021 (Shift-I)

Ans. (c) : Given,

$x^2+4y^2+3z^2+\frac{19}{4}=2\sqrt{3}(x+y+z)$

$x^2-2\sqrt{3}x+3+4y^2-2\sqrt{3}y+\frac{3}{4}+3z^2-2\sqrt{3}z+1=0$

$\left(x-\sqrt{3}\right)^2+\left(2y-\frac{\sqrt{3}}{2}\right)^2+\left(\sqrt{3}z-1\right)^2=0$

$x=\sqrt{3}, \quad 2y=\frac{\sqrt{3}}{2}, \quad \sqrt{3}z=1, \Rightarrow y=\frac{\sqrt{3}}{4}, z=\frac{1}{\sqrt{3}}$

Hence,

$x-4y+3z$

$=\sqrt{3}-4\times\frac{\sqrt{3}}{4}+3\times\frac{1}{\sqrt{3}}$

$=\sqrt{3}-\sqrt{3}+\sqrt{3}$

$=\sqrt{3}$

53. If x + y + z = 13, $x^2+y^2+z^2=91$ and $xz=y^2$, then the difference between z and x is:

(a) 3 (b) 8

(c) 5 (d) 9

SSC CHSL 05/08/2021 (Shift-I)

Ans. (b) : Given,

$x+y+z=13 \quad x^2+y^2+z^2=91$ and $xz=y^2$

$x+y+z=13$

On squaring both sides,

$x^2+y^2+z^2+2(xy+yz+zx)=169$

$91+2(xy+yz+y^2)=169$

$2(x+y+z)y=169-91$

$y=\frac{39}{13}=3$

$x+z=13-3$

$x+z=10$

$xz=9$

$z=\frac{9}{x}$

$x+\frac{9}{x}=10$

$x(10-x)=9$

$x=1$

Hence, $z \sim x = 9 - 1 = 8$

54. If x + y = 5 and $\frac{1}{x}+\frac{1}{y}=\frac{20}{9}$, then the value of (x^3+y^3) will be:

(a) $\frac{635}{8}$ (b) $\frac{365}{4}$

(c) $\frac{205}{4}$ (d) $\frac{635}{4}$

SSC CHSL 15/04/2021 (Shift-I)

Ans. (b) : $x+y=5$ ....(i)

$\frac{1}{x}+\frac{1}{y}=\frac{20}{9}$

$\frac{x+y}{xy}=\frac{20}{9}$

$\frac{5}{xy}=\frac{20}{9}$ [On putting the value of x + y = 5]

$xy=\frac{9}{4}$

$(x+y)^3=x^3+y^3+3xy(x+y)$

$(5)^3=x^3+y^3+3\times\frac{9}{4}\times5$

$125-\frac{135}{4}=x^3+y^3$

$x^3+y^3=\frac{500-135}{4}=\frac{365}{4}$

55. If x + y + z = 5, $\frac{1}{x}+\frac{1}{y}+\frac{1}{z}=0$, xyz = 12 and $x^3+y^3+z^3=151$, then the value of $(x^2+y^2+z^2)$ is:

(a) 23 (b) 24

(c) 21 (d) 22

SSC CHSL 15/04/2021 (Shift-I)

Ans. (a) : Given $x+y+z=5, \frac{1}{x}+\frac{1}{y}+\frac{1}{z}=0$, $xyz=12$

$x^3+y^3+z^3=151$

$\because \frac{1}{x}+\frac{1}{y}+\frac{1}{z}=0$

$yz+zx+xy=0$

$x^3+y^3+z^3-3xyz=(x+y+z)(x^2+y^2+z^2-xy-yz-zx)$

$151-3\times12=5[x^2+y^2+z^2-(xy+yz+zx)]$

$115=5(x^2+y^2+z^2-0)$

$x^2+y^2+z^2=\frac{115}{5}=23$

56. If $49a^2+25b^2=30$ and ab = 1, a, b > 0, then the value of (7a + 5b) is:

(a) 14 (b) 10

(c) 8 (d) 12

SSC CHSL 15/04/2021 (Shift-I)

Ans. (b) : $49a^2+25b^2=30$

On adding 70ab both sides,

$49a^2+25b^2+70ab=30+70ab$

$(7a)^2+(5b)^2+2\times7\times5ab=30+70ab \quad (\because ab=1)$

$(7a+5b)^2=30+70$

$7a+5b=\sqrt{100}=10$

57. If $x^4 + \frac{1}{x^4} = 727$, x > 1, then what is the value of $\left(x - \frac{1}{x}\right)$?

(a) 6 **(b) 5**
(c) –5 **(d) –6**

SSC CGL–(Tier-I) 13/08/2021 (Shift III)

Ans. (b) : Given that– $x^4 + \frac{1}{x^4} = 727,\ x > 1$

Adding 2 on both sides, $x^4 + \frac{1}{x^4} + 2 = 727 + 2$

$$\Rightarrow \left(x^2 + \frac{1}{x^2}\right)^2 = (27)^2$$

$$\Rightarrow x^2 + \frac{1}{x^2} = 27$$

Subtracting 2 from both sides,

$$x^2 + \frac{1}{x^2} - 2 = 27 - 2$$

$$\Rightarrow x^2 + \frac{1}{x^2} - 2 \times x \times \frac{1}{x} = 25$$

$$\Rightarrow \left(x - \frac{1}{x}\right)^2 = 5^2$$

Taking square root both sides,

$$\boxed{x - \frac{1}{x} = 5}$$

Hence, option (b) is correct.

58. If $x - \frac{1}{x} = 1$, then what is the value of $x^8 + \frac{1}{x^8}$?

(a) 119 (b) –1
(c) 3 (d) 47

SSC CGL–(Tier-I) 13/08/2021 (Shift III)

Ans. (d) : From question,

$$x - \frac{1}{x} = 1$$

On squaring both sides,

$$\left(x - \frac{1}{x}\right)^2 = 1^2$$

$$\Rightarrow x^2 + \frac{1}{x^2} - 2 = 1$$

$$\Rightarrow x^2 + \frac{1}{x^2} = 3$$

Again on squaring both sides,

$$\left(x^2 + \frac{1}{x^2}\right)^2 = 3^2$$

$$\Rightarrow x^4 + \frac{1}{x^4} + 2 = 9\ ,\ \Rightarrow x^4 + \frac{1}{x^4} = 7$$

Again on squaring both sides,

$$\left(x^4 + \frac{1}{x^4}\right)^2 = 7^2$$

$$\Rightarrow x^8 + \frac{1}{x^8} + 2 = 49$$

$$\therefore \boxed{x^8 + \frac{1}{x^8} = 47}$$

59. If $2x^2 - 7x + 5 = 0$, then what is the value of $x^3 + \frac{125}{8x^3}$?

(a) $12\frac{5}{8}$ (b) $16\frac{5}{8}$
(c) $10\frac{5}{8}$ (d) $18\frac{5}{8}$

SSC CGL–(Tier-I) 2308/2021 (Shift I)

Ans. (b) : $2x^2 - 7x + 5 = 0$

On dividing by 2x, on both sides

$$x - \frac{7}{2} + \frac{5}{2x} = 0$$

$$x + \frac{5}{2x} = \frac{7}{2}$$

On cubing both sides,

$$x^3 + \frac{125}{8x^3} + 3 \times x \times \frac{5}{2x}\left(x + \frac{5}{2x}\right) = \frac{343}{8}$$

$$x^3 + \frac{125}{8x^3} + \frac{15}{2} \times \frac{7}{2} = \frac{343}{8}$$

$$x^3 + \frac{125}{8x^3} = \frac{343}{8} - \frac{105}{4} = \frac{133}{8}$$

$$= 16\frac{5}{8}$$

60. If 2x + 3y + 1 = 0, then what is the value of $(8x^3 + 8 + 27y^3 - 18xy)$?

(a) –7 (b) 7
(c) –9 (d) 9

SSC CGL–(Tier-I) 24/08/2021 (Shift I)

Ans. (b) : If a + b + c = 0

$\therefore a^3 + b^3 + c^3 - 3abc = 0$

$\because 2x + 3y + 1 = 0$

$\therefore 8x^3 + 27y^3 + (1)^3 - 3 \times 2x \times 3y \times 1 = 0$

$8x^3 + 27y^3 + 1 - 18xy = 0$ (adding +7 to Both sides)

$8x^3 + 27y^3 + 8 - 18xy = 7$

61. If $a^4 + b^4 + a^2b^2 = 273$ and $a^2 + b^2 - ab = 21$, then one of the values of $\left(\frac{1}{a} + \frac{1}{b}\right)$ is :

(a) $-\frac{9}{4}$ (b) $-\frac{3}{4}$
(c) $\frac{9}{8}$ (d) $\frac{3}{2}$

SSC CGL–(Tier-I) 24/08/2021 (Shift I)

Ans. (b) : $\because (a^2 + b^2 + ab)(a^2 + b^2 - ab) = a^4 + b^4 + a^2b^2$

$$\therefore a^2 + b^2 + ab = \frac{273}{21} = 13 \quad .....(1)$$

Given $a^2 + b^2 - ab = 21$ .....(2)

From eq^{n} (1) – (2),

$2ab = -8$

From eq^{n} (1) + (2),

$2(a^2 + b^2) = 34$

$a^2 + b^2 = 17$

$\therefore (a+b)^2 = 17-8 = 9$

$a + b = 3$

$\therefore \frac{1}{a}+\frac{1}{b}=\frac{b+a}{ab}=\frac{3}{-4}=\frac{-3}{4}$

62. If $\left(54\sqrt{2}x^3+24\sqrt{3}y^3\right)\div\left(\sqrt{18}x+\sqrt{12}y\right)= Ax^2 + By^2 + Cxy$, then what is the value of $A^2 - (B^2 + C^2)$?

(a) 12 (b) –36

(c) –24 (d) 24

SSC CGL–(Tier-I) 17/08/2021 (Shift I)

Ans. (b) :

$\left[\left(3\sqrt{2}x\right)^3+\left(2\sqrt{3}y\right)^3\right]\div\left(3\sqrt{2}x+2\sqrt{3}y\right)$

$= Ax^2 + By^2 + Cxy$

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

$$\frac{\left(3\sqrt{2}x+2\sqrt{3}y\right)\left(18x^2+12y^2-6\sqrt{6}xy\right)}{\left(3\sqrt{2}x+2\sqrt{3}y\right)}=Ax^2+By^2+Cxy$$

On comparing:

$Ax^2+By^2+Cxy = 18x^2 + 12y^2 - 6\sqrt{6}xy$

$A = 18, B = 12, C = -6\sqrt{6}$

$\therefore A^2-(B^2+C^2) = 18^2 - (144+216)$

$= 324 - 360$

$= -36$

63. If $x + y + z = 7$, $x^2 + y^2 + z^2 = 85$ and $x^3 + y^3 + z^3 = 913$, then the value of $\sqrt[3]{xyz}$ is:

(a) 1 (b) 2

(c) 4 (d) 8

SSC CGL–(Tier-I) 17/08/2021 (Shift I)

Ans. (c) : Given,

$x + y + z = 7, x^2 + y^2 + z^2 = 85, x^3 + y^3 + z^3 = 913$

$\therefore x^3+y^3+z^3-3xyz = (x+y+z)[x^2+y^2+z^2-xy-yz-zx]$

$\because (x+y+z)^2 = x^2 + y^2 + z^2 + 2(xy + yz+zx)$

$\because x^2+y^2+z^2+2(xy+yz+zx) = 49$

$2(xy+yz+zx) = -36$

$(xy+yz+zx) = -18$

$x^3+y^3+z^3-3xyz = 7 \times [85 + 18]$

$3xyz = 913 - 721 = 192$

$xyz = 64$

$\sqrt[3]{xyz} = \sqrt[3]{64} = 4$

64. If $x^4 + y^4 + x^2y^2 = 21$ and $x^2 + y^2 - xy = 7$, then what is the value of $\frac{x}{y}+\frac{y}{x}$?

(a) $\frac{5}{4}$ (b) $\frac{3}{4}$

(c) $-\frac{3}{2}$ (d) $-\frac{5}{2}$

SSC CGL–(Tier-I) 18/08/2021 (Shift I)

Ans. (d) : $x^4 + y^4 + x^2y^2 = 21$

given $x^2 + y^2 - xy = 7$ .....(i)

$(x^2 + y^2 + xy)(x^2 + y^2 - xy) = x^4 + y^4 + x^2y^2$

$(x^2 + y^2 + xy) \times 7 = 21$

$x^2 + y^2 + xy = 3$.....(ii)

Equation (i) + Equation (ii),

$x^2 + y^2 + xy = 3$

$x^2 + y^2 - xy = 7$

$2(x^2+y^2) = 10$

$x^2 + y^2 = 5$

$x^2 + y^2 + xy = 3$

$xy = -2$

$\frac{x}{y}+\frac{y}{x}=\frac{x^2+y^2}{xy}=\frac{-5}{2}$

65. If $x-y = 11$ and $\frac{1}{x}-\frac{1}{y}=\frac{11}{24}$, then what is the value of $x^3 - y^3 + x^2y^2$?

(a) 1331 (b) 1105

(c) 1307 (d) 1115

SSC CGL–(Tier-I) 13/08/2021 (Shift II)

Ans. (d) Given,

$x - y = 11$ and $\frac{1}{x}-\frac{1}{y}=\frac{11}{24}$, $\frac{y-x}{xy}=\frac{11}{24}$

$xy = -1 \times 24$

$xy = -24$

$x^3 - y^3 + x^2y^2 = ?$

$=(x-y)[(x-y)^2 + 3xy)] + (-24)^2$

$= 11 \times [121 - 72) + 576$

$= 11 \times 49 + 576$

$= 539 + 576 = 1115$

66. If $\left(16\sqrt{2}x^3+81\sqrt{3}y^3\right)\div\left(2\sqrt{2x}+3\sqrt{3}y\right)= Ax^2 + By^2 + Cxy$, then find the value of $2A - 3B - 2\sqrt{6}C$.

(a) 25 (b) 7

(c) 137 (d) 79

SSC CGL–(Tier-I) 16/08/2021 (Shift II)

Ans. (b) : From question,

$$\frac{\left(16\sqrt{2}x^3+81\sqrt{3}y^3\right)}{\left(2\sqrt{2}x+3\sqrt{3}y\right)}=Ax^2+By^2+Cxy$$

From formula : $(a^3 + b^3) = (a + b)(a^2 + b^2 - ab)$

$$\frac{\left(2\sqrt{2x}+3\sqrt{3}y\right)\left(8x^2+27y^2-6\sqrt{6}xy\right)}{\left(2\sqrt{2}x+3\sqrt{3}y\right)}=Ax^2+By^2+Cxy$$

$\Rightarrow 8x^2 + 27y^2 - 6\sqrt{6}xy = Ax^2 + By^2 + Cxy$

On comparing both sides,

$A = 8$

$B = 27$

$C = -6\sqrt{6}$

Then,

$2A-3B-2\sqrt{6}C=2\times8-3\times27-2\sqrt{6}\times\left(-6\sqrt{6}\right)$

$=16-81+12\times6$

$=16-81+72$

$=88-81$

$=7$

$\therefore \boxed{2A-3B-2\sqrt{6}C=7}$

67. If $4x^4-37x^2+9=0$, $x>\sqrt{\frac{3}{2}}$, then what is the value of $8x^3-\frac{27}{x^3}$?

(a) 35 (b) 215

(c) –215 (d) –35

SSC CGL–(Tier-I) 16/08/2021 (Shift II)

Ans. (b) : $4x^4-37x^2+9=0$

Let us consider $x^2=a$

then, $4a^2-37a+9=0$

$4a^2-36a-a+9=0$

$4a(a-9)-1(a-9)=0$

$4a(a-9)-1(a-9)=0$

$a=1/4$ or $a=9$

On putting the value of $a=x^2$

$x^2=1/4$ not acceptable as $x>\sqrt{\frac{3}{2}}$

$x^2=9$ then $x=3$ or $x=-3$

$\left(x=-3 \text{ not valid as } x>\sqrt{\frac{3}{2}}\right)$

Then put $x=3$,

$8x^3-\frac{27}{x^3}=?$

$?=8\times(3)^3-\frac{27}{(3)^3}$

$?=8\times27-\frac{27}{27}$

$?=216-1$, $\boxed{?=215}$

68. If $x+y+z=1$, $xy+yz+zx=xyz=-4$, then what is the value of $(x^3+y^3+z^3)$?

(a) 8 (b) –8

(c) 1 (d) –1

SSC CGL–(Tier-I) 18/08/2021 (Shift II)

Ans. (c) : Given,

$x+y+z=1$, $xy+yz+zx=xyz=-4$

$(x^3+y^3+z^3)=?$

$\boxed{(x+y+z)^2=x^2+y^2+z^2+2(xy+yz+zx)}$

$(1)^2=x^2+y^2+z^2+2\times(-4)$

$x^2+y^2+z^2=9$

$\because\left[x^3+y^3+z^3-3xyz=(x+y+z)\left[x^2+y^2+z^2-xy-yz-zx\right]\right]$

$x^3+y^3+z^3-3\times-4=1\left[9-(-4)\right]$

$x^3+y^3+z^3=9+4-12$

$x^3+y^3+z^3=1$

69. If $x+y=2$ and $\frac{1}{x}+\frac{1}{y}=\frac{18}{5}$, then the value of (x^3+y^3) is :

(a) $4\frac{2}{3}$ (b) $4\frac{3}{5}$

(c) $3\frac{1}{5}$ (d) $3\frac{1}{3}$

SSC CGL–(Tier-I) 16/08/2021 (Shift III)

Ans. (a) : Given:- $x+y=2$ -------(i),

$\frac{1}{x}+\frac{1}{y}=\frac{18}{5}$

$\frac{x+y}{xy}=\frac{18}{5}$

On putting the value of $x+y$ from equation (i)

$\frac{2}{xy}=\frac{18}{5}$

$xy=\frac{2\times5}{18}=\frac{5}{9}$ ------ (ii)

On cubing of equation (i) ,

$x^3+y^3+3xy(x+y)=(2)^3$

On putting the value of $xy=\frac{5}{9}$,

$x^3+y^3+3\times\frac{5}{9}(2)=8$

$x^3+y^3+\frac{10}{3}=8$

$x^3+y^3=8-\frac{10}{3}=\frac{24-10}{3}=\frac{14}{3}=4\frac{2}{3}$

$x^3+y^3=4\frac{2}{3}$

70. If $x-\frac{1}{x}=\sqrt{77}$, then one of the values of $x^3+\frac{1}{x^3}$ is :

(a) $80\sqrt{77}$ (b) 702

(c) $77\sqrt{77}$ (d) $3\sqrt{77}$

SSC CGL–(Tier-I) 18/08/2021 (Shift III)

Ans. (b) : Given :- $x-\frac{1}{x}=\sqrt{77}$

From formula $(a-b)^2=(a+b)^2-4ab$

$\left(\sqrt{77}\right)^2=\left(x+\frac{1}{x}\right)^2-4$

$\left(x+\frac{1}{x}\right)^2=77+4=81$

$x+\frac{1}{x}=9$ --------(ii)

On cubing both side of equation (ii),

$\left(x+\frac{1}{x}\right)^3=(9)^3$

$$x^3+\frac{1}{x^3}+3\times x\times\frac{1}{x}\left(x+\frac{1}{x}\right)=729$$

$$x^3+\frac{1}{x^3}+3\times(9)=729$$

$$x^3+\frac{1}{x^3}=729-27=702$$

$$x^3+\frac{1}{x^3}=702$$

71. If $x+y+z=3$, $xy+yz+zx=-12$ and $xyz=-16$, then the value of $\sqrt{x^3+y^3+z^3+13}$ is :

(a) 9 (b) 8 (c) 10 (d) 11

SSC CGL–(Tier-I) 20/08/2021 (Shift III)

Ans. (c) : From formula :-

$a^3+b^3+c^3-3abc=(a+b+c)[(a+b+c)^2-3(ab+bc+ca)]$

$x^3+y^3+z^3-3xyz=(x+y+z)[(x+y+z)^2-3(xy+yz+zx)]$

As per question

$x^3+y^3+z^3-3\times(-16)=3[(3)^2-3(-12)]$

$x^3+y^3+z^3+48=3(9+36)$

$x^3+y^3+z^3+48=135$

$x^3+y^3+z^3+13=135-35=100$

On taking square root both sides,

$$\sqrt{x^3+y^3+z^3+13}=\sqrt{100}$$

$$\sqrt{x^3+y^3+z^3+13}=10$$

72. If $x^8-433x^4+16=0$, $x>0$, then what is the value of $\left(x+\frac{2}{x}\right)$?

(a) 7 (b) 4 (c) 5 (d) 9

SSC CGL–(Tier-I) 17/08/2021 (Shift II)

Ans. (c) : Given equation– $x^8-433x^4+16=0$

$$x^4+\frac{16}{x^4}=433$$

On adding + 8 at both side

$$x^4+\frac{16}{x^4}+8=441$$

$$\left(x^2+\frac{4}{x^2}\right)^2=21^2$$

$$x^2+\frac{4}{x^2}=21$$

$$x^2+\frac{4}{x^2}+4=21+4$$

$$\left(x+\frac{2}{x}\right)^2=25$$

$$x+\frac{2}{x}=5$$

$\{\because x>0\}$

73. If $(x+y)^3+27(x-y)^3=(Ax-2y)(Bx^2+Cxy+13y^2)$, then the value of A–B–C is :

(a) 27 (b) 13 (c) 15 (d) 20

SSC CGL–(Tier-I) 17/08/2021 (Shift II)

Ans. (b) : Given that,

$(x+y)^3+27(x-y)^3=(Ax-2y)(Bx^2+Cxy+13y^2)$

LHS $=(x+y)^3+(3x-3y)^3$

$(x+y+3x-3y)[(x+y)^2+(3x-3y)^2-(x+y)(3x-3y)]$

$\{\because a^3+b^3=(a+b)(a^2+b^2-ab)\}$

$=(4x-2y)[10x^2+10y^2-16xy-3(x^2-y^2)]$

$=(4x-2y)[10x^2+10y^2-16xy-3x^2+3y^2]$

$=(4x-2y)[7x^2+13y^2-16xy]$

After comparing LHS with RHS,

$(4x-2y)[7x^2+13y^2-16xy]=(Ax-2y)(Bx^2+xy+13y^2)$

$A=4$, $B=7$ & $C=-16$

$\therefore (A-B-C)=(4-7+16)=13$

74. If $\left(2x-\frac{3}{x}\right)=2$, then what is the value of $\left(16x^4+\frac{81}{x^4}\right)$?

(a) 328 (b) 180 (c) 184 (d) 220

SSC CGL (Tier-I) 16/08/2021 (Shift I)

Ans. (c) : $\left(2x-\frac{3}{x}\right)=2$

On squaring both sides,

$$4x^2+\frac{9}{x^2}=4+12$$

$$4x^2+\frac{9}{x^2}=16$$

Again on squaring both sides,

$$16x^4+\frac{81}{x^4}=256-72$$

$$16x^4+\frac{81}{x^4}=184$$

75. $x+y+z=2$ and $xy+yz+zx=-11$, then the value of $x^3+y^3+z^3-3xyz$ is:

(a) 78 (b) 71 (c) 74 (d) 69

SSC CGL (Tier-I) 16/08/2021 (Shift I)

Ans. (c) : $x+y+z=2$

$$x^2+y^2+z^2+2(xy+yz+zx)=4$$

$$x^2+y^2+z^2=4+22=26$$

$\therefore x^3+y^3+z^3-3xyz=(x+y+z)[x^2+y^2+z^2-(xy+yz+zx)]$

$=2\times[26+11]$

$=2\times37=74$

76. If $x+\frac{1}{x}=4$, then the value of $x^5+\frac{1}{x^5}$ is :

(a) 776 (b) 684 (c) 724 (d) 736

SSC CGL–(Tier-I) 13/08/2021 (Shift I)

Ans. (c) : Given,

$$x+\frac{1}{x}=4 \Rightarrow \quad x^2+\frac{1}{x^2}=14,\ x^3+\frac{1}{x^3}=52$$

$$x^5+\frac{1}{x^5}=\left(x^2+\frac{1}{x^2}\right)\left(x^3+\frac{1}{x^3}\right)-\left(x+\frac{1}{x}\right)$$

$= 14 \times 52 - 4$

$= 728 - 4 = 724$

77. If x + y = 4 and $\frac{1}{x}+\frac{1}{y}=\frac{16}{15}$, then what is the value of $(x^3 + y^3)$?

(a) 18 (b) 16

(c) 19 (d) 21

SSC CGL–(Tier-I) 13/08/2021 (Shift I)

Ans. (c) :

Ans. (c) :

$$\frac{1}{x}+\frac{1}{y}=\frac{16}{15}$$

$$\frac{x+y}{xy}=\frac{16}{15}$$

$$\frac{4}{xy}=\frac{16}{15} \qquad \text{....(Given } x+y=4)$$

$$xy=\frac{15}{4}$$

$\therefore\ x^3 + y^3 = (x+y)^3 - 3xy\,(x+y)$

$$= 4^3 - 3\times\frac{15}{4}\times 4$$

$= 64 - 45 = 19$

78. If x + y + z = 3, $x^2 + y^2 + z^2 = 45$ and $x^3 + y^3 + z^3 = 69$, then what is the value of xyz?

(a) –40 (b) 40

(c) –30 (d) 30

SSC CHSL 19/04/2021 (Shift-I)

Ans. (a) : Given,

$x + y + z = 3,\ x^2+y^2+z^2 = 45,\ x^3 + y^3 + z^3 = 69,\ xyz = ?$

$(x+y+z)^2 = x^2+y^2+z^2 + 2\,(xy+yz+zx)$

$9 = 45 + 2(xy+yz+zx)$

$2(xy+yz+zx) = -36$

$xy+yz+zx = -18$

$x^3 + y^3 + z^3 - 3xyz = (x+y+z)\,(x^2+y^2+z^2 - xy - yz - zx)$

$69 - 3xyz = 3\times[45 - (-18)]$

$-3xyz = 63\times 3 - 69$

$$xyz = \frac{189-69}{-3} = -40$$

79. If $x + \frac{1}{x} = \sqrt{7}$, then what is the value of $(x^2 + 1) \div \left[x^4 + \left(\frac{1}{x^2}\right)\right]$?

(a) $2\sqrt{7}$ (b) $3\sqrt{7}$

(c) $\frac{1}{2}$ (d) $\frac{1}{4}$

SSC CHSL 19/04/2021 (Shift-I)

Ans. (d) : Given,

$$x + \frac{1}{x} = \sqrt{7}$$

$$x^3 + \frac{1}{x^3} = \left(\sqrt{7}\right)^3 - 3\sqrt{7} = 4\sqrt{7}$$

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

On dividing by x,

$$? = \frac{x+\frac{1}{x}}{x^3+\frac{1}{x^3}}$$

$$? = \frac{\sqrt{7}}{4\sqrt{7}} = \frac{1}{4}$$

80. If $x^6 - 6\sqrt{6}y^6 = (x^2 + Ay^2)(x^4 + Bx^2y^2 + Cy^4)$, then what will be the value of $(A^2 – B^2 + C^2)$?

(a) 27 (b) 42

(c) 36 (d) 18

SSC CHSL 10/08/2021 (Shift-I)

Ans. (c) : $x^6 - 6\sqrt{6}y^6 = (x^2 + Ay^2)(x^4 + Bx^2y^2 + Cy^4)$

$$\left(x^2\right)^3 - \left(\sqrt{6}y^2\right)^3 = (x^2 + Ay^2)(x^4 + Bx^2y^2 + Cy^4)$$

$$\left(x^2 - \sqrt{6}y^2\right)\left[x^4 + \sqrt{6}x^2y^2 + 6y^4\right]$$

$$= (x^2 + Ay^2)(x^4 + Bx^2y^2 + Cy^4)$$

On comparing both sides,

$\therefore \quad A = -\sqrt{6}, \qquad B = \sqrt{6}, \qquad C = 6$

$\therefore \quad A^2 - B^2 + C^2 = (-\sqrt{6})^2 - (\sqrt{6})^2 + (6)^2$

$= 6 - 6 + 36 = 36$

81. If $x + \frac{1}{15x} = 3$, then the value of $9x^3 + \frac{1}{375x^3}$ will be:

(a) 237.6 (b) 376.2

(c) 273.6 (d) 367.2

SSC CHSL 10/08/2021 (Shift-I)

Ans. (a) : $x + \frac{1}{15x} = 3$

On multiplying by 3 in both side,

$$3x + \frac{1}{5x} = 9$$

Taking cube on both sides,

$$27x^3 + \frac{1}{125x^3} + 3\times 3x \times \frac{1}{5x}\left(3x + \frac{1}{5x}\right) = 729$$

$$27x^3 + \frac{1}{125x^3} + \frac{9}{5}\times 9 = 729$$

On multiplying by $\frac{1}{3}$ of both side

$$9x^3 + \frac{1}{375x^3} + 5.4 = 243$$

$$9x^3 + \frac{1}{375x^3} = 237.6$$

82. If $x - y = 4$ and $xy = 3$, then what is the value of $x^3 - y^3$?

(a) 88 (b) 28
(c) 100 (d) 64

SSC CHSL 06/08/2021 (Shift-I)

Ans. (c) : $x - y = 4$, $xy = 3$

$\therefore x^3 - y^3 = (x-y)(x^2+y^2+xy)$ $[(x^2+y^2 = (x-y)^2+2xy]$

$= 4\times[(x-y)^2 + 2xy + xy]$

$= 4\times[4^2 + 3\times3]$

$= 4\times[16 + 9]$

$= 4 \times 25 = 100$

83. If $x^2 - 6\sqrt{3}\ x + 1 = 0$, then the value of $x^3 + \frac{1}{x^3}$ will be:

(a) $666\sqrt{3}$ (b) $630\sqrt{3}$
(c) $234\sqrt{3}$ (d) $216\sqrt{3}$

SSC CHSL 12/04/2021 (Shift-I)

Ans : (b) $x^2 - 6\sqrt{3}\ x + 1 = 0$ ------ [Given]

$$x - 6\sqrt{3} + \frac{1}{x} = 0$$

$$x + \frac{1}{x} = 6\sqrt{3}$$

On cubing both sides,

$$x^3 + \frac{1}{x^3} + 3\left(x + \frac{1}{x}\right) = 6\times6\times6\times3\sqrt{3}$$

$$x^3 + \frac{1}{x^3} = 648\sqrt{3} - 3\times6\sqrt{3}$$

$$= 630\sqrt{3}$$

84. If $a + b = p$, $ab = q$, then $(a^4 + b^4)$ is equal to

(a) $p^4 - 2p^2q^2 + q^2$ (b) $p^4 - 4p^2q^2 + 2q^2$
(c) $p^4 - 4p^2q + q^2$ (d) $p^4 - 4p^2q + 2q^2$

SSC CHSL 04/08/2021 (Shift-I)

Ans. (d) : Given–

$a + b = p$, $ab = q$ $[a^4 + b^4 = ?]$

$(a + b) = p$ (On squaring both sides)

$a^2 + b^2 + 2ab = p^2$

$a^2 + b^2 = p^2 - 2q$ (On squaring both sides)

$a^4 + b^4 + 2q^2 = p^4 + 4q^2 - 2p^2 \times 2q$

$a^4 + b^4 = p^4 - 4p^2q + 2q^2$

85. If $x^4 + y^4 + x^2y^2 = 117$ and $x^2 + y^2 - xy = 3(4+\sqrt{3})$, then the value of $(x^2 + y^2)$ will be:

(a) $6\sqrt{3}$ (b) 12
(c) 9 (d) $13\sqrt{3}$

SSC CHSL 12/04/2021 (Shift-I)

Ans : (b) $x^4 + y^4 + x^2y^2 = 117$, $x^2 + y^2 - xy = 3(4+\sqrt{3})$

$x^4 + y^4 + x^2y^2 = (x^2 + y^2 + xy)(x^2 + y^2 - xy)$

$117 = (x^2 + y^2 + xy)[3(4+\sqrt{3})]$

$$x^2 + y^2 + xy = \frac{117}{3(4+\sqrt{3})} \times \frac{(4-\sqrt{3})}{(4-\sqrt{3})}$$

$$= \frac{39(4-\sqrt{3})}{13} = 3(4-\sqrt{3})$$

$x^2 + y^2 + xy = 3(4-\sqrt{3})$ ...(i)

$x^2 + y^2 - xy = 3(4+\sqrt{3})$ ...(ii)

From eq^n (i) and eq^n (ii),

$2(x^2 + y^2) = 24$

$x^2 + y^2 = 12$

86. If $\left(x + \frac{1}{x}\right)^2 = 27$, then what is the value of $\left(x^2 + \frac{1}{x^2}\right)$? Given that x is real.

(a) 11 (b) 25
(c) 7 (d) 9

SSC CHSL 04/08/2021 (Shift-I)

Ans. (b) $\left(x + \frac{1}{x}\right)^2 = 27$

$$x^2 + \frac{1}{x^2} + 2\times x\times\frac{1}{x} = 27$$

$$x^2 + \frac{1}{x^2} = 27 - 2$$

$$x^2 + \frac{1}{x^2} = 25$$

87. If $\left(x + \frac{2}{x}\right) = 7$, then what is the value of $\left(2x^2 + \frac{8}{x^2}\right)$?

(a) 90 (b) 44
(c) 50 (d) 94

SSC CHSL 16/04/2021 (Shift-I)

Ans. (a) : Given, $x + \frac{2}{x} = 7$

On squaring both sides,

$$x^2 + \frac{4}{x^2} + 4 = 49$$

$$x^2 + \frac{4}{x^2} = 45$$

On multiplying by 2 on both sides,

$$2x^2 + \frac{8}{x^2} = 90$$

88. If $x - 3 = \frac{1}{2x}$, then what is the value of $\left(x^4 + \frac{1}{16x^4}\right)$?

(a) 11 (b) 99½
(c) 98 (d) 10

SSC CHSL 16/04/2021 (Shift-I)

Ans. (b) : $x - 3 = \frac{1}{2x}$

$$x - \frac{1}{2x} = 3$$

On squaring both sides,

$$x^2 + \frac{1}{4x^2} - 2 \times x \times \frac{1}{2x} = 9$$

$$x^2 + \frac{1}{4x^2} = 10$$

Again on squaring both sides,

$$x^4 + \frac{1}{16x^4} + 2 \times x^2 \times \frac{1}{4x^2} = 100$$

$$x^4 + \frac{1}{16x^4} = 100 - \frac{1}{2} = \frac{199}{2} = 99\frac{1}{2}$$

89. Given that $3\sqrt{3}x^3 - 8y^3 = \left(\sqrt{3}x + Ay\right)(3x^2+By^2+Cxy)$, the value of $(A^2+B^2-C^2)$ is:

(a) 0 (b) 12
(c) 8 (d) 4

SSC CHSL 12/08/2021 (Shift-I)

Ans. (c) : $3\sqrt{3}x^3 - 8y^3 = (\sqrt{3}x + Ay)(3x^2+By^2+Cxy)$

$(\sqrt{3}x - 2y)(3x^2+2\sqrt{3}xy+4y^2)$

$= (\sqrt{3}x+Ay)(3x^2+By^2+Cxy)$

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

$\therefore$ On comparing both sides,

$A = -2, B = 4, C = 2\sqrt{3}$

So, $A^2+B^2-C^2 = (-2)^2 + (4)^2 - (2\sqrt{3})^2$

$= 4 + 16 - 12 = 8$

90. If $3x - 2y + 3 = 0$, then what will be the value of $27x^3 + 54xy + 30 - 8y^3$?

(a) 3 (b) –27
(c) –57 (d) 57

SSC CHSL 12/08/2021 (Shift-I)

Ans. (a) : $3x - 2y + 3 = 0$

Let, $x = 1, y = 3$

Then, $3x - 2y + 3 = 3\times1 - 2\times3 + 3 = 0$ L.H.S =R.H.S.

On putting $x = 1$ and $y = 3$,

$27x^3+54xy+30-8y^3 = 27+54\times1\times3+30-8\times27$

$= 27 + 162 + 30 - 216$

$= 219 - 216 = 3$

91. If $\sqrt{x} + \frac{1}{\sqrt{x}} = 2\sqrt{3}$, then what will be the value of $x^4 + \frac{1}{x^4}$?

(a) 10406 (b) 9602
(c) 9606 (d) 10402

SSC CHSL 12/08/2021 (Shift-I)

Ans. (b) : $\sqrt{x} + \frac{1}{\sqrt{x}} = 2\sqrt{3}$

On squaring both sides,

$$x + \frac{1}{x} + 2 = 12$$

$$x + \frac{1}{x} = 10$$

Again, on squaring both sides,

$$x^2 + \frac{1}{x^2} = 98$$

Again on squaring both sides,

$$x^4 + \frac{1}{x^4} = (98)^2 - 2 = 9604 - 2 = 9602$$

92. If $3u+2v = 7$ and $uv = 2$, then the value of $(3u-2v)$ is:

(a) 2 (b) 0
(c) 1 (d) 5

SSC CHSL 13/04/2021 (Shift-I)

Ans. (c) : $\because (a-b)^2 = (a+b)^2 - 4ab$

$(3u - 2v)^2 = (3u+2v)^2 - 4\times3u\times2v$

$= 49 - 24 \times 2 = 1$

$3u - 2v = 1$

93. If $2x^2 - 6x = 1$, then $x^2 + \frac{1}{4x^2} = ?$

(a) 8 (b) 12
(c) 9 (d) 10

SSC CHSL 13/04/2021 (Shift-I)

Ans. (d) : $2x^2 - 6x = 1$

On dividing by 2x,

$$x - 3 = \frac{1}{2x}$$

$$x - \frac{1}{2x} = 3$$

On squaring both sides,

$$\left(x - \frac{1}{2x}\right)^2 = 9$$

$$x^2 + \frac{1}{4x^2} - 2 \times x \times \frac{1}{2x} = 9$$

$$x^2 + \frac{1}{4x^2} = 10$$

94. If $a + b + c = 5$ and $a^3 + b^3 + c^3 - 3abc = 185$, then the value of $ab + bc + ca$ lies between:

(a) –7 and –3 (b) 1 and 5
(c) –3 and 1 (d) 5 and 9

SSC CHSL 13/04/2021 (Shift-I)

Ans. (a) :

$a^3+b^3+c^3-3abc = (a+b+c)[(a+b+c)^2-3(ab+bc+ca)]$

$185 = 5[25-3(ab+bc+ca)]$

$37-25 = -3(ab+bc+ca)$

$ab + bc + ca = -4$

$\because$ –4 lies between –7 and – 3.

Hence option (a) will be right.

95. If $3x + 5y = 14$ and $xy = 6$, then what is the value of $9x^2 + 25y^2$?

(a) 16 (b) 14
(c) 20 (d) 182

SSC CHSL 11/08/2021 (Shift-I)

Ans. (a) : $3x + 5y = 14$, $xy = 6$ (Given)

On squaring both sides,

$(3x + 5y)^2 = 142$

$9x^2 + 25y^2 + 30xy = 196$ $(\because xy = 6)$

So, $9x^2 + 25y^2 = 196 - 30 \times 6 = 196 - 180 = 16$

96. If $a^2 + b^2 + c^2 + 48 = 8(a + b + c)$, then what is the value of $\sqrt[3]{a^3 - b^3 + c^3}$?

(a) 6 (b) 4
(c) 3 (d) 2

SSC CHSL 11/08/2021 (Shift-I)

Ans. (b) : $a^2 + b^2 + c^2 + 48 = 8(a + b + c)$

$a^2 - 8a + 16 + b^2 - 8b + 16 + c^2 - 8c + 16 = 0$

$(a-4)^2 + (b-4)^2 + (c-4)^2 = 0$

$\therefore$ $(a-4)^2 = 0$, $a = 4$

$(b-4)^2 = 0$, $b = 4$

$(c-4)^2 = 0$, $c = 4$

So, $\sqrt[3]{a^3 - b^3 + c^3} = \sqrt[3]{4^3 - 4^3 + 4^3} = 4$

97. If $x^4 + x^{-4} = 47$, $x > 0$, then the value of $(2x - 3)^2$ is:

(a) 9 (b) 3
(c) 5 (d) 7

SSC CHSL 11/08/2021 (Shift-I)

Ans. (c) : $x^4 + \frac{1}{x^4} = 47$

$x^2 + \frac{1}{x^2} = 7$

$\left(x + \frac{1}{x}\right)^2 = 7 + 2 = 9$

$x + \frac{1}{x} = 3$

$x^2 + 1 - 3x = 0$

$x^2 - 3x + 1 = 0$

Multiply by 4 on both sides,

$4x^2 - 12x + 4 = 0$

After adding 5 on both sides,

$4x^2 - 12x + 4 + 5 = 5$

$4x^2 - 12x + 9 = 5$

$(2x - 3)^2 = 5$

98. If $x - \frac{2}{x} = 4$, then what will be the value of $x^2 + \frac{4}{x^2}$?

(a) 8 (b) 20
(c) 18 (d) 12

SSC CHSL 04/08/2021 (Shift-II)

Ans. (b) : $x - \frac{2}{x} = 4$

$x^2 + \frac{4}{x^2} - 2 \times x \times \frac{2}{x} = 16$ (on squaring both sides)

$x^2 + \frac{4}{x^2} = 16 + 4 = 20$

99. If $\sqrt{x} + \frac{1}{\sqrt{x}} = \sqrt{6}$, then the value of $x^6 + \frac{1}{x^6}$ will be:

(a) 2712 (b) 2270
(c) 2502 (d) 2702

SSC CHSL 04/08/2021 (Shift-II)

Ans. (d) : $\sqrt{x} + \frac{1}{\sqrt{x}} = \sqrt{6}$

On squaring both sides,

$x + \frac{1}{x} + 2 = 6$

$x + \frac{1}{x} = 4$

$x^2 + \frac{1}{x^2} = 14$

Again on cubing both sides,

$x^6 + \frac{1}{x^6} = (14)^3 - 3 \times 14$

$= 2744 - 42 = 2702$

100. If $x^4 + \frac{1}{x^4} = 3842$, then the positive value of $x + \frac{1}{x}$ will be:

(a) 10 (b) 8
(c) 12 (d) 6

SSC CHSL 04/08/2021 (Shift-II)

Ans. (b) : $x^4 + \frac{1}{x^4} = 3842$

$x^2 + \frac{1}{x^2} = \sqrt{3842 + 2} = \sqrt{3844} = 62$

$x + \frac{1}{x} = \sqrt{62 + 2} = \sqrt{64} = 8$

Hence, $x + \frac{1}{x} = 8$

101. If $x + \frac{1}{3x} = 5$, then the value of $27x^3 + \frac{1}{x^3}$ will be:

(a) 3042 (b) 3024
(c) 3420 (d) 3240

SSC CHSL 10/082021 (Shift-II)

Ans. (d) : Given

$x + \frac{1}{3x} = 5$

On multiplying by 3 of both side

$$3x+\frac{1}{x}=5\times3=15$$

On cubing both sides,

$$\left(3x+\frac{1}{x}\right)^3=(15)^3$$

$$27x^3+\frac{1}{x^3}+3\times3x\times\frac{1}{x}\left(3x+\frac{1}{x}\right)=3375$$

$$27x^3+\frac{1}{x^3}+9(15)=3375$$

$$27x^3+\frac{1}{x^3}=3375-135$$

$$27x^3+\frac{1}{x^3}=3240$$

102. If $1+4x^2+16x^4=512$, and $1-2x+4x^2=64$, then the value of $1-2x+4x^2$ is:

(a) 6 (b) 8
(c) 10 (d) 12

SSC CHSL 10/082021 (Shift-II)

Ans. (b) : Given :-

$1+4x^2+16x^4=512$ -------(i)

And $1-2x+4x^2=64$ ------- (ii)

On dividing equation (i) by equation (ii)

$$\frac{1+4x^2+16x^4}{1-2x+4x^2}=\frac{512}{64}$$

$$\frac{(1+2x+4x^2)(1-2x+4x^2)}{1-2x+4x^2}=8$$

$$1+2x+4x^2=8$$

103. If $x^4-12x^2+1=0$, then what will be the value of $x^4+\frac{1}{x^4}$?

(a) 142 (b) 146
(c) 10 (d) 144

SSC CHSL 06/08/2021 (Shift-III)

Ans. (a) : Given :- $x^4-12x^2+1=0$

$x^4+1=12x^2$

On dividing by x^2 of both side

$$x^2+\frac{1}{x^2}=12$$

On squaring both side

$$\left(x^2+\frac{1}{x^2}\right)^2=(12)^2$$

$$x^4+\frac{1}{x^4}+2=144$$

$$x^4+\frac{1}{x^4}=144-2$$

$$\boxed{x^4+\frac{1}{x^4}=142}$$

104. If $x+\frac{81}{x}=18$ where x > 0, then the value of $x^2+\frac{162}{x^2}$ is:

(a) 78 (b) 83
(c) 85 (d) 81

SSC CHSL 06/08/2021 (Shift-III)

Ans. (b) : From question,

$$x+\frac{81}{x}=18$$

$\Rightarrow x^2+81=81x$

$\Rightarrow x^2-18x+81=0$

$\Rightarrow x^2-(9+9)x+81=0$

$\Rightarrow x^2-9x-9x+81=0$

$\Rightarrow x(x-9)-9(x-9)=0$

$\Rightarrow (x-9)(x-9)=0$

$\therefore \boxed{x=9}$

So, $x^2+\frac{162}{x^2}=9^2+\frac{162}{92}$

$=81+\frac{162}{81}$

$=81+2$

$=83$

105. If $x^3+y^3=468$ and $x+y=12$, then the value of x^4+y^4 will be:

(a) 3026 (b) 2036
(c) 3620 (d) 3025

SSC CHSL 13/04/2021 (Shift-III)

Ans.(a) : Given :- $x^3+y^3=468$

$(x+y)(x^2+y^2-xy)=468$

$x^2+y^2-xy=\frac{468}{12}$ ----- [$\because$ on putting the value of $(x+y)=12$]

$x^2+y^2-xy=39$ -------(i)

And $x+y=12$

On squaring both sides

$x^2+y^2+2xy=144$ ----(ii)

On subtracting equation (i) from equation (ii)

$$xy=144-39=\frac{105}{3}=35 \text{ -----(iii)}$$

On putting the value of xy in equation (ii)

$x^2+y^2+2\times35=144$

$x^2+y^2=144-70=74$

Again, on squaring both sides,

$x^4+y^4+2x^2y^2=(74)^2$

On putting the value of $xy=35$,

$x^4+y^4+2\times(35)^2=5476$

$x^4+y^4=5476-2450=3026$

Hence, $\boxed{x^4+y^4=3026}$

106. If $x^2 - 3\sqrt{2}x + 1 = 0$, then what is the value of $x^3 + \left(\frac{1}{x^2}\right)$?

(a) $30\sqrt{6}$ (b) $45\sqrt{2}$
(c) $15\sqrt{6}$ (d) $30\sqrt{2}$

SSC CHSL 04/08/2021 (Shift-III)

Ans. (b) : $x^2 - 3\sqrt{2}x + 1 = 0$

$x^2 + 1 = 3\sqrt{2}x$

On dividing by x both sides,

$$x + \frac{1}{x} = 3\sqrt{2}$$

On cubing both sides,

$$x^3 + \frac{1}{x^3} + 3\left(x + \frac{1}{x}\right) = 54\sqrt{2}$$

$$x^3 + \frac{1}{x^3} + 3 \times 3\sqrt{2} = 54\sqrt{2}$$

$$x^3 + \frac{1}{x^3} = 54\sqrt{2} - 9\sqrt{2}$$

$$x^3 + \frac{1}{x^3} = 45\sqrt{2}$$

107. If $x^2 + 1 - 2x = 0$, $x > 0$, then $x^2(x^2 - 2)$ = ...

(a) 1 (b) $\sqrt{2}$
(c) –1 (d) 0

SSC CHSL 04/08/2021 (Shift-III)

Ans. (c) : $x^2 + 1 - 2x = 0$ $(x > 0)$

$(x-1)^2 = 0$

$x = 1$

$x^2 (x^2 - 2) = 1 (1 - 2) = -1$

108. If $a + b = 24$ and $a^2 + b^2 = 306$, where $a > b$, then the value of $4a - 5b$ is:

(a) 18 (b) 20
(c) 12 (d) 15

SSC CHSL 05/08/2021 (Shift-III)

Ans. (d) : $(a + b) = 24$ ------(i) [Given]

On squaring both sides,

$a^2 + b^2 + 2ab = 576$

$2ab = 576 - (a^2 + b^2)$

$2ab = = 576 - 306 = 270$

$$ab = \frac{270}{2} = 135$$

$ab = 135$.....(ii)

From equations (i) and (ii)

$a = 15, b = 9$

Then, $4a - 5b = 4 \times 15 - 5 \times 9 = 15$, $\boxed{4a - 5b = 15}$

109. If $x - y = 4$ and $x^3 - y^3 = 316$, then the value of $x^4 + y^4$ is:

(a) 2248 (b) 2482
(c) 2428 (d) 2284

SSC CHSL 05/08/2021 (Shift-III)

Ans. (b) : Given :- $x - y = 4$ and $x^3 - y^3 = 316$

From, $x^3 - y^3 = 316$

$(x - y)(x^2 + y^2 + xy) = 316$

$$x^2 + y^2 + xy = \frac{316}{4} = 79 \text{ --------(i)}$$

From, $x - y = 4$

On squaring both sides,

$x^2 + y^2 - 2xy = 16$ ------- (ii)

From equation (i) and (ii),

$xy = 21 = 7 \times 3$

On taking $x = 7$ and $y = 3$,

Now, $x^4 + y^4 = (7)^4 + (3)^4 = 2401 + 81$

$x^4 + y^4 = 2482$

109. If $a + b + c = 5$, $a^2 + b^2 + c^2 = 27$ and $a^3 + b^3 + c^3 = 125$ then the value of $\frac{abc}{5}$ is:

(a) –1 (b) –5
(c) 1 (d) 5

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Ans. (a) : Given :-

$a + b + c = 5$, $a^2 + b^2 + c^2 = 27$ and $a^3 + b^3 + c^3 = 125$

On squaring both sides of $a + b + c = 5$

$a^2 + b^2 + c^2 + 2(ab + bc + ca) = 25$

$2(ab + bc + ca) = 25 - 27 = -2$

$$ab + bc + ca = \frac{-2}{2} = -1 \text{ ----- (i)}$$

Now from formula :

$a^3 + b^3 + c^3 - 3abc = (a + b + c)[(a+b+c)^2 - 3(ab + bc + ca)]$

As per question

$a^3 + b^3 + c^3 - 3abc = 5[(5)^2 - 3(-1)]$

$125 - 3abc = 5(25 + 3)$

$3abc = 125 - 140$

$$abc = \frac{-15}{3} = -5$$

On dividing by 5 both sides,

$$\frac{abc}{5} = \frac{-5}{5} = -1$$

$$\boxed{\frac{abc}{5} = -1}$$

110. If $a + b + c = 11$ and $ab + bc + ca = 15$ then what is the value of $a^3 + b^3 + c^3 - 3abc$?

(a) 368 (b) 386
(c) 638 (d) 836

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Ans. (d) : From formula :-

$a^3 + b^3 + c^3 - 3abc = (a+b+c)[(a+b+c)^2 - 3(ab + bc + ca)]$

$a^3 + b^3 + c^3 - 3abc = 11[(11)^2 - 3(15)]$

$= 11(121 - 45)$

$a^3 + b^3 + c^3 - 3abc = 11 \times 76 = 836$

Hence, $a^3 + b^3 + c^3 - 3abc = 836$

111. If $(x-1.5)^3 + (x-4)^3 + (x-3.5)^3 = 3(x-1.5)(x-4)(x-3.5)$, then what is the value of x?

(a) 9 (b) 3
(c) 6 (d) 1

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Ans. (b) :

$(x-1.5)^3 + (x-4)^3 + (x-3.5)^3 = 3(x-1.5)(x-4)(x-3.5)$

Now from the formula

When, $a^3+b^3+c^3 = 3abc$

Then, $a + b + c = 0$

Hence $x-1.5 + x-4 + x-3.5 = 0$

$3x - 9 = 0$

$3x = 9$

$x = \frac{9}{3} = 3$

112. If $a^3 + b^3 + c^3 - 3abc = 250$ and $a + b + c = 10$, then what will be the value of $\frac{1}{5}$ (ab + bc + ca)?

(a) 10 (b) 25

(c) 15 (d) 5

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Ans.(d) : Given :- $a^3+b^3+c^3 - 3abc = 250$

and $a+b+c = 10$

From formula,

$a^3+b^3+c^3 - 3abc = (a+b+c)[(a+b+c)^2 - 3(ab+bc+ca)]$

$250 = 10[(10)^2 - 3(ab+bc+ca)]$

$100 - 3(ab+bc+ca) = \frac{250}{10} = 25$

$3(ab+bc+ca) = 100 - 25 = 75$

$ab+bc+ca = \frac{75}{3} = 25$

Hence

$\frac{1}{5}(ab+bc+ca) = \frac{1}{5} \times 25 = 5$

113. If $x^2 + y^2 = 45$ and $x-y = 5$ then what is the value of $x^3 - y^3$?

(a) –25 (b) 250

(c) 275 (d) 150

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Ans.(c) : Given :-

$x-y = 5$

On squaring both sides,

$x^2+y^2 - 2xy = 25$

On putting the value of $x^2+y^2 = 45$

$2xy = 45 - 25 = 20$

$xy = \frac{20}{2} = 10$

Now $x^3-y^3 = (x-y)(x^2+y^2+xy)$

$= 5(45+10)$

$= 5 \times 55 = 275$

$\therefore x^3 - y^3 = 275$

114. If $a^2 + 49b^2 + c^2 + 18 = 2(28b - c - a)$ then the value of (a + 7b – c) is:

(a) 4 (b) 2

(c) –1 (d) 6

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Ans. (a) : Given :-

$a^2+49b^2+c^2 + 18 = 2(28b-c-a)$

$a^2+2a+49b^2 - 56b + c^2 + 2c + 18 = 0$

$a^2+2a+1+(7b)^2 - 56b + 16 + c^2 + 2c + 1 = 0$

$(a+1)^2 + (7b-4)^2 + (c+1)^2 = 0$

Hence,

$a = -1$

$b = \frac{4}{7}$,

and $c = -1$

On putting the value of a, b and c in a + 7b – c,

$-1 + 7 \times \frac{4}{7} + 1$

$-1 + 4 + 1 = 4$

Hence,

$\boxed{a + 7b - c = 4}$

115. If x – y – z = 0, then the value of $(x^2 + y^2 + z^2) \div (y^2 + xz)$ is:

(a) –1 (b) 2

(c) 1 (d) –2

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Ans : (b) Given :- x – y – z = 0

On taking, x = 2, y = 1 and z = 1

$x - y - z = 2 - 1 - 1 = 0$

Hence, $(x^2 + y^2 + z^2) \div (y^2 + xz)$

$[(2)^2 + (1)^2 + (1)^2 \div [(1)^2 + 2 \times 1]$

$6 \div 3 = 2$

$(x^2 + y^2 + z^2) \div (y^2 + xy) = 2$

116. If $x^4 + \frac{1}{x^4} = 6887$, then the positive value of $x - \frac{1}{x}$ is = ?

(a) 9 (b) 8

(c) 12 (d) 15

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Ans : (a) Given :-

$x^4 + \frac{1}{x^4} = 6887$

On adding 2 at both sides,

$x^4 + \frac{1}{x^4} + 2 = 6887 + 2 = 6889$

$\left(x^2 + \frac{1}{x^2}\right)^2 = (83)^2$

$x^2 + \frac{1}{x^2} = 83$

On subtracting 2 from both sides,

$x^2 + \frac{1}{x^2} - 2 = 83 - 2 = 81$

$\left(x - \frac{1}{x}\right)^2 = (9)^2$

$x - \frac{1}{x} = 9$

117. If $x^2 - 3x + 1 = 0$, then the value of $2\left(x^8 + \frac{1}{x^8}\right) - 5\left(x^2 + \frac{1}{x^2}\right)$ is:

(a) 4370 (b) 4279
(c) 4379 (d) 3479

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Ans : (c) Given :- $x^2 - 3x + 1 = 0$

$$x + \frac{1}{x} = 3$$

On squaring both sides,

$$x^2 + \frac{1}{x^2} = 9 - 2 = 7 \text{ -------(ii)}$$

Again, on squaring both sides,

$$x^4 + \frac{1}{x^4} = 49 - 2 = 47$$

Again, on squaring both sides,

$$x^8 + \frac{1}{x^8} = 2209 - 2 = 2207 \text{ ------(iii)}$$

From equation (ii) and (iii),

$$2\left(x^8 + \frac{1}{x^8}\right) - 5\left(x^2 + \frac{1}{x^2}\right)$$

$4414 - 35 = 4379$

Hence, $2\left(x^8 + \frac{1}{x^8}\right) - 5\left(x^2 + \frac{1}{x^2}\right) = 4379$

118. If $(4x - 5)^3 + (x - 2)^3 + 27(2x - 5)^3 = 9(4x - 5)(x - 2)(2x - 5)$, then the value of $\left(x + \frac{3}{2}\right)$ will be:

(a) $\frac{1}{2}$ (b) $\frac{3}{2}$
(c) $\frac{7}{2}$ (d) $\frac{5}{2}$

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Ans. (c) : Given :-

$(4x-5)^3 + (x-2)^3 + 27(2x-5)^3 = 9(4x-5)(x-2)(2x-5)$

Now, from formula

When $a^3+b^3+c^3 = 3abc$

Then $a+b+c = 0$

Hence, $4x - 5 + x - 2 + 3(2x-5) = 0$

$4x - 5 + x - 2 + 6x - 15 = 0$

$11x - 22 = 0$

$11x = 22$

$$x = \frac{22}{11} = 2$$

$$\left(x + \frac{3}{2}\right) = 2 + \frac{3}{2} = \frac{7}{2}$$

119. If $x^2 - 5\sqrt{2}x - 1 = 0$, then what will be the value of $x^3 - \frac{1}{x^3}$?

(a) $250\sqrt{2}$ (b) $485\sqrt{2}$
(c) $265\sqrt{2}$ (d) $255\sqrt{2}$

SSC CHSL 19/08/2021 (Shift-II)

Ans. (c) : Given :-

$$x^2 - 5\sqrt{2}x - 1 = 0$$

$$x^2 - 1 = 5\sqrt{2}x$$

$$x - \frac{1}{x} = 5\sqrt{2}$$

On cubing both sides,

$$x^3 - \frac{1}{x^3} - 3\left(x - \frac{1}{x}\right) = 250\sqrt{2}$$

$$x^3 - \frac{1}{x^3} - 3 \times 5\sqrt{2} = 250\sqrt{2}$$

$$x^3 - \frac{1}{x^3} - 15\sqrt{2} = 250\sqrt{2}$$

$$x^3 - \frac{1}{x^3} = 265\sqrt{2}$$

120. If $a^4+b^4+a^2b^2 = 133$ and $a^2+b^2-ab=19$, then the value of ab will be:

(a) −9 (b) 15
(c) −6 (d) 12

SSC CHSL 19/08/2021 (Shift-II)

Ans. (c) : From the formula,

$a^4+b^4+a^2b^2 = (a^2+b^2-ab)(a^2+b^2+ab)$

As per question:-

$133 = 19(a^2+b^2+ab)$

$$a^2+b^2+ab = \frac{133}{19} = 7 \text{ -------(i)}$$

and $a^2+b^2-ab = 19$ ------ (ii) -----(Given)

On solving equation (i) and (ii),

$2ab = -12$

$$ab = \frac{-12}{2} = -6$$

121. If $x - y = \frac{7}{4}$ and $\frac{1}{x} - \frac{1}{y} = \frac{14}{3}$, then $x^3 - y^3$ is equal to:

(a) $\frac{433}{64}$ (b) $\frac{217}{32}$
(c) $\frac{217}{64}$ (d) $\frac{433}{32}$

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Ans. (c) : From,

$$\frac{1}{x} - \frac{1}{y} = \frac{14}{3}$$

$3(y - x) = 14xy$

On putting the value of $x - y = \frac{7}{4}$,

$$3\left(\frac{-7}{4}\right) = 14xy$$

$$xy = \frac{-21}{4} \times \frac{1}{14} = \frac{-21}{56}$$

And $x-y=\frac{7}{4}$

On squaring both sides,

$$x^2+y^2-2xy=\frac{49}{16}$$

$$x^2+y^2+xy=\frac{49}{16}+3xy$$

$$x^2+y^2+xy=\frac{49}{16}+3\times\left(\frac{-21}{56}\right)$$

$$x^2+y^2+xy=\frac{49}{16}-\frac{63}{56}=\frac{49-18}{16}=\frac{31}{16}$$

Now, $x^3-y^3=(x-y)(x^2+y^2+xy)$

$$=\frac{7}{4}\times\frac{31}{16}=\frac{217}{64}$$

Hence, $x^3-y^3=\frac{217}{64}$

122. If x = 555, y = 556 and z = 557, then find the value of $x^3+y^3+z^3-3xyz$.

(a) 5006 (b) 5002
(c) 5004 (d) 5008

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Ans. (c) : From formula

$$x^3+y^3+z^3-3xyz=\frac{1}{2}(x+y+z)\left[(x-y)^2+(y-z)^2+(z-x)^2\right]$$

$$x^3+y^3+z^3-3xyz=\frac{1}{2}(555+556+557)\left[(555-556)^2+(556-557)^2+(557-555)^2\right]$$

$$=\frac{1}{2}\times1668\times(1+1+4)$$

$$=\frac{1}{2}\times1668\times6=5004$$

Hence $\boxed{x^3+y^3+z^3-3xyz=5004}$

123. If a + 5b = 25 and ab = 20, then one of the values of (a – 5b) is:

(a) 14 (b) 13
(c) 15 (d) 16

SSC CHSL 11/08/2021 (Shift-III)

Ans. (c) : From formula:-

$(a+b)^2-4ab=(a-b)^2$

$(a+5b)^2-4\times a\times 5b=(a-5b)^2$

$(25)^2-20\times ab=(a-5b)^2$

$625-20\times20=(a-5b)^2$

$(a-5b)^2=225$

$a-5b=\sqrt{225}=15$

$a-5b=15$

124. If 3a – b = 1 and ab = 4, then the value of $(9a^2-b^2)$ is:

(a) 7 (b) 8
(c) 5 (d) 6

SSC CHSL 11/08/2021 (Shift-III)

Ans. (a) : From formula,

$(x-y)^2+4xy=(x+y)^2$

$(3a-b)^2+4\times3a\times b=(3a+b)^2$

$(1)^2+12\times4=(3a+b)^2$

$3a+b=\sqrt{49}=7$ ------- (i)

Now, $9a^2-b^2=(3a)^2-(b)^2$

$9a^2-b^2=(3a+b)(3a-b)$

$9a^2-b^2=7\times1=7$

Hence, $9a^2-b^2=7$

125. If 3x + y = 12 and xy = 9, then the value of (3x – y) is:

(a) 4 (b) 5
(c) 6 (d) 3

SSC CHSL 09/08/2021 (Shift-III)

Ans. (c) : Given

$3x+y=12$ and $xy=9$

Now, from $(3x+y)^2-4\times3x\times y=(3x-y)^2$

$(12)^2-12\times9=(3x-y)^2$

$144-108=(3x-y)^2$

$36=(3x-y)^2$

$3x-y=\sqrt{36}=6$

Hence, $\boxed{3x-y=6}$

126. If $a^2+b^2+c^2=576$ and (ab + bc + ca) = 50, then what is the value of (a + b + c), if (a + b + c) < 0?

(a) ±26 (b) –24
(c) –26 (d) ±24

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Ans. (c) : From formula,

$(a+b+c)^2=a^2+b^2+c^2+2ab+2bc+2ca$

$(a+b+c)^2=576+2\times50$

$\left[\begin{matrix}\text{Given } a^2+b^2+c^2=576\\ (ab+bc+ca)=50\end{matrix}\right]$

$(a+b+c)^2=676$

$a+b+c=\sqrt{676}=\pm26$

$\because$ $a+b+c<0$

Hence, $a+b+c=-26$

127. If $\left(2x+\frac{1}{2x}\right)=5$, then what is the value of $\left(8x^3+\frac{1}{8x^3}\right)$?

(a) 110 (b) 120
(c) 100 (d) 125

SSC CHSL 09/08/2021 (Shift-III)

Ans. (a) : Given :- $2x+\frac{1}{2x}=5$

On cubing both sides,

$$\left(2x+\frac{1}{2x}\right)^3=(5)^3$$

$$8x^3+\frac{1}{8x^3}+3\times 2x\times\frac{1}{2x}\left(2x+\frac{1}{2x}\right)=125$$

$$8x^3+\frac{1}{8x^3}+3(5)=125$$

$$8x^3+\frac{1}{8x^3}=125-15$$

$$8x^3+\frac{1}{8x^3}=110$$

128. If $x + y = 27$ and $x^2 + y^2 = 425$, then the value of $(x - y)^2$ will be:

(a) 225 (b) 169
(c) 121 (d) 144

SSC CHSL 09/082021 (Shift-II)

Ans. (c) : Given:- $x+y = 27$ and $x^2+y^2 = 425$

On squaring both side of $x+y =27$,

$(x+y)^2 = (27)^2$

$x^2+y^2 + 2xy = 729$

$2xy = 729 – 425 = 304$ -----(i)

Now, $(x–y)^2 = x^2 + y^2 –2xy$

$= 425-304$

$(x–y)^2 = 121$

129. If $\left(40\sqrt{5}x^3 - 2\sqrt{2}y^3\right)\div\left(2\sqrt{5}x - \sqrt{2y}\right) = Ax^2+By^2 – Cxy$, then find the value of $A + 3B – \sqrt{10}C$

(a) 34 (b) 46
(c) 6 (d) 28

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Ans. (b) :

$$\left(40\sqrt{5}x^3 - 2\sqrt{2}y^3\right)\div\left(2\sqrt{5}x - \sqrt{2y}\right) = Ax^2+By^2–Cxy$$

$$\frac{\left(2\sqrt{5}x\right)^3-\left(\sqrt{2}y\right)^3}{2\sqrt{5}x-\sqrt{2}y}=Ax^2+By^2-Cxy$$

$$\frac{\left(2\sqrt{5}x-\sqrt{2}y\right)\left(20x^2+2y^2+2\sqrt{10}xy\right)}{\left(2\sqrt{5}x-\sqrt{2}y\right)}=Ax^2+By^2-Cxy$$

$20x^2 + 2y^2 + 2\sqrt{10}xy = Ax^2+By^2–Cxy$

On comparing both sides,

$A = 20$, $B = 2$ and $C = –2\sqrt{10}$

Now $A + 3B - \sqrt{10}C$

$= 20 + 3 \times 2 - \sqrt{10}\times\left(-2\sqrt{10}\right)$

$= 20 + 6 + 2 \times 10$

$= 26 + 20 = 46$

130. If $x^4+\frac{1}{x^4}=1154, x>0$, then what will be the value of $x+\frac{1}{x}$?

(a) $\sqrt{34}$ (b) 18
(c) $\sqrt{32}$ (d) 6

SSC CHSL 09/082021 (Shift-II)

Ans. (d) : Given :–

$$x^4+\frac{1}{x^4}=1154$$

$$x^4+\frac{1}{x^4}+2=1154+2$$

$$\left(x^2+\frac{1}{x^2}\right)^2=1156$$

$$\left(x^2+\frac{1}{x^2}\right)=\sqrt{1156}=34$$

Now, again adding 2 both sides,

$$x^2+\frac{1}{x^2}+2=34+2$$

$$\left(x+\frac{1}{x}\right)^2=36$$

$$x+\frac{1}{x}=\sqrt{36}=6$$

$$x+\frac{1}{x}=6$$

131. The value of $a^3 + b^3 + c^3 – 3abc$, when $a = 125$, $b = 127$ and $c = 129$, is:

(a) 4725 (b) 4752
(c) 3752 (d) 4572

SSC CHSL 12/08/2021 (Shift-II)

Ans. (d) : From the formula :-

$$a^3+b^3+c^3-3abc=\frac{(a+b+c)}{2}\left[(a-b)^2+(b-c)^2+(c-a)^2\right]$$

$$=\left(\frac{125+127+129}{2}\right)\left[(125-127)^2+(127-129)^2+(129-125)^2\right]$$

$= 190.5 \times (4+4+16)$

$= 190.5 \times 24$

$= 4572$

132. If $(7x + 3)^3 + (x–2)^3 + 27(2x –5)^3 = 9(7x+3)(x–2)(2x–5)$, then the value of $5x + 3$ is:

(a) 2 (b) 10
(c) 6 (d) 8

SSC CHSL 15/04/2021 (Shift-II)

Ans : (d) Given :-

$(7x + 3)^3 + (x–2)^3 + 27(2x –5)^3 = 9(7x+3)(x–2)(2x–5)$

From formula

If $a^3+b^3+c^3 = 3abc$ then $a+b+c$ will be zero

Hence,

$(7x+3) + (x–2) +3 (2x–5) = 0$

$7x + 3 + x–2 + 6x–15 = 0$

$14x = –3 + 2 + 15 = 14$

$$x = \frac{14}{14} = 1$$

Now, $5x+3 = 5 \times 1+3 = 8$

$5x+3 = 8$

133. If (3p – 5m) = 5 and pm = 6, then what is the value of $(9p^2 – 25m^2)$?

(a) $\pm 30\sqrt{10}$ (b) $30\sqrt{10}$

(c) $\pm 5\sqrt{385}$ (d) $5\sqrt{385}$

SSC CHSL 15/04/2021 (Shift-II)

Ans : (d) Given:- (3p – 5m) = 5, pm = 6

$(3p–5m)^2 + 4 \times 3p \times 5m = (3p+5m)^2$

$(5)^2 + 60 \times pm = (3p+5m)^2$

$(3p+5m)^2 = 25 + 360 = 385$

$3p + 5m = \sqrt{385}$ -------(i)

Now, $9p^2 – 25m^2 = (3p)^2 – (5m)^2$

$= (3p+5m)(3p–5m)$

$= \sqrt{365} \times 5$

Hence, $9p^2 – 25m^2 = 5\sqrt{385}$

134. If a + b + c = 2 and ab + bc + ca = –1, then the value of $a^3 + b^3 + c^3 – 3abc$ is:

(a) 14 (b) 2

(c) 5 (d) 10

SSC CHSL 06/082021 (Shift-II)

Ans. (a) : Given,

$a + b + c = 2 \rightarrow a^2 + b^2 + c^2 + 2(ab+bc+ca) = 4$

$a^3+b^3+c^3 – 3abc = (a+b+c)[a^2 + b^2 + c^2 – ab – bc – ca]$

$= 2 \times [4–(ab + bc + ca) \times 2 – (ab+bc+ca)]$

$= 2 \times [4–3(ab+bc+ca)]$

$= 2 \times [4+3]$

$= 14$

135. If $\left(x^2 + \frac{1}{49x^2}\right) = 15\frac{5}{7}$, then what is the value of $\left(x + \frac{1}{7x}\right)$?

(a) 7 (b) ± 7

(c) ± 4 (d) 4

SSC CHSL 06/08/2021 (Shift-II)

Ans. (c) : $x^2 + \frac{1}{49x^2} = 15\frac{5}{7}$

$$\left(x + \frac{1}{7x}\right)^2 = x^2 + \frac{1}{49x^2} + \frac{2}{7} = \frac{110}{7} + \frac{2}{7}$$

$$= \frac{112}{7} = 16$$

$$\therefore \left(x + \frac{1}{7x}\right) = \pm 4$$

136. If $x + \frac{1}{x} = \sqrt{13}$ then findout the value of $x^3 - \frac{1}{x^3}$.

(a) 32 (b) 36

(c) $4\sqrt{11}$ (d) $4\sqrt{11}$

SSC CHSL 12/08/2021 (Shift-III)

Ans. (b) : Given

$$x + \frac{1}{x} = \sqrt{13}$$

From formula :-

$$\left(x + \frac{1}{x}\right)^2 - 4 = \left(x - \frac{1}{x}\right)^2$$

$$\left(x - \frac{1}{x}\right)^2 = \left(\sqrt{13}\right)^2 - 4$$

$$x - \frac{1}{x} = 3$$

On cubing both sides,

$$\left(x - \frac{1}{x}\right)^3 = (3)^3$$

$$x^3 - \frac{1}{x^3} - 3\left(x - \frac{1}{x}\right) = 27$$

$$x^3 - \frac{1}{x^3} - 3 \times 3 = 27$$

$$x^3 - \frac{1}{x^3} = 27 + 9 = 36$$

$$x^3 - \frac{1}{x^3} = 36$$

137. If $x^4 + \frac{16}{x^4} = 27217, x > 0$, then the value of $x + \frac{2}{x}$ is:

(a) 15 (b) 11

(c) 17 (d) 13

SSC CHSL 15/04/2021 (Shift-III)

Ans.(d) : Given:-

$$x^4 + \frac{16}{x^4} = 27217$$

On adding 8 both sides,

$$\left(x^2\right)^2 + \left(\frac{4}{x^2}\right)^2 + 8 = 27217 + 8$$

$$\left(x^2 + \frac{4}{x^2}\right)^2 = 27225$$

$$x^2 + \frac{4}{x^2} = \sqrt{27225} = 165$$

Again, on adding 4 both sides,

$$\left(x^2\right)^2 + \left(\frac{2}{x}\right)^2 + 4 = 165 + 4 = 169$$

$$\left(x + \frac{2}{x}\right)^2 = 169$$

$$x + \frac{2}{x} = \sqrt{169} = 13$$

Hence $x + \frac{2}{x} = 13$

138. If $8a^3 + b^3 = 16$ and $2a + b = 4$, then find the value of $16a^4 + b^4$.

(a) 36 (b) 38
(c) 32 (d) 28

SSC CHSL 15/04/2021 (Shift-III)

Ans.(c) : Given:- $8a^3 + b^3 - 16$ -------(i)
and $2a + b = 4$ --------(ii)
From equation (i) and (ii) we will put the value of
$a = 1$ and $b = 2$
Now $16a^4 + b^4$
$= 16 \times (1)^4 + (2)^4$
$= 16 + 16 = 32$
Hence $\boxed{16a^2 + b^4 = 32}$

139. If $x - \frac{1}{2x} = 4$, then the value of $x^3 - \frac{1}{x^3}$ will be:

(a) 480 (b) 540
(c) 520 (d) 560

SSC CHSL 15/04/2021 (Shift-III)

Ans.(d) : Given that– $x - \frac{1}{2x} = 4$
On multiplying by 2 in both sides,
$2x - \frac{1}{x} = 8$ ____(i)
On cubing both sides,
$8x^3 - \frac{1}{x^3} - 3 \times 2x \times \frac{1}{x}\left(2x - \frac{1}{x}\right) = 512$
$\Rightarrow 8x^3 - \frac{1}{x^3} - 6 \times 8 = 512$ $\left[\text{From eq}^n\text{ (i)}\right]$
$\Rightarrow 8x^3 - \frac{1}{x^3} = 512 + 48$
$\boxed{8x^3 - \frac{1}{x^3} = 560}$

140. If $x^2 + \frac{1}{x^2} = 83, x > 0$ then find the value of $x^3 - \frac{1}{x^3}$?

(a) 657 (b) 746
(c) 756 (d) 576

SSC CHSL 12/08/2021 (Shift-III)

Ans. (c) : Given, $x^2 + \frac{1}{x^2} = 83$
On subtracting 2 from both sides,
$x^2 + \frac{1}{x^2} - 2 = 83 - 2 = 81$
$x - \frac{1}{x} = 9$
On cubing both sides,
$x^3 - \frac{1}{x^3} = 729 + 27 = 756$

141. If $x^2 + \left(4 - \sqrt{3}\right)x - 1 = 0$ then find the value of $x^2 + \frac{1}{x^2}$?

(a) $21 - 12\sqrt{3}$ (b) $17 - 8\sqrt{3}$
(c) $21 - 8\sqrt{3}$ (d) $9 - 8\sqrt{3}$

SSC CHSL 12/08/2021 (Shift-III)

Ans. (c) : Given
$x^2 + \left(4 - \sqrt{3}\right)x - 1 = 0$
On multiplying by $\frac{1}{x}$ both sides,
$x - \frac{1}{x} = 4 - \sqrt{3}$
On squaring both sides,
$x^2 + \frac{1}{x^2} - 2 = \left(4 - \sqrt{3}\right)^2 = 16 + 3 - 8\sqrt{3}$
$x^2 + \frac{1}{x^2} = 19 - 8\sqrt{3} + 2 = 21 - 8\sqrt{3}$
Hence, $\boxed{x^2 + \frac{1}{x^2} = 21 - 8\sqrt{3}}$

142. Given that $(2x+y)^3 - (x+2y)^3 = (x-y)[A(x^2+y^2) + Bxy]$, the value of $(2A - B)$ is:

(a) 0 (b) 7
(c) 1 (d) 6

SSC CHSL 13/04/2021 (Shift-II)

Ans. (c) : Given:-
$(2x+y)^3 - (x+2y)^3 = (x-y)\,[A(x^2+y^2) + Bxy]$
From formula,
$a^3 - b^3 = (a-b)\,(a^2+b^2+ab)$
$(2x+y)^3 - (x+2y)^3 = (2x+y-x-2y)\,[(2x+y)^2 + (x+2y)^2 + (2x+y)\,(x+2y)]$
$= (x-y)\,(5x^2 + 5y^2 + 8xy + 2x^2 + 2y^2 + 5xy)$
$(x-y)\,[7(x^2+y^2) + 13xy] = (x-y)\,[A(x^2+y^2) + Bxy]$
On comparing both sides,
$A = 7$ and $B = 13$
Now $2A - B = 2 \times 7 - 13$
$= 14 - 13 = 1$
Hence, $2A - B = 1$

143. If $x^4 - 142x^2 + 1 = 0$, then the value of $x^3 + \frac{1}{x^3}$ is:

(a) 1592 (b) 1692
(c) 1952 (d) 1962

SSC CHSL 13/04/2021 (Shift-II)

Ans. (b) : Given :-
$x^4 - 142x^2 + 1 = 0$
$x^4 + 1 = 142x^2$
$x^2 + \frac{1}{x^2} = 142$
On adding 2 to both sides –
$x^2 + \frac{1}{x^2} + 2 = 142 + 2 = 144$

$$\left(x+\frac{1}{x}\right)^2=(12)^2$$

$$x+\frac{1}{x}=12$$

On cubing both sides,

$$x^3+\frac{1}{x^3}+3\left(x+\frac{1}{x}\right)=1728$$

$$x^3+\frac{1}{x^3}+3\times12=1728$$

$$x^3+\frac{1}{x^3}=1728-36$$

$$\boxed{x^3+\frac{1}{x^3}=1692}$$

144. If $x^8 - 2599x^4 + 1 = 0$, then the positive value of $x-\frac{1}{x}$ will be:

(a) 8 (b) 6
(c) 12 (d) 7

SSC CHSL 19/04/2021 (Shift-III)

Ans. (d) : Given, $x^8 - 2599\,x^4 + 1 = 0$

$$x^8 + 1 = 2599\,x^4$$

On multiplying by $\frac{1}{x^4}$ both sides,

$$x^4+\frac{1}{x^4}=2599$$

On adding 2 to both sides,

$$x^4+\frac{1}{x^4}+2=2599+2$$

$$\left(x^2+\frac{1}{x^2}\right)^2=(51)^2$$

$$x^2+\frac{1}{x^2}=51$$

On subtracting 2 from both sides,

$$x^2+\frac{1}{x^2}-2=51-2=49$$

$$\left(x-\frac{1}{x}\right)^2=(7)^2$$

$$x-\frac{1}{x}=7$$

145. If $x^2+\frac{1}{x^2}=7$, then the value of $x^3+\frac{1}{x^3}$ where $x > 0$ is equal to :

(a) 16 (b) 18
(c) 15 (d) 12

SSC CGL (Tier-II)-2019 – 18/11/2020

Ans. (b) : $x^2+\frac{1}{x^2}=7,\quad x>0$

$$x^2+\frac{1}{x^2}+2=9 \qquad \text{(adding 2 both side)}$$

$$x+\frac{1}{x}=3$$

$$x^3+\frac{1}{x^3}=3^3-3\times3=27-9$$

$$\therefore\quad x^3+\frac{1}{x^3}=18$$

146. If $x\left(3-\frac{2}{x}\right)=\frac{3}{x}$ then the value of $x^3-\frac{1}{x^3}$ is equal to?

(a) $\frac{8}{27}$ (b) $\frac{52}{27}$
(c) $\frac{62}{27}$ (d) $\frac{61}{27}$

SSC CGL (Tier-II)-2019 – 18/11/2020

Ans. (c) : $x\left(3-\frac{2}{x}\right)=\frac{3}{x}$

$$3x-2=\frac{3}{x}$$

$$x-\frac{1}{x}=\frac{2}{3}$$

From formula if the $x-\frac{1}{x}=K$

$$x^3-\frac{1}{x^3}=K^3+3K$$

Hence,

$$x^3-\frac{1}{x^3}=\left(\frac{2}{3}\right)^3+3\times\frac{2}{3}$$

$$=\frac{8}{27}+2=\frac{62}{27}$$

147. If $\sqrt{x}+\frac{1}{\sqrt{x}}=3$, then the value of $x^3+\frac{1}{x^3}$ is:

(a) 324 (b) 326
(c) 322 (d) 422

SSC CGL (Tier-II)-2019 – 18/11/2020

Ans. (c) : Let, $\sqrt{x}+\frac{1}{\sqrt{x}}=3=K$

$$\because\quad x+\frac{1}{x}=K^2-2$$

$$x+\frac{1}{x}=3^2-2=7$$

$$\therefore\quad x^3+\frac{1}{x^3}=K^3-3K$$

$$=7^3-3\times7$$

$$=343-21=322$$

148. If $x-\frac{3}{x}=6$, $x \neq 0$, then the value of $\frac{x^4-\frac{27}{x^2}}{x^2-3x-3}$ is?

(a) 90 (b) 80
(c) 270 (d) 54

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Ans. (a) : $x-\frac{3}{x}=6, \quad x\neq 0$

$\left(x-\frac{3}{x}\right)^3=6^3$ (On cubing both sides)

$x^3-\frac{27}{x^3}-3\times x\times\frac{3}{x}\times\left(x-\frac{3}{x}\right)=216$

$x^3-\frac{27}{x^3}-9\times 6=216$

$x^3-\frac{27}{x^3}=270$

$\frac{x^4-\frac{27}{x^2}}{x^2-3x-3}$

$=\frac{x^3-\frac{27}{x^3}}{x-3-\frac{3}{x}}$

$=\frac{270}{6-3}=90$

149. If $\frac{3\left(x^2+1\right)-7x}{3x}=6, x\neq 0$, then the value of $\sqrt{x}+\frac{1}{\sqrt{x}}$ is ?

(a) $\sqrt{\frac{35}{3}}$ (b) $\sqrt{\frac{31}{3}}$

(c) $\sqrt{\frac{11}{3}}$ (d) $\sqrt{\frac{25}{3}}$

SSC CGL (Tier-II) 13-09-2019

Ans. (b) :

$\frac{3\left(x^2+1\right)-7x}{3x}=6$

$x+\frac{1}{x}-\frac{7}{3}=6$

$x+\frac{1}{x}=\frac{25}{3}$

$x+\frac{1}{x}+2=\frac{25}{3}+2$

$\left(\sqrt{x}+\frac{1}{\sqrt{x}}\right)^2=\frac{31}{3}$

$\sqrt{x}+\frac{1}{\sqrt{x}}=\sqrt{\frac{31}{3}}$

150. If x+y= 3, then what is the value of x^3+y^3+9xy?

(a) 15 (b) 81

(c) 27 (d) 9

SSC CGL (Tier-II) 18-02-2018

Ans. (c) : Given,

$x + y = 3$

On cubing both sides

$x^3 + y^3 + 3xy\,(x+y) = 27$

$x^3 + y^3 + 3xy\,(3) = 27$

$x^3 + y^3 + 9xy = 27$

Trick:

$x = 0, y = 3$

$x + y = 3$

$0 + 3 = 3$

$3 = 3$ (equation satisfies)

Now,

$x^3 + y^3 + 9xy = (0)^3 + (3)^3 + 9 \times 0 \times 3 = 27$

151. If $a^4 + 1 = [a^2/b^2]\,(4b^2 - b^4 - 1)$, then what is the value of $a^4 + b^4$?

(a) 2 (b) 16

(c) 32 (d) 64

SSC CGL (Tier-II) 20-02-2018

Ans. (a)

$a^4+1=\frac{a^2}{b^2}\left(4b^2-b^4-1\right)$

$a^2+\frac{1}{a^2}=4-b^2-\frac{1}{b^2}$

$a^2+\frac{1}{a^2}-2+b^2+\frac{1}{b^2}-2=0$

$\left(a-\frac{1}{a}\right)^2+\left(b-\frac{1}{b}\right)^2=0$

$\left(a-\frac{1}{a}\right)=0, \qquad \left(b-\frac{1}{b}\right)=0$

$a^2 - 1 = 0, \qquad b^2 - 1 = 0$

$a = 1, \qquad b = 1$

According to the question

$a^4 + b^4$

$= 1 + 1 = 2$

Trick:

Put, $a = 1, b = 1$

$a^4+1=\left[\frac{a^2}{b^2}\right]\left[4b^2-b^2-1\right]$

$1 + 1 = 1\,(4 - 2)$

$2 = 2$

(equation satisfies)

$\therefore\ a^4 + b^4 = 1$

$\therefore\ a^4 + b^4 = 1 + 1 = 2$

152. If $(27x^3 - 343y^3) \div (3x - 7y) = Ax^2 + By^2 + 7Cyx$, then the value of (4A – B + 5C) is:

(a) 3 (b) 1

(c) 0 (d) 2

SSC CGL (TIER-I) – 04.06.2019 (Shift-III)

Ans. (d) : $(27x^3 - 343y^3) \div (3x - 7y) = Ax^2 + By^2 + 7Cyx$

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

$\frac{(3x-7y)\,(9x^2+49y^2+21xy)}{(3x-7y)}=Ax^2+By^2+7Cyx$

$9x^2 + 49y^2 + 21xy = Ax^2+By^2+7Cyx$

On comparing equation

$A = 9,\ B = 49,\ C=\frac{21}{7}=3$

$4A - B + 5C = 4 \times 9 - 49 + 5 \times 3$

$= 51 - 49$

$= 2$

153. If $a^2 + b^2 + 64c^2 + 16c + 3 = 2(a+b)$, then the value of $4a^7 + b^7 + 8c^2$ is?

(a) $3\frac{7}{8}$ (b) $5\frac{1}{8}$

(c) $4\frac{1}{8}$ (d) $4\frac{7}{8}$

SSC CGL (TIER-I)– 04.06.2019 (Shift-III)

Ans. (b) : $a^2+b^2+64c^2 + 16c + 1 + 1 + 1 - 2a - 2b = 0$

$a^2-2a+1+b^2-2b+1+64c^2+16c+1=0$

$(a-1)^2 + (b-1)^2 + (8c+1)^2 = 0$

$(a-1)^2 = 0 \mid (b-1)^2 = 0 \mid (8c+1)^2 = 0$

$a = 1 \mid b = 1 \mid 8c = -1$

$c = -\frac{1}{8}$

$\Rightarrow \quad 4a^7 + b^7 + 8c^2 = 4\times1+1+8\times\frac{1}{64}$

$= 4 + 1 + \frac{1}{8} = 5\frac{1}{8}$

154. If $x + y = 1$ and $xy (xy - 2) = 12$, then the value of $x^4 + y^4$ is:

(a) 19 (b) 23

(c) 25 (d) 20

SSC CGL (TIER-I) – 04.06.2019 (Shift-III)

Ans. (c) : $x+y = 1$

On squaring both sides

$x^2 + y^2 + 2xy = 1$

$x^2 + y^2 = 1 - 2xy$

Again, on squaring both sides

$x^4 + y^4 + 2x^2y^2 = 1+4x^2y^2 - 4xy$

$x^4 + y^4 = 1+2xy (xy-2)$ $[\because xy(xy-2) = 12]$

$= 1 + 2 \times 12$

$= 25$

155. If $a^2 + b^2 + c^2 = 21$, and $a + b + c = 7$, then $(ab + bc + ca)$ is equal to?

(a) 14 (b) 8

(c) 12 (d) 28

SSC CGL (TIER-I) – 04.06.2019 (Shift-III)

Ans. (a) : $(a+b+c)^2 = \underbrace{a^2+b^2+c^2} + 2(\underbrace{ab+bc+ca})$

$49 = 21 + 2(ab+bc+ca)$

$\frac{28}{2} = (ab+bc+ca)$

$(ab+bc+ca) = 14$

156. If $16x^2 + 9y^2 + 4z^2 = 24 (x - y + z) - 61$, then the value of $(xy + 2z)$ is:

(a) 1 (b) 2

(c) 5 (d) 3

SSC CGL (TIER-I) – 04.06.2019 (Shift-II)

Ans. (c) : Given that,

$16x^2 + 9y^2 + 4z^2 = 24 (x - y + z) - 61$ $[xy + 2z = ?]$

$16x^2 + 9y^2 + 4z^2 - 24x + 24y - 24z + 61 = 0$

$(16x^2-24x+9)+(9y^2+24y+16)+(4z^2-24z+36)=0$

$(4x-3)^2 + (3y+4)^2 + (2z-6)^2 = 0$

$4x-3=0 \mid 3y+4=0 \mid 2z-6=0$

$x = 3/4 \mid y = -4/3 \mid z = 3$

$\Rightarrow xy + 2z = \frac{3}{4}\times\left(-\frac{4}{3}\right) + 2\times3$

$= -1 + 6 = 5$

157. If $[8(x + y)^3 - 27 (x - y)^3] \div (5y - x) = Ax^2 + Bxy + Cy^2$, then the value of $(A + B + C)$ is?

(a) 26 (b) 19

(c) 13 (d) 16

SSC CGL (TIER-I)– 04.06.2019 (Shift-II)

Ans. (d) :

$[8(x + y)^3 - 27 (x - y)^3] \div (5y - x) = Ax^2 + Bxy + Cy^2$

$[A + B + C = ?]$

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

$[2(x + y)]^3 - [3(x - y)]^3 \div (5y - x) = Ax^2 + Bxy + Cy^2$

$\Rightarrow \frac{(5y-x)[2(x+y)]^2 + [3(x-y)]^2 + 2(x+y)\times(3(x-y)}{(5y-x)}$

$= Ax^2 + Bxy + Cy^2$

$\Rightarrow \frac{(5y-x)[2(x+y)]^2 + [3(x-y)]^2 + 6(x^2-y^2)}{(5y-x)}$

$= Ax^2 + Bxy + Cy^2$

$= 4(x+y)^2 + 9(x-y)^2 + 6(x^2-y^2) = Ax^2 + Bxy + Cy^2$

$4(x^2+y^2)+9(x^2+y^2) + 6(x^2-y^2)+8xy - 18xy = Ax^2 + Bxy + Cy^2$

$19x^2 + 7y^2 - 10xy = Ax^2 + Bxy + Cy^2$

On comparing both sides with the respective term

$A = 19$

$B = -10$

$C = 7$

$\Rightarrow A + B + C = 19 + 7 - 10 = 16$

158. If $x + y + z = 19$, $xy + yz + zx = 114$, then the value of $\sqrt{x^3 + y^3 + z^3 - 3xyz}$ is:

(a) 17 (b) 13

(c) 19 (d) 21

SSC CGL (TIER-I) – 04.06.2019 (Shift-II)

Ans. (c) $(x+y+z)^2 = x^2+y^2+z^2 + 2 (xy + yz + zx)$

$361 = x^2 + y^2 + z^2 + 2 \times 114$

$361 - 228 = x^2 + y^2 + z^2$

$x^2 + y^2 + z^2 = 133$

$x^3+y^3+z^3-3xyz = (x+y+z)(x^2+y^2+z^2-xy-yz-zx)$

$= 19 \times (133-114)$

$\sqrt{x^3 + y^3 + z^3 - 3xyz} = \sqrt{19\times19}$

$\sqrt{x^3 + y^3 + z^3 - 3xyz} = 19$

159. If $x + y + z = 19$, $x^2 + y^2 + z^2 = 133$ and $xz = y^2$, then the difference between z and x is:

(a) 6 (b) 5

(c) 3 (d) 4

SSC CGL (TIER-I)– 04.06.2019 (Shift-I)

Ans. (b) $x + y + z = 19$ ..... (i)
$x^2 + y^2 + z^2 = 133$ ..... (ii)
$xz = y^2$ ..... (iii)
$z - x = ?$
$(x+y+z) = 19$ (On squaring both sides)
$x^2 + y^2 + z^2 + 2xy + 2yz + 2xz = 361$
$133 + 2(xy + yz + zx) = 361$
$2(xy + yz + zx) = 361 - 133$
$xy + yz + xz = 114$
$xz = y^2$ (On putting the value) ..... from equation (iii)
$xy + yz + y^2 = 114$
$y(x+y+z) = 114$ ($x+y+z = 19$ From equation (i))
$y \times 19 = 114$
$y = 6$
$y^2 = xz$
$36 = x \times z$
$36 = 4 \times 9$
$36 = 36$
Hence, we will put the value of x and z in such a way that the equation $x + y + z = 19$ is satisfied.
$x = 4$
$y = 6$
$z = 9$
$\therefore z - x = 9 - 4 = 5$

OR

$x + y + z = 19$, $x^2 + y^2 + z^2 = 133$, $xz = y^2$, $z - x = ?$
Equation is satisfied from the value of $x = 4$, $y = 6$, $z = 9$
$x + y + z = 19$
$4 + 6 + 9 = 19$
$19 = 19$
$\therefore z - x = 9 - 4 = 5$

160. If $3\sqrt{3}x^3 - 2\sqrt{2}y^3 = \left(\sqrt{3}x - \sqrt{2}y\right)\left(Ax^2 + By^2 + Cxy\right)$, then the value of $(A \times B) \div C$ is?

(a) $\sqrt{3}$ (b) $\sqrt{6}$
(c) $6\sqrt{6}$ (d) $6\sqrt{3}$

SSC CGL (TIER-I)– 06.06.2019 (Shift-III)

Ans. (b) :
$3\sqrt{3}x^3 - 2\sqrt{2}y^3 = \left(\sqrt{3}x - \sqrt{2}y\right)\left(Ax^2 + By^2 + Cxy\right)$
$\left(\sqrt{3}x\right)^3 - \left(\sqrt{2}y\right)^3 = \left(\sqrt{3}x - \sqrt{2}y\right)\left(Ax^2 + By^2 + Cxy\right)$
$\left(\sqrt{3}x - \sqrt{2}y\right)\left(3x^2 + 2y^2 + \sqrt{6}xy\right) = \left(\sqrt{3}x - \sqrt{2}y\right)\left(Ax^2 + By^2 + Cxy\right)$
$3x^2 + 2y^2 + \sqrt{6}xy = Ax^2 + By^2 + Cxy$
By comparing
$A = 3$, $B = 2$, $C = \sqrt{6}$
Hence $(A \times B) \div C = (3 \times 2) \div \sqrt{6} = \sqrt{6}$

161. If $a + b + c = 2$, $a^2 + b^2 + c^2 = 26$, then the value of $a^3 + b^3 + c^3 - 3abc$ is?

(a) 71 (b) 74
(c) 78 (d) 69

SSC CGL (TIER-I) – 06.06.2019 (Shift-III)

Ans. (b): $\because (a+b+c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca)$
$4 = 26 + 2(ab + bc + ca)$
$ab + bc + ca = -11$
$a^3 + b^3 + c^3 - 3abc = (a+b+c)(a^2 + b^2 + c^2 - ab - bc - ca)$
$= 2(26 + 11)$
$= 2 \times 37 = 74$

162. If $a + \frac{1}{a} = 3$, then $\left(a^4 + \frac{1}{a^4}\right)$ is equal to:

(a) 47 (b) 27
(c) 77 (d) 81

SSC CGL (TIER-I)– 06.06.2019 (Shift-III)

Ans. (a) : $a + \frac{1}{a} = 3$
$\left(a + \frac{1}{a}\right)^2 = 9$ (On squaring both sides)
$a^2 + \frac{1}{a^2} + 2 = 9$
$a^2 + \frac{1}{a^2} = 7$ (Again, on squaring both side)
$\left(a^2 + \frac{1}{a^2}\right)^2 = 49$
$a^4 + \frac{1}{a^4} + 2 = 49$
$a^4 + \frac{1}{a^4} = 47$

163. If $x = a + \frac{1}{a}$ and $y = a - \frac{1}{a}$ then $\sqrt{x^4 + y^4 - 2x^2y^2}$ is equal to?

(a) $16a^2$ (b) $\frac{8}{a^2}$
(c) 4 (d) 8

SSC CGL (TIER-I) – 06.06.2019 (Shift-I)

Ans. (c) : $\sqrt{x^4 + y^4 - 2x^2y^2}$
$= \sqrt{\left(x^2 - y^2\right)^2}$
$= x^2 - y^2$
$= (x+y)(x-y)$
$= 2a \times \frac{2}{a} = 4$

164. If $ab + bc + ca = 8$ and $a^2 + b^2 + c^2 = 20$, then a possible value of $\frac{1}{2}(a+b+c)$ $\left[(a-b)^2 + (b-c)^2 + (c-a)^2\right]$ is :

(a) 84 (b) 56
(c) 72 (d) 80

SSC CGL (TIER-I)– 06.06.2019 (Shift-I)

Ans. (c) : $\because\ (a+b+c)^2 = a^2+b^2+c^2+2(ab+bc+ca)$

$= 20 + 2\times 8 = 36$

$a+b+c = 6$

$\therefore\quad \frac{1}{2}(a+b+c)\left[(a-b)^2+(b-c)^2+(c-a)^2\right]$

$= (a+b+c)(a^2+b^2+c^2-ab-bc-ca)$

$= 6\times[20-8]$

$= 6\times 12 = 72$

165. If $\frac{6x}{(2x^2+5x-2)} = 1, x>0,$, then the value of $x^3+\frac{1}{x^3}$ is?

(a) $\frac{3}{8}\sqrt{17}$ (b) $\frac{5\sqrt{17}}{8}$

(c) $\frac{5\sqrt{17}}{16}$ (d) $\frac{3}{4}\sqrt{17}$

SSC CGL (TIER-I)– 07.06.2019 (Shift-III)

Ans. (b) : Given, $\frac{6x}{(2x^2+5x-2)} = 1$

$\Rightarrow\quad \frac{6}{2x+5-\frac{2}{x}} = 1 \Rightarrow 2\left(x-\frac{1}{x}\right) = 1$

$\Rightarrow \left(x-\frac{1}{x}\right) = \frac{1}{2}$

$\therefore\quad \left(x+\frac{1}{x}\right) = \sqrt{\left(x-\frac{1}{x}\right)^2+4}$

$= \sqrt{\left(\frac{1}{2}\right)^2+4} = \frac{\sqrt{17}}{2}$

$\therefore\quad x^3+\frac{1}{x^3} = \left(x+\frac{1}{x}\right)\left[x^2+\frac{1}{x^2}-1\right]$

$= \left(x+\frac{1}{x}\right)\left[\left\{\left(x+\frac{1}{x}\right)^2-2\right\}-1\right]$

$= \left(\frac{\sqrt{17}}{2}\right)\left[\left(\frac{\sqrt{17}}{2}\right)^2-3\right]$

$= \frac{\sqrt{17}}{2}\left[\frac{17-12}{4}\right]$

$= \frac{5\sqrt{17}}{8}$

166. If $x^2 - 3x - 1 = 0$, then the value of $(x^2 + 8x - 1)(x^3 + x^{-1})^{-1}$ is?

(a) 8 (b) $\frac{3}{8}$

(c) 1 (d) 3

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Ans. (c) : $x^2 - 3x - 1 = 0$

$x^2 - 1 = 3x$ .....(i)

$(x^2-1)^2 = (3x)^2$ (On squaring both sides)

$x^4 + 1 - 2x^2 = 9x^2$

$x^4 + 1 = 11x^2$ .....(ii)

$(x^2+8x-1)\left(\frac{x^4+1}{x}\right)^{-1}$

From question,

$(11x)\left(\frac{11x^2}{x}\right)^{-1}$ $\quad[\because\ x^2-1=3x]$

$(11x)\times\left(\frac{1}{11x}\right) = 1$

167. If $\left(135\sqrt{5}x^3 - 2\sqrt{2}y^3\right) \div \left(3\sqrt{5}x - \sqrt{2}y\right) = Ax^2 + By^2 + \sqrt{10}Cxy$, then the value of (A + B – 9 C) is?

(a) 18 (b) 12

(c) 10 (d) 20

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Ans. (d) : $\left(135\sqrt{5}x^3 - 2\sqrt{2}y^3\right) \div \left(3\sqrt{5}x - \sqrt{2}y\right)$

$= Ax^2 + By^2 + \sqrt{10}Cxy$

$\left[\left(3\sqrt{5}x\right)^3 - \left(\sqrt{2}y\right)^3 \div \left(3\sqrt{5}x - \sqrt{2}y\right)\right]$

$= Ax^2 + By^2 + \sqrt{10}Cxy$

$\because\quad a^3-b^3 = (a-b)(a^2+b^2+ab)$

$\left(3\sqrt{5}x - \sqrt{2}y\right)\left(45x^2 + 2y^2 + 3\sqrt{10}xy\right) \div \left(3\sqrt{5}x - \sqrt{2}y\right)$

$= Ax^2 + By^2 + \sqrt{10}Cxy$

$45x^2 + 2y^2 + 3\sqrt{10}xy = Ax^2 + By^2 + \sqrt{10}Cxy$

By comparing

$A = 45, \quad B = 2, \quad C = 3$

$(A + B - 9C) = 45 + 2 - 27$

$= 47 - 27$

$= 20$

168. If $9a^2 + 4b^2 + c^2 + 21 = 4(3a + b - 2c)$, then the value of (9a + 4b – c) is?

(a) 12 (b) 2

(c) 16 (d) 6

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Ans. (a): $9a^2 + 4b^2 + c^2 + 21 = 4(3a + b - 2c)$

$(9a^2 - 12a + 4) + (4b^2 - 4b + 1) + (c^2 + 8c + 16) = 0$

$(3a-2)^2 + (2b-1)^2 + (c+4)^2 = 0$

$3a - 2 = 0 \qquad 2b - 1 = 0 \qquad c + 4 = 0$

$\Rightarrow \quad a = 2/3 \quad \Rightarrow b = 1/2 \quad \Rightarrow c = -4$

$9a + 4b - c$

$= 9 \times \frac{2}{3} + 4 \times \frac{1}{2} - (-4)$

$= 6 + 2 + 4 = 12$

169. If $x = 2 - p$, then $x^3 + 6xp + p^3$ is equal to?

(a) 12 (b) 6

(c) 8 (d) 4

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Ans. (c) : $x = 2 - p$

$x + p = 2$

On cubing both sides

$(x + p)^3 = (2)^3$

$x^3 + p^3 + 3xp(x + p) = 8$

$x^3 + p^3 + 3xp(2) = 8$

$\boxed{x^3 + p^3 + 6xp = 8}$

170. If $x^4 - 6x^2 - 1 = 0$, then the value of $x^6 - 5x^2 + \frac{5}{x^2} - \frac{1}{x^6} + 5$ is?

(a) 239 (b) 204

(c) 209 (d) 219

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Ans. (c) :

$x^6 - 5x^2 + \frac{5}{x^2} - \frac{1}{x^6} + 5$

$x^6 - \frac{1}{x^6} - 5\left(x^2 - \frac{1}{x^2}\right) + 5$ .....(A)

$\because \quad x^4 - 6x^2 - 1 = 0$

$x^4 - 1 = 6x^2$

$x^2 - \frac{1}{x^2} = 6$ .....(B)

$\left(x^2 - \frac{1}{x^2}\right)^3 = (6)^3$

$x^6 - \frac{1}{x^6} - 3\left(x^2 - \frac{1}{x^2}\right) = 216$

$x^6 - \frac{1}{x^6} - 3(6) = 216$

$x^6 - \frac{1}{x^6} = 216 + 18$

$\boxed{x^6 - \frac{1}{x^6} = 234}$ .....(C)

By putting the value of equation B and equation (C) in equation (A)

$= 234 - 5(6) + 5$

$= 234 - 30 + 5$

$= \boxed{209}$

171. If $a + b + c = 11$ and $ab + bc + ca = 38$, then $a^3 + b^3 + c^3 - 3abc$ is equal to?

(a) 44 (b) 77

(c) 55 (d) 66

SSC CGL (TIER-I)-2018 – 10.06.2019 (Shift-III)

Ans. (b) : $a + b + c = 11$ ..... (i)

Given

$\therefore ab + bc + ca = 38$

From equation (i)

$(a + b + c)^2 = (11)^2 = 121$

$a^2 + b^2 + c^2 + 2(ab + bc + ca) = 121$

$a^2 + b^2 + c^2 = 121 - 2 \times 38 = 121 - 76 = 45$

$\because a^3 + b^3 + c^3 - 3abc = (a+b+c)(a^2+b^2+c^2-ab-bc-ca)$

$\therefore a^3 + b^3 + c^3 - 3abc = 11 \times (45 - 38)$

$= 11 \times 7$

$= 77$

172. If $\sqrt{x} - \frac{1}{\sqrt{x}} = 4$, then $x^2 + \frac{1}{x^2}$ is equal to?

(a) 192 (b) 322

(c) 256 (d) 326

SSC CGL (TIER-I)-2018 – 10.06.2019 (Shift-II)

Ans. (b) : Given,

$\sqrt{x} - \frac{1}{\sqrt{x}} = 4$

On squaring both sides

$\left(\sqrt{x} - \frac{1}{\sqrt{x}}\right)^2 = (4)^2$

$x + \frac{1}{x} - 2 = 16$

$\left(x + \frac{1}{x}\right) = 18$ .....(i)

$\therefore \quad x^2 + \frac{1}{x^2} = \left(x + \frac{1}{x}\right)^2 - 2$

$x^2 + \frac{1}{x^2} = (18)^2 - 2$ (From equation (i))

$x^2 + \frac{1}{x^2} = 324 - 2$

$x^2 + \frac{1}{x^2} = 322$

173. If $4x^2 - 6x + 1 = 0$, then the value of $8x^3 + (8x^3)^{-1}$ is:

(a) 36 (b) 13

(c) 11 (d) 18

SSC CGL (TIER-I)-2018 – 10.06.2019 (Shift-I)

Ans. (d) : $4x^2 - 6x + 1 = 0$

$4x^2 + 1 = 6x$

$\frac{4x^2 + 1}{2x} = \frac{6x}{2x}$ ($\because$ on dividing by 2x)

$2x + \frac{1}{2x} = 3$ .....(i)

From equation (i)

$$\left(2x+\frac{1}{2x}\right)^3 = 8x^3+\frac{1}{8x^3}+3\times 2x\times\frac{1}{2x}\left(2x+\frac{1}{2x}\right)$$

$$(3)^3 = 8x^3+\frac{1}{8x^3}+9$$

$$18 = 8x^3+\frac{1}{8x^3}$$

or, $\quad 8x^3+\left(8x^3\right)^{-1} = 18$

174. If $\sqrt{x}+\frac{1}{\sqrt{x}}=\sqrt{7}$, then $x^3+\frac{1}{x^3}$ is equal to?

(a) 120 (b) 110
(c) 140 (d) 130

SSC CGL (TIER-I)-2018 – 11.06.2019 (Shift-III)

Ans. (b) $\sqrt{x}+\frac{1}{\sqrt{x}}=\sqrt{7}$

$$x+\frac{1}{x}+2=7 \qquad \text{(By squaring both sides)}$$

$$x+\frac{1}{x}=5$$

$[(a+b)^3 = a^3+b^3+3ab(a+b)]$

$$\left(x+\frac{1}{x}\right)^3=(5)^3$$

$$x^3+\frac{1}{x^3}+3\times x\times\frac{1}{x}\left(x+\frac{1}{x}\right)=125$$

$$x^3+\frac{1}{x^3}+3(5)=125, \qquad \boxed{x^3+\frac{1}{x^3}=110}$$

175. If a + b = 8 and $ab=\frac{32}{3}$, then (a^3+b^3) is equal to:

(a) 256 (b) 384
(c) 128 (d) 320

SSC CGL (TIER-I)-2018 – 11.06.2019 (Shift-III)

Ans. (a) : We know that formula

$(a+b)^3 = a^3+b^3+3ab(a+b)$

According to this formula

$$(8)^3 = a^3+b^3+3\times\frac{32}{3}(8)$$

$$512 = a^3+b^3+256$$

$$a^3+b^3 = 256$$

176. If a + b + c = 4 and ab + bc + ca = 2, then $a^3+b^3+c^3-3abc$ is equal to:

(a) 36 (b) 32
(c) 48 (d) 40

SSC CGL (TIER-I)-2018 – 11.06.2019 (Shift-III)

Ans. (d) : We know that:–

$(a+b+c)^2 = a^2+b^2+c^2+2(ab+bc+ca)$

$$(4)^2 = a^2+b^2+c^2+2(2)$$

$$a^2+b^2+c^2 = 12$$

$a^3+b^3+c^3-3abc = (a+b+c)[a^2+b^2+c^2-(ab+bc+ca)] = 4[12-2]$

$$a^3+b^3+c^3-3abc = 4\times 10 = 40$$

177. If (a + b) = 6 and $ab=\frac{16}{3}$, then (a^3+b^3) is equal to:

(a) 150 (b) 190
(c) 220 (d) 120

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Ans. (d) : Given,

$$a+b=6 \qquad \text{.....(i)}$$

$$ab=\frac{16}{3}$$

$\because \quad a^3+b^3 = (a+b)(a^2+b^2-ab) \qquad$ ....(ii)

From equation (i)

$$(a+b)^2 = 36$$

$$a^2+b^2+2ab = 36$$

$$a^2+b^2 = 36-2\times\frac{16}{3}=\frac{108-32}{3}=\frac{76}{3}$$

From equation (ii)

$$a^3+b^3 = 6\times\left(\frac{76}{3}-\frac{16}{3}\right)=6\times\frac{60}{3}=120$$

178. If a + b + c = 8 and ab + bc + ca = 12, then $a^3+b^3+c^3-3abc$ is equal to:

(a) 192 (b) 144
(c) 400 (d) 224

SSC CGL (TIER-I)-2018 – 11.06.2019 (Shift-I)

Ans. (d) : a + b + c = 8, ab + bc + ca = 12 Given that

$a^2+b^2+c^2+2(ab+bc+ca) = 64$

$a^2+b^2+c^2 = 64-2(ab+bc+ca) \qquad$ .....(i)

Now,

$a^3+b^3+c^3-3abc = (a+b+c)(a^2+b^2+c^2-ab-bc-ca)$

$\therefore$ From equation (i)

$a^3+b^3+c^3-3abc = (a+b+c)[64-3(ab+bc+ca)]$

$= 8\times[64-3\times 12] = 8\times[64-36]$

$= 8\times 28$

$= 224$

179. If a – b = 5 and ab = 2, then a^3-b^3 is equal to?

(a) 95 (b) 145
(c) 125 (d) 155

SSC CGL (TIER-I)-2018 – 12.06.2019 (Shift-III)

Ans. (d) : a – b = 5, ab = 2

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

$$a^3-b^3 = (5)^3+3\times 2\times(5)$$

$$= 125+30$$

$$= 155$$

180. If $\sqrt{x}-\frac{1}{\sqrt{x}}=2\sqrt{2}$, then $x^2+\frac{1}{x^2}$ is equal to:

(a) 100 (b) 98
(c) 102 (d) 104

SSC CGL (TIER-I)-2018 – 12.06.2019 (Shift-II)

Ans. (b) :

$$\sqrt{x}-\frac{1}{\sqrt{x}}=2\sqrt{2} \qquad \text{.....(i)}$$

On squaring equation (i)

$$\left(\sqrt{x}-\frac{1}{\sqrt{x}}\right)^2=\left(2\sqrt{2}\right)^2$$

$$x+\frac{1}{x}-2=8$$

$$x+\frac{1}{x}=10 \qquad \text{.....(ii)}$$

On squaring equation (ii)

$$\left(x+\frac{1}{x}\right)^2=(10)^2$$

$$x^2+\frac{1}{x^2}=98$$

181. If (a +b) = 6 and ab = 8, then ($a^3 + b^3$) is equal to?

(a) 72 (b) 108
(c) 144 (d) 216

SSC CGL (TIER-I)-2018 – 12.06.2019 (Shift-I)

Ans. (a) :

(a + b) = 6

by cubing both sides

$(a+b)^3 = (6)^3$

$\Rightarrow a^3 + b^3 + 3ab\,(a+b) = 216$

$\Rightarrow a^3 + b^3 + 3 \times 8 \times 6 = 216$ [$\because ab = 8$]

$\Rightarrow a^3 + b^3 = 216 - 144$

$\Rightarrow \boxed{a^3 + b^3 = 72}$

182. If $x+\frac{1}{x}=5$, then $x^3+\frac{1}{x^3}$ is equal to:

(a) 110 (b) 130
(c) 125 (d) 145

SSC CGL (TIER-I)-2018 – 13.06.2019 (Shift-III)

Ans. (a) : Given–

$$x+\frac{1}{x}=5$$

$$\therefore \quad x^3+\frac{1}{x^3}=\left(x+\frac{1}{x}\right)^3-3\left(x+\frac{1}{x}\right)$$

$$= 125 - 15 = 110$$

183. If $(x-5)^3+(x-6)^3+(x-7)^3 = 3\,(x-5)\,(x-6)\,(x-7)$ then what is the value of x?

(a) 18 (b) 6
(c) 5 (d) 7

SSC CGL (TIER-I)-2018 – 13.06.2019 (Shift-III)

Ans. (b) : $(x-5)^3 + (x-6)^3 + (x-7)^3$

$= 3(x-5)(x-6)(x-7)$

$a = x-5,\ b = x-6,\ c = x-7$

$\because \quad a^3 + b^3 + c^3 = 3abc$

$\therefore \quad a + b + c = 0$

$x - 5 + x - 6 + x - 7 = 0$

$3x - 18 = 0$

$x = 6$

184. If $a^3 - b^3 = 208$ and a – b = 4, then $(a + b)^2 - ab$ is equal to:

(a) 32 (b) 38
(c) 52 (d) 42

SSC CGL (TIER-I)-2018 – 13.06.2019 (Shift-III)

Ans. (c) : $a^3 - b^3 = 208$

$(a - b)(a^2 + b^2 + ab) = 208$

$4(a^2+b^2+ab)=208$

$a^2 + b^2 + ab = 52$

$\therefore \quad (a + b)^2 - ab = 52$

185. If a–b=5 and ab = 6, then ($a^3 - b^3$) is equal to?

(a) 215 (b) 155
(c) 90 (d) 225

SSC CGL (TIER-I)-2018 – 13.06.2019 (Shift-II)

Ans. (a) : a – b = 5 and ab = 6

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

$a^3 - b^3 = 5^3 + 3 \times 6 \times 5$

$a^3 - b^3 = 125 + 90$

$a^3 - b^3 = 215$

186. If $a-\frac{1}{a}=3$, then $a^6+\frac{1}{a^6}$ equal to :

(a) 996 (b) 729
(c) 1298 (d) 1331

SSC CGL (TIER-I)-2018 – 19.06.2019 (Shift-III)

Ans. (c) : $a-\frac{1}{a}=3$.....(i)

By squaring the equation (i)

$$a^2+\frac{1}{a^2}-2=9$$

$$a^2+\frac{1}{a^2}=11 \text{.....(ii)}$$

By cubing the equation (ii)

$$a^6+\frac{1}{a^6}+3\left(a^2+\frac{1}{a^2}\right)=1331$$

$$a^6+\frac{1}{a^6}=1331-33=1298$$

187. If $x+\frac{1}{x}=4$, then $x^3+\frac{1}{x^3}$ equal to :

(a) 52 (b) 64
(c) 40 (d) 50

SSC CGL (TIER-I)-2018 – 19.06.2019 (Shift-III)

Ans. (a) : $x+\frac{1}{x}=4$ $\qquad \boxed{x^3+\frac{1}{x^3}=a^3-3a}$

On cubing both sides

$$x^3+\frac{1}{x^3}=(4)^3-3\times4=64-12$$

$$\therefore \quad x^3+\frac{1}{x^3}=52$$

188. If $a^3 - b^3 = 210$ and a – b = 5, then $(a+b)^2 - ab$ equal to:

(a) 52 (b) 42
(c) 38 (d) 32

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Ans. (b) $\therefore a^3 - b^3 = 210$, a – b = 5

$(a-b)(a^2 + b^2 + ab) = 210$

$\therefore$ a – b = 5 Given

$\therefore \quad 5 \times (a^2 + b^2 + ab) = 210$

$(a^2 + b^2 + 2ab) - ab = 42$

$(a + b)^2 - ab = 42$

189. If $(x-4)^3 + (x-5)^3 + (x-3)^3 = 3(x-4)(x-5)(x-3)$, then what will be the value of x.

(a) 7 (b) 4
(c) 18 (d) 6

SSC CGL (TIER-I)-2018 – 19.06.2019 (Shift-III)

Ans. (b) $a^3 + b^3 + c^3 = 3abc$ It is possible only when
$a + b + c = 0$
$x-4 + x - 5 + x - 3 = 0$
$3x - 12 = 0$
$3x = 12 \quad x = 4$
II[nd] method
$(x-4)^3 + (x-5)^3 + (x-3)^3 = 3(x-4)(x-5)(x-3)$
$\because$ By option (b)
$\therefore x = 4$ By taking the value of $x = 4$
$(4-4)^3 + (4-5)^3 + (4-3)^3 = 3(4-4)(4-5)(4-3)$
$0 + (-1) + 1 = 3(0) \times (-1)(1)$
$0 = 0$
L.H.S. = R.H.S.
$\therefore x = 4$

190. If $x^2 + 3x + 1 = 0$, then what is the value of $x^6 + \frac{1}{x^6}$?

(a) 324 (b) 327
(c) 322 (d) 318

SSC CGL (Tier-I)-2019 – 03/03/2020 (Shift-II)

Ans. (c) : $x^2 + 3x + 1 = 0$
Dividing by x to both sides

$$x + 3 + \frac{1}{x} = 0$$

$$x + \frac{1}{x} = -3$$

On cubing both sides,

$$\left(x + \frac{1}{x}\right)^3 = (-3)^3$$

$$x^3 + \frac{1}{x^3} + 3(x)\frac{1}{(x)}\left(x + \frac{1}{x}\right) = -27$$

$$x^3 + \frac{1}{x^3} + 3(-3) = -27$$

$$x^3 + \frac{1}{x^3} = -27 + 9$$

$$x^3 + \frac{1}{x^3} = -18$$

On squaring both sides

$$\left(x^3 + \frac{1}{x^3}\right)^2 = (-18)^2$$

$$x^6 + \frac{1}{x^6} + 2 = 324$$

$$x^6 + \frac{1}{x^6} = 324 - 2 = 322$$

191. The value of $27a^3 - 2\sqrt{2}b^3$ is equal to?

(a) $\left(3a - \sqrt{2}b\right)\left(9a^2 + 2b^2 + 6\sqrt{2}ab\right)$

(b) $\left(3a - \sqrt{2}b\right)\left(9a^2 - 2b^2 - 3\sqrt{2}ab\right)$

(c) $\left(3a - \sqrt{2}b\right)\left(9a^2 + 2b^2 + 3\sqrt{2}ab\right)$

(d) $\left(3a - \sqrt{2}b\right)\left(9a^2 - 2b^2 + 6\sqrt{2}ab\right)$

SSC CGL (Tier-I)-2019 – 03/03/2020 (Shift-III)

Ans. (c) : $\because A^3 - B^3 = (A - B)(A^2 + B^2 + AB)$

$$27a^3 - 2\sqrt{2}b^3 = (3a)^3 - \left(\sqrt{2}b\right)^3$$

$$= \left(3a - \sqrt{2}b\right)\left(9a^2 + 2b^2 + 3\sqrt{2}ab\right)$$

192. If $x^4 + x^2y^2 + y^4 = 21$ and $x^2 + xy + y^2 = 7$, then the value of $\left(\frac{1}{x^2} + \frac{1}{y^2}\right)$ is?

(a) $\frac{7}{4}$ (b) $\frac{5}{4}$
(c) $\frac{7}{3}$ (d) $\frac{5}{2}$

SSC CGL (Tier-I)-2019 – 03/03/2020 (Shift-II)

Ans. (b) : $x^2 + xy + y^2 = 7$ ..... (1)
$\because (x^2 - xy + y^2)(x^2 + xy + y^2) = x^4 + x^2y^2 + y^4$

$$x^2 - xy + y^2 = \frac{x^4 + x^2y^2 + y^4}{x^2 + xy + y^2}$$

$$= \frac{21}{7} = 3 \text{.....(2)}$$

For equation (1) + (2),
$2(x^2 + y^2) = 10$
$x^2 + y^2 = 5$
For equation (1) – (2),
$2xy = 4$
$xy = 2$

$$\therefore \frac{1}{x^2} + \frac{1}{y^2} = \frac{x^2 + y^2}{x^2y^2} = \frac{5}{4}$$

193. If $x - y = 4$ and $xy = 45$, then the value of $x^3 - y^3$ is:

(a) 82 (b) 604
(c) 151 (d) 822

SSC CGL (Tier-I)-2019 – 03/03/2020 (Shift-I)

Ans. (b) : $\because x^3 - y^3 = (x-y)^3 + 3xy(x-y)$
$= 64 + 3 \times 45 \times 4$
$= 64 + 540 = 604$

194. If $2x^2 + y^2 + 8z^2 - 2\sqrt{2}xy + 4\sqrt{2}yz - 8zx = (Ax + y + Bz)^2$, then the value of $(A^2 + B^2 - AB)$ is:

(a) 16 (b) 6
(c) 18 (d) 14

SSC CGL (Tier-I)-2019 – 04/03/2020 (Shift-III)

Ans. (d) :

$$2x^2 + y^2 + 8z^2 - 2\sqrt{2}xy + 4\sqrt{2}yz - 8zx = \left(Ax + y + Bz\right)^2$$

$$\left(-\sqrt{2}x + y + 2\sqrt{2}z\right)^2 = \left(Ax + y + Bz\right)^2$$

On comparing the coefficients,
$A = -\sqrt{2}$, $B = 2\sqrt{2}$
$\therefore A^2 + B^2 - AB = 2 + 8 + 4 = 14$

195. If $12x^2 - 21x + 1 = 0$, then what is the value of $9x^2 + (16x^2)^{-1}$?

(a) $\frac{465}{16}$ (b) $\frac{429}{8}$

(c) $\frac{417}{16}$ (d) $\frac{453}{8}$

SSC CGL (Tier-I)-2019 – 04/03/2020 (Shift-III)

Ans. (c) : $12x^2 - 21x + 1 = 0$

$$12x + \frac{1}{x} = 21$$

$$3x + \frac{1}{4x} = \frac{21}{4}$$

On squaring both sides,

$$9x^2 + \frac{1}{16x^2} + 2 \times 3x \times \frac{1}{4x} = \frac{441}{16}$$

$$9x^2 + \left(16x^2\right)^{-1} = \frac{441}{16} - \frac{3}{2} = \frac{417}{16}$$

196. If $30x^2 - 15x + 1 = 0$, then what is the value of $25x^2 + (36x^2)^{-1}$?

(a) $6\frac{1}{4}$ (b) $\frac{65}{12}$

(c) $\frac{9}{2}$ (d) $\frac{55}{12}$

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Ans. (d) : $30x^2 - 15x + 1 = 0$

$$30x + \frac{1}{x} = 15$$

Dividing by 6

$$5x + \frac{1}{6x} = \frac{15}{6} = \frac{5}{2}$$

On squaring both sides,

$$25x^2 + \frac{1}{36x^2} + 2 \times 5x \times \frac{1}{6x} = \frac{25}{4}$$

$$25x^2 + \frac{1}{36x^2} = \frac{25}{4} - \frac{5}{3} = \frac{55}{12}$$

197. If $a + b + c = 7$ and $ab + bc + ca = -6$, then the value of $a^3 + b^3 + c^3 - 3abc$ is:

(a) 463 (b) 469

(c) 479 (d) 472

SSC CGL (Tier-I)-2019 – 04/03/2020 (Shift-II)

Ans. (b) : $a^2 + b^2 + c^2 = (a+b+c)^2 - 2(ab+bc+ca)$

$= 49 + 12 = 61$

$a^3 + b^3 + c^3 - 3abc = (a+b+c)(a^2+b^2+c^2-ab-bc-ca)$

$= 7(61+6)$

$= 7 \times 67 = 469$

198. If $P = \frac{x^4 - 8x}{x^3 - x^2 - 2x}$, $Q = \frac{x^2 + 2x + 1}{x^2 - 4x - 5}$ and $R = \frac{2x^2 + 4x + 8}{x - 5}$, then $(P \times Q) \div R$ is equal to:

(a) $\frac{1}{2}$ (b) 2

(c) 1 (d) 4

SSC CGL (Tier-I)-2019 – 04/03/2020 (Shift-II)

Ans. (a) :

$$P = \frac{x^4 - 8x}{x^3 - x^2 - 2x} = \frac{x^3 - 8}{x^2 - x - 2} = \frac{(x-2)(x^2+2x+4)}{(x-2)(x+1)}$$

$$= \frac{(x^2+2x+4)}{(x+1)}$$

$$Q = \frac{x^2 + 2x + 1}{x^2 - 4x - 5} = \frac{(x+1)^2}{(x-5)(x+1)} = \frac{x+1}{x-5}$$

$$R = \frac{2(x^2+2x+4)}{x-5}$$

$$(P \times Q) \div R = \frac{x^2+2x+4}{x+1} \times \frac{x+1}{x-5} \times \frac{x-5}{2(x^2+2x+4)}$$

$$= \frac{1}{2}$$

199. If $5x + \frac{1}{3x} = 4$, then what is the value of $9x^2 + \frac{1}{25x^2}$?

(a) $\frac{119}{25}$ (b) $\frac{174}{125}$

(c) $\frac{144}{125}$ (d) $\frac{114}{25}$

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Ans. (d) :

$$5x + \frac{1}{3x} = 4$$

On multiplying by $\frac{3}{5}$

$$3x + \frac{1}{5x} = \frac{12}{5}$$

On squaring both sides

$$9x^2 + \frac{1}{25x^2} + 2 \times 3x \times \frac{1}{5x} = \frac{144}{25}$$

$$9x^2 + \frac{1}{25x^2} = \frac{144}{25} - \frac{6}{5} = \frac{114}{25}$$

200. If $a + b + c = 11$, $ab + bc + ca = 3$ and $abc = -135$, then what is the value of $a^3 + b^3 + c^3$?

(a) 827 (b) 823

(c) 925 (d) 929

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Ans. (a) : $\because a^3 + b^3 + c^3 - 3abc = (a+b+c)[(a+b+c)^2 - 3(ab + bc + ca)]$

$a^3 + b^3 + c^3 + 405 = 11[121-9]$

$a^3 + b^3 + c^3 = 1232 - 405 = 827$

201. On simplification,

$$\frac{x^3 - y^3}{x[(x+y)^2 - 3xy]} \div \frac{y[(x-y)^2 + 3xy]}{x^3 + y^3} \times \frac{(x+y)^2 - (x-y)^2}{x^2 - y^2}$$

is equal to:

(a) $\frac{1}{4}$ (b) 1

(c) 4 (d) $\frac{1}{2}$

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Ans. (c) :

$$\frac{x^3-y^3}{x\left[(x+y)^2-3xy\right]} \div \frac{y\left[(x-y)^2+3xy\right]}{x^3+y^3} \times \frac{(x+y)^2-(x-y)^2}{x^2-y^2}$$

$$= \frac{(x-y)(x^2+xy+y^2)}{x(x^2+y^2-xy)} \times \frac{(x+y)(x^2-xy+y^2)}{y(x^2+y^2+xy)} \times \frac{4xy}{(x+y)(x-y)}$$

$= 4$

202. If $x^4 + x^2y^2 + y^4 = 273$ and $x^2 - xy + y^2 = 13$, then the value of xy is:

(a) 6 (b) 10

(c) 8 (d) 4

SSC CGL (Tier-I)-2019 – 05/03/2020 (Shift-II)

Ans. (d) : $x^2 + xy + y^2 = \frac{x^4 + x^2y^2 + y^4}{x^2 - xy + y^2}$

$$x^2 + xy + y^2 = \frac{273}{13}$$

$$x^2 + xy + y^2 = 21 \text{ .....(i)}$$

$$x^2 - xy + y^2 = 13 \text{ .....(ii)}$$

From equation (i) and equation (ii),

$2xy = 8$

$xy = 4$

203. If $20x^2 - 30x + 1 = 0$, then what is the value of $25x^2 + \frac{1}{16x^2}$?

(a) $53\frac{1}{2}$ (b) $58\frac{3}{4}$

(c) $58\frac{1}{2}$ (d) $53\frac{3}{4}$

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Ans. (d) : $20x^2 - 30x + 1 = 0$

$$20x + \frac{1}{x} = 30$$

$$5x + \frac{1}{4x} = \frac{15}{2}$$

On squaring both sides,

$$25x^2 + \frac{1}{16x^2} + 2 \times 5x \times \frac{1}{4x} = \frac{225}{4}$$

$$25x^2 + \frac{1}{16x^2} = \frac{225}{4} - \frac{5}{2} = \frac{215}{4} = 53\frac{3}{4}$$

204. If $16a^4 + 36a^2b^2 + 81b^4 = 91$ and $4a^2 + 9b^2 - 6ab = 13$, then what is the value of 3ab?

(a) $-\frac{3}{2}$ (b) $\frac{3}{2}$

(c) 5 (d) –3

SSC CGL (Tier-I)-2019 – 05/03/2020 (Shift-I)

Ans. (a) :

$16a^4 + 36a^2b^2 + 81b^4 = (4a^2 + 9b^2 - 6ab)\ (4a^2 + 9b^2 + 6ab)$ From formula

$$4a^2 + 9b^2 + 6ab = \frac{91}{13} = 7 \text{ .....(i)}$$

$$4a^2 + 9b^2 - 6ab = 13 \text{ .....(ii)}$$

From equation (i) – equation (ii)

$12ab = -6$

$$3ab = \frac{-6}{4} = \frac{-3}{2}$$

205. If $x^2 - 2\sqrt{5}x + 1 = 0$, then what is the value of $x^5 + \frac{1}{x^5}$?

(a) $408\sqrt{5}$ (b) $612\sqrt{5}$

(c) $406\sqrt{5}$ (d) $610\sqrt{5}$

SSC CGL (Tier-I)-2019 – 05/03/2020 (Shift-I)

Ans. (d) : $x^2 - 2\sqrt{5}x + 1 = 0$

$$x + \frac{1}{x} = 2\sqrt{5}$$

$$\because\ x^5 + \frac{1}{x^5} = \left(x^2 + \frac{1}{x^2}\right)\left(x^3 + \frac{1}{x^3}\right) - \left(x + \frac{1}{x}\right)$$

then, $x^2 + \frac{1}{x^2} = (2\sqrt{5})^2 - 2 = 18$

$$x^3 + \frac{1}{x^3} = (2\sqrt{5})^3 - 3 \times 2\sqrt{5} = 34\sqrt{5}$$

$$\therefore \left(x^2 + \frac{1}{x^2}\right)\left(x^3 + \frac{1}{x^3}\right) = 18 \times 34\sqrt{5}$$

$$\therefore\ x^5 + \frac{1}{x^5} = 612\sqrt{5} - 2\sqrt{5} = 610\sqrt{5}$$

206. Find the product of $(a+b+2c)\ (a^2+b^2+4c^2-ab-2bc-2ca)$.

(a) $a^3 + b^3 + 8c^3 - 6abc$ (b) $a^3 + b^3 + 8c^3 - 2abc$

(c) $a^3 + b^3 + 8c^3 - abc$ (d) $a^3 + b^3 + 6c^3 - 6abc$

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Ans. (a) : $(a+b+2c)\ (a^2+b^2+4c^2 - ab - 2bc - 2ca)$

$= (a + b + 2c)\ [a^2 + b^2 + (2c)^2 - ab - 2bc - 2ca]$

$\therefore\ a^3 + b^3 + (2c)^3 - 3 \times a \times b \times (2c)$

$= a^3 + b^3 + 8c^3 - 6abc$

207. If $a^4 + \frac{1}{a^4} = 50$, $a > 0$, then find the value of $a^3 + \frac{1}{a^3}$.

(a) $\sqrt{2\left(1-\sqrt{13}\right)}\left(-1+2\sqrt{13}\right)$

(b) $\sqrt{2\left(1+\sqrt{13}\right)}\left(-1-2\sqrt{13}\right)$

(c) $\sqrt{2\left(1+\sqrt{13}\right)}\left(-1+2\sqrt{13}\right)$

(d) $\sqrt{2\left(1+\sqrt{13}\right)} + \left(-1+2\sqrt{13}\right)$

SSC CGL (Tier-I)-2019 – 07/03/2020 (Shift-III)

Ans. (c) : $a^4 + \frac{1}{a^4} = 50$

$a^2 + \frac{1}{a^2} = \sqrt{52}$

$\left(a + \frac{1}{a}\right)^2 = 2\sqrt{13} + 2$

$a + \frac{1}{a} = \sqrt{2\left(1+\sqrt{13}\right)}$

if $a + \frac{1}{a} = k$ and $a^3 + \frac{1}{a^3} = k^3 - 3k$

$\therefore a^3 + \frac{1}{a^3} = 2\left(1+\sqrt{13}\right)\sqrt{2\left(1+\sqrt{13}\right)} - 3\sqrt{2\left(1+\sqrt{13}\right)}$

$= \sqrt{2\left(1+\sqrt{13}\right)}\left(-1+2\sqrt{13}\right)$

208. If $a^2 + b^2 + c^2 = 300$ and $ab + bc + ca = 50$, then what is the value of $a + b + c$? (Given that a, b and c are all positive).

(a) 15 (b) 20
(c) 22 (d) 25

SSC CGL (Tier-I)-2019 – 07/03/2020 (Shift-II)

Ans. (b) : $(a+b+c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$
$= 300 + 100 = 400$
$a + b + c = 20$

209. If $1–64x^3 – 12x + px^2 = (1–4x)^3$, then the value of p is:

(a) 48 (b) -12
(c) -48 (d) 16

SSC CGL (Tier-I)-2019 – 07/03/2020 (Shift-I)

Ans. (a) : $1 – 64x^3 – 12x + px^2 = (1–4x)^3$
$1 – 64x^3 – 12x + px^2 = 1 – 64x^3 – 12x + 48x^2$
On comparing both sides,
$p = 48$

210. If $a^2 + b^2 – c^2 = 0$, then the value of $\frac{2(a^6 + b^6 – c^6)}{3a^2b^2c^2}$ is :

(a) 1 (b) 0
(c) 2 (d) 3

SSC CGL (Tier-I)-2019 – 09/03/2020 (Shift-II)

Ans. (*) : $\because a^2 + b^2 – c^2 = 0$
$a^2 + b^2 = c^2$ .....(i)
On cubing both sides,
$(a^2 + b^2)^3 = c^6$
$a^6 + b^6 + 3a^2b^2(a^2+b^2) = c^6$
$a^6 + b^6 – c^6 = – 3a^2b^2c^2$ ----------($\because a^2 + b^2 = c$)

$\frac{a^6 + b^6 – c^6}{3a^2b^2c^2} = –1$

On multiplying by 2 of both sides

$\frac{2(a^6 + b^6 – c^6)}{3a^2b^2c^2} = –2$

Note– SSC (Staff selection commission) has considered the answer to this question as 2, while the correct answer would be –2.

211. Expand : $(4a + 3b + 2c)^2$

(a) $4a^2 + 3b^2 + 2c^2 + 24\,ab + 12\,bc + 16\,ca$
(b) $16a^2 – 9b^2 + 4c^2 – 24ab + 12\,bc – 16\,ca$
(c) $16a^2 + 9b^2 + 4c^2 + 24ab + 12\,bc + 16\,ca$
(d) $16a^2 + 9b^2 + 4c^2 – 24\,ab – 12bc – 16ca$

SSC CGL (Tier-I)-2019 – 09/03/2020 (Shift-I)

Ans. (c) : We know that formula:–
$\because (a + b + c)^2 = (a^2 + b^2 + c^2 + 2ab + 2bc + 2ca)$
$(4a + 3b + 2c)^2$
$= 16a^2 + 9b^2 + 4c^2 + 24ab + 12\,bc + 16\,ca$

212. If $x + y = 10$ and $xy = 4$, then what is the value of $x^4 + y^4$?

(a) 8464 (b) 8432
(c) 7478 (d) 6218

SSC CGL (Tier-II) 21-02-2018

Ans. (b) : Given–
$x + y = 10$ .....(i)
$xy = 4$ ..... (ii)
$\therefore x^4 + y^4 = (x^2 + y^2)^2 – 2x^2y^2$
$\therefore x^4 + y^4 = [(x+y)^2 – 2xy]^2 – 2(xy)^2$ .....(iii)
By putting the value from equation (i) and (ii) in equation (iii)
$x^4 + y^4 = [(10)^2 – 2 \times 4]^2 – 2 \times (4)^2$
$= (92)^2 – 2 \times 16$
$= 8464 – 32$
$= \boxed{8432}$

213. If $a + b + c = 9$, $ab + bc + ca = 26$, $a^3 + b^3 = 91$, $b^3 + c^3 = 72$ and $c^3 + a^3 = 35$, then what is the value of abc ?

(a) 48 (b) 24
(c) 36 (d) 42

SSC CGL (Tier-II) 21-02-2018

Ans. (b) : $a^3 + b^3 = 91$ ----------(i)
$b^3 + c^3 = 72$ ----------(ii)
$c^3 + a^3 = 35$ ----------(iii)
By adding
$2(a^3 + b^3 + c^3) = 198$
$a^3 + b^3 + c^3 = 99$
$\because a^3+b^3+c^3–3abc = (a+b+c)[(a+b+c)^2 –3(ab+bc+ca)]$
$99 – 3abc = 9(81–78)$
$3abc = 99 – 27 = 72$
$abc = 24$

214. If $x^3 – 4x^2 + 19 = 6(x–1)$, then what is the value of $[x^2 + (1/x – 4)]$?

(a) 3 (b) 5
(c) 6 (d) 8

SSC CGL (Tier-II) 21-02-2018

Ans. (c) : Given–
$x^3 – 4x^2 + 19 = 6(x–1)$
$\Rightarrow x^3 – 4x^2 = 6x – 6 – 19$
$\Rightarrow x^3 – 4x^2 = 6x – 25$ ..... (i)

$\therefore x^2 + \frac{1}{(x-4)} = \frac{x^3 – 4x^2 + 1}{x – 4}$

$= \frac{6x-25+1}{x-4}$ (From equation (i))

$= \frac{6(x-4)}{(x-4)}$

$= \boxed{6}$

215. If x + y + z = 22 and xy + yz + zx = 35, then what is the value of $(x-y)^2 + (y-z)^2 + (z-x)^2$?

(a) 793 (b) 681

(c) 758 (d) 715

SSC CGL (Tier-II) 20-02-2018

Ans. (c) $(x-y)^2 + (y-z)^2 + (z-x)^2$

$= [x^2+y^2-2xy+y^2+z^2-2yz+z^2+x^2-2zx]$

$= 2(x^2+y^2+z^2-xy-yz-zx)$

$= 2[(x+y+z)^2 - 3(xy+yz+zx)]$

$= 2[(22)^2 - 3 \times 35]$

$= 2[484 - 105]$

$= 2 \times 379$

$= 758$

216. If α and β are the roots of the equation $x^2+x-1=0$, then what is the equation whose roots are α^5 and β^5?

(a) $x^2+7x-1=0$ (b) $x^2-7x-1=0$

(c) $x^2-11x-1=0$ (d) $x^2+11x-1=0$

SSC CGL (Tier-II) 19-02-2018

Ans. (d) : $x^2 + x - 1 = 0$

$\alpha + \beta = -1$

$\alpha.\beta = -1$

$\alpha^2 + \beta^2 = (-1)^2 + 2 = 3$

$\alpha^3 + \beta^3 = (-1)^3 - 3 \times (-1) \times (-1) = -1 - 3 = -4$

$(\alpha^2+\beta^2)(\alpha^3+\beta^3) = \alpha^5 + \alpha^2\beta^2 + \beta^2\alpha^3 + \beta^5$

$3 \times (-4) = \alpha^5 + \beta^5 + \alpha^2\beta^2(\alpha+\beta)$

$-12 = \alpha^5 + \beta^5 + 1 \times (-1)$

$\alpha^5 + \beta^5 = -11$

$\therefore$ Quadratic equation

$x^2 - (\alpha^5+\beta^5)x + (\alpha\beta)^5 = 0$

$x^2 + 11x - 1 = 0$

217. If $x + (1/x) = (\sqrt{3}+1)/2$, then what is the value of $x^4+(1/x^4)$?

(a) $(4\sqrt{3}-1)/4$ (b) $(4\sqrt{3}+1)/2$

(c) $(-4\sqrt{3}-1)/4$ (d) $(-4\sqrt{3}-1)/2$

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Ans. (c) : $x + \frac{1}{x} = \frac{\sqrt{3}+1}{2}$ (Squaring in both sides)

$x^2 + \frac{1}{x^2} = \left(\frac{\sqrt{3}+1}{2}\right)^2 - 2$

$= \frac{4+2\sqrt{3}}{4} - 2 = \frac{2\sqrt{3}-4}{4} = \frac{\sqrt{3}-2}{2}$

$x^4 + \frac{1}{x^4} = \left(\frac{\sqrt{3}-2}{2}\right)^2 - 2$

$= \frac{7-4\sqrt{3}}{4} - 2 = \frac{(-4\sqrt{3}-1)}{4}$

218. $A = (x^8-1)/(x^4+1)$ and $B = (y^4-1)/(y^2+1)$. If x = 2 and y = 9, the what is the value of $A^2 + 2AB + AB^2$?

(a) 96475 (b) 98625

(c) 92425 (d) 89125

SSC CGL (Tier-II) 18-02-2018

Ans. (b) : Given–

$A = \frac{x^8-1}{x^4+1}$ & $B = \frac{y^4-1}{y^2+1}$

From formula

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

By solving the equation A and B

$A = \frac{(x^4-1)(x^4+1)}{(x^4+1)}$ & $B = \frac{(y^2-1)(y^2+1)}{(y^2+1)}$

$A = (x^4-1)$ & $B = (y^2-1)$

If x = 2, & y = 9

Then–

$A = 2^4 - 1 = 15$

$B = 9^2 - 1 = 80$

By putting the value of A and B

$\Rightarrow A^2 + AB^2 + 2AB$

$\Rightarrow (15)^2 + 15 \times (80)^2 + 2 \times 15 \times 80$

$= 225 + 96000 + 2400 = 98625$

219. If $x = (\sqrt{5})+1$ and $y = (\sqrt{5})-1$ then what is the value of $(x^2/y^2) + (y^2/x^2) + 4\left(\frac{x}{y}+\frac{y}{x}\right) + 6$?

(a) 31 (b) $23\sqrt{5}$

(c) $27\sqrt{5}$ (d) 25

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Ans. (d) : Given,

$x = \sqrt{5} + 1$.....(1)

$y = \sqrt{5} - 1$.....(2)

From equation (1) and (2)

$x + y = 2\sqrt{5}$ & $xy = 4$

$x^2 + y^2 = (x+y)^2 - 2xy$

$= 20 - 2 \times 4$

$x^2+y^2 = 12$

$= \frac{x^2}{y^2} + \frac{y^2}{x^2} + 4\left[\left(\frac{x}{y}\right)+\left(\frac{y}{x}\right)\right] + 6$

$= \frac{x^4+y^4}{x^2y^2} + 4\left[\frac{x^2+y^2}{xy}\right] + 6$

$= \frac{(x^2+y^2)^2 - 2x^2y^2}{x^2y^2} + 4\frac{[(x+y)^2 - 2xy]}{xy} + 6$-------(3)

By putting the value in equation (3)

$$\Rightarrow \frac{(12)^2 - 2\times 16}{16} + \frac{4\times(12)}{4} + 6$$

$= 7 + 18 = 25$

220. If $x = 2+\sqrt{3}, y = 2-\sqrt{3}$ and z = 1, then what is the value of (x/yz) + (y/xz) + (z/xy) + 2 [(1/x) + (1/y) + (1/z)] ?

(a) 25 (b) 22

(c) 17 (d) 43

SSC CGL (Tier-II) 18-02-2018

Ans. (a) : Given–

$x = 2+\sqrt{3},\ y = 2-\sqrt{3},\ z = 1$

$x \times y \times z = \left(2+\sqrt{3}\right)\times\left(2-\sqrt{3}\right)\times 1 = 1$

$x + y + z = 2+\sqrt{3}+2-\sqrt{3}+1 = 5$

$x^2 + y^2 + z^2 = \left(2+\sqrt{3}\right)^2 + \left(2-\sqrt{3}\right)^2 + 1$

$7 + 4\sqrt{3} + 7 - 4\sqrt{3} + 1$

$= 7 + 7 + 1$

$= 15$

We know that

$(x+y+z)^2 = x^2 + y^2 + z^2 + 2\,(xy + yz + zx)$

$5^2 = 15 + 2\,(xy + yz + zx)$

$xy + yz + zx = \frac{10}{2} = 5$

$\frac{x}{yz} + \frac{y}{xz} + \frac{z}{xy} + 2\left[\frac{1}{x} + \frac{1}{y} + \frac{1}{z}\right]$

$\Rightarrow \frac{x^2 + y^2 + z^2}{xyz} + 2\left[\frac{xy + yz + zx}{xyz}\right]$ (Putting the value)

$\frac{15}{1} + 2\left[\frac{5}{1}\right] \Rightarrow 15 + 10 = 25$

221. If $f(x) = (x-2)/(x^2 + Px + 4)$ and (x–3) is a factor of f(x), then what is the value of P ?

(a) 4 (b) –4

(c) –13/3 (d) 13/3

SSC CGL (Tier-II) 9-3-2018

Ans. (c) : $f(x) = (x-2)(x^2 + Px + 4)$

$\therefore$ (x–3), is a factor of f (x)

Then putting the value of x = 3

Remainder = 0

$(3-2)(9 + 3P + 4) = 0$

$3P = -13 \Rightarrow P = \frac{-13}{3}$

222. If $[x-(1/x)] = 2$, then what is the value of $[x^6 - (1/x^6)]$?

(a) $114\sqrt{3}+1$ (b) $134\sqrt{2}$

(c) $142\sqrt{2}+3$ (d) $140\sqrt{2}$

SSC CGL (Tier-II) 9-3-2018

Ans. (d) :

$x - \frac{1}{x} = 2$ (squaring both sides)

$x^3 - \frac{1}{x^3} = (2)^3 + 3\times 2 = 14$.....(1)

Again $x + \frac{1}{x} = \sqrt{(2)^2 + 4} = \sqrt{8}$

$x^3 + \frac{1}{x^3} = \left(\sqrt{8}\right)^3 - 3\sqrt{8} = 5\sqrt{8}$.....(2)

By multiplying the equation (i) and (ii)

$x^6 - \frac{1}{x^6} = 70\sqrt{8} = 140\sqrt{2}$

223. x, y and z are real numbers. If $x^3+y^3+z^3 = 13$, x + y + z = 1 and xyz = 1, then what is the value of xy + yz + zx?

(a) – 1 (b) 1

(c) 3 (d) – 3

SSC CGL (Tier-II) 17-2-2018

Ans. (d)

$x^3 + y^3 + z^3 - 3\,xyz = (x + y + z)(x^2 + y^2 + z^2 - xy - yz - zx)$

$13 - 3\times 1 = 1\left((x+y+z)^2 - 3(xy + yz + zx)\right)$

$10 = 1^2 - 3(xy + yz + zx)$

$3(xy + yz + zx) = 1 - 10 = -9$

$xy + yz + zx = -3$

224. If $x^3 + y^3 + z^3 = 3(1+xyz)$, P = y + z – x, Q = z + x –y and R = x + y – z, then what is the value of $P^3+Q^3+R^3-3PQR$?

(a) 9 (b) 8

(c) 12 (d) 6

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Ans. (c) : From value putting,

$y = z = 0$

$x^3 + 0 = 3(1+0)$

$x^3 = 3$

$P = 0 + 0 - x = -x$

$Q = 0 + x - 0 = x$

$R = x + 0 - 0 = x$

$P^3 + Q^3 + R^3 - 3PQR = (-x)^3 + x^3 + x^3 - 3\times(-x)\times x\times x$

$= x^3 + 3x^3$

$= 4x^3$

$= 4 \times 3 = 12$

225. The value of $\frac{(4.6)^4 + (5.4)^4 + (24.84)^2}{(4.6)^2 + (5.4)^2 + 24.84}$ is :

(a) 24.42 (b) 25.48

(c) 24.24 (d) 25.42

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Ans. (b) :

$\frac{(4.6)^4 + (5.4)^4 + (24.84)^2}{(4.6)^2 + (5.4)^2 + 24.84}$

Hence x = 4.6, y = 5.4

$x^4 + y^4 + x^2y^2 = (x^2+y^2+xy)(x^2+y^2-xy)$

$$= \frac{\left[(4.6)^2 + (5.4)^2 + 4.6 \times 5.4\right]\left[(4.6)^2 + (5.4)^2 - 4.6 \times 5.4\right]}{(4.6)^2 + (5.4)^2 + 24.84}$$

$= (4.6 + 5.4)^2 - 3 \times 4.6 \times 5.4$

$= 100 - 74.52 = 25.48$

226. Let $x = \sqrt[6]{27} - \sqrt{6\frac{3}{4}}$ and $y = \frac{\sqrt{45} + \sqrt{605} + \sqrt{245}}{\sqrt{80} + \sqrt{125}}$, then the value of $x^2 + y^2$ is?

(a) $\frac{223}{36}$ (b) $\frac{221}{36}$

(c) $\frac{221}{9}$ (d) $\frac{227}{9}$

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Ans. (a) :

$x = \sqrt[6]{27} - \sqrt{6\frac{3}{4}}$

$= \left(3^3\right)^{\frac{1}{6}} - \sqrt{\frac{27}{4}}$

$= \sqrt{3} - \frac{3\sqrt{3}}{2} = \frac{-\sqrt{3}}{2}$

$y = \frac{\sqrt{45} + \sqrt{605} + \sqrt{245}}{\sqrt{80} + \sqrt{125}} = \frac{3\sqrt{5} + 11\sqrt{5} + 7\sqrt{5}}{4\sqrt{5} + 5\sqrt{5}} = \frac{7}{3}$

$x^2 + y^2 = \frac{3}{4} + \frac{49}{9} = \frac{27 + 196}{36} = \frac{223}{36}$

227. If $8x^3 - 27y^3 = (Ax + By)(Cx^2 - Dy^2 + 6xy)$, then $(A + B + C - D)$ is equal to :

(a) –12 (b) 12

(c) 9 (d) 15

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Ans. (b) : Given,

$8x^3 - 27y^3 = (Ax + By)(Cx^2 - Dy^2 + 6xy)$

$(2x-3y)(4x^2 + 9y^2 + 6xy) = (Ax + By)(Cx^2 - Dy^2 + 6xy)$

On comparing both sides,

$A = 2,\ C = 4$

$B = -3,\ D = -9$

$\therefore (A+B+C-D) = 2 - 3 + 4 + 9$

$= 12$

228. If $x = \frac{\sqrt{5} - \sqrt{3}}{\sqrt{5} + \sqrt{3}}$ and y is the reciprocal of x, then what is the value of $(x^3 + y^3)$?

(a) 504 (b) 476

(c) 472 (d) 488

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Ans. (d) :

$\therefore xy = 1$

$x + y = \frac{\sqrt{5} - \sqrt{3}}{\sqrt{5} + \sqrt{3}} + \frac{\sqrt{5} + \sqrt{3}}{\sqrt{5} - \sqrt{3}}$

$= \frac{5 + 3 - 2\sqrt{15} + 5 + 3 + 2\sqrt{15}}{2} = 8$

$x^3 + y^3 = (x+y)^3 - 3xy(x+y)$

$= (x+y)\left[(x+y)^2 - 3xy\right]$

$= 8[64 - 3]$

$= 8 \times 61 = 488$

229. If $x^4 - 83x^2 + 1 = 0$, then value of $x^3 - x^{-3}$ can be:

(a) 758 (b) 739

(c) 737 (d) 756

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Ans. (d) : $x^4 - 83x^2 + 1 = 0$

$$x^4 + 1 = 83x^2 \Rightarrow x^2 + \frac{1}{x^2} = 83$$

$$\left(x - \frac{1}{x}\right)^2 = 81 \Rightarrow \left(x - \frac{1}{x}\right) = 9$$

$\therefore$ On cubing both sides,

$$x^3 - \frac{1}{x^3} = 729 + 3 \times 9 = 729 + 27$$

$\therefore x^3 - x^{-3} = 756$

230. If $x + y + z = 2$, $xy + yz + zx = -11$ and $xyz = -12$, then what is the value of $\sqrt{x^3 + y^3 + z^3 - 2}$?

(a) 12 (b) 9

(c) 6 (d) 8

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Ans. (c) : Value putting,

$\because xyz = -12 = 1 \times (-3) \times 4$

Taking the value $x = 1,\ y = -3,\ z = 4$

$x + y + z = 1 - 3 + 4 = 2$

$xy + yz + zx = -3 - 12 + 4 = -11$

$\therefore \sqrt{x^3 + y^3 + z^3 - 2} = \sqrt{1^3 + (-3)^3 + (4)^3 - 2} = \sqrt{1 - 27 + 64 - 2}$

$= \sqrt{63 - 27} = \sqrt{36} = 6$

231. If $x + \frac{1}{16x} = 3$, then the value of $16x^3 + \frac{1}{256x^3}$ is:

(a) 423 (b) 441

(c) 414 (d) 432

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Ans. (a) :

$x + \frac{1}{16x} = 3$

On cubing both sides,

$$x^3 + \frac{1}{4096x^3} + 3 \times x \times \frac{1}{16x}\left(x + \frac{1}{16x}\right) = 27$$

$$x^3 + \frac{1}{4096x^3} + \frac{3}{16} \times 3 = 27$$

$$x^3 + \frac{1}{4096x^3} = 27 - \frac{9}{16} = \frac{432 - 9}{16} = \frac{423}{16}$$

Multiplying by 16 in both sides,

$$16x^3 + \frac{1}{256x^3} = 16 \times \frac{423}{16} = 423$$