

ALGEBRA

बीजगणित

PRACTICE SHEET

WITH SOLUTIONS

BY ADITYA RANJAN



Maths By Aditya Ranjan



Rankers Gurukul

PDF की विशेषताएं

INDIA में पहली बार

- **UPDATED CONTENT**
- **TYPE WISE**
- **LEVEL WISE**
- **BILINGUAL**
- **ERROR FREE**

MATHS SPECIAL BATCH
में Enroll करने के लिए

8506003399

9289079800



DOWNLOAD

RG VIKRAMJEET APP

MATHS EXPERT



ALGEBRA/बीजगणित

(Practice Sheet With Solution)

Level - 01

1. If $x + \frac{1}{x} = 7$, then the value of $x^2 + \frac{1}{x^2}$ is:

यदि $x + \frac{1}{x} = 7$, तो $x^2 + \frac{1}{x^2}$ का मान है:

SSC CHSL 02/08/2023 Shift-01

- (a) 49 (b) 51
(c) 47 (d) 5

2. If $\left(y + \frac{1}{y}\right) = 8$, find the value of $\left(y^2 + \frac{1}{y^2}\right)$.

यदि $\left(y + \frac{1}{y}\right) = 8$ है, तो $\left(y^2 + \frac{1}{y^2}\right)$ का मान ज्ञात कीजिए।

SSC CHSL 03/08/2023 (Shift-03)

- (a) 64 (b) 66
(c) 62 (d) 60

3. If $\left(z + \frac{1}{z}\right) = 4$, then what will be the value of $\frac{1}{2}\left(z^2 + \frac{1}{z^2}\right)$?

यदि $\left(z + \frac{1}{z}\right) = 4$, तो $\frac{1}{2}\left(z^2 + \frac{1}{z^2}\right)$ का मूल्य क्या होगा ?

SSC CHSL 03/08/2023 (Shift-02)

- (a) 14 (b) 16
(c) 7 (d) 8

4. If $x + y = 7$ and $xy = 19$, then calculate the value of $x^2 + y^2$

यदि $x + y = 7$ और $xy = 19$ है, तो $x^2 + y^2$ का मान ज्ञात करें।

SSC CGL 21/07/2023 (Shift-01)

- (a) 17 (b) 12
(c) 11 (d) 19

5. If $\left(3y - \frac{3}{y}\right) = 5$, find the value of $\left(y^2 + \frac{1}{y^2}\right)$.

यदि $\left(3y - \frac{3}{y}\right) = 5$ है, तो $\left(y^2 + \frac{1}{y^2}\right)$ का मान ज्ञात करें।

SSC CGL 19/07/2023 (Shift-02)

- (a) $\frac{47}{9}$ (b) $\frac{49}{9}$
(c) $\frac{41}{9}$ (d) $\frac{43}{9}$

6. If $p + q = 12$ and $pq = 14$, then find the value of $p^2 - pq + q^2$

यदि $p + q = 12$ और $pq = 14$, तो $p^2 - pq + q^2$ का मान ज्ञात कीजिए।

SSC CHSL 14/08/2023 (Shift-1)

- (a) 192 (b) 181
(c) 102 (d) 144

7. If $x^2 + x = 19$, find $(x + 5)^2 + \frac{1}{(x + 5)^2}$.

यदि $x^2 + x = 19$ तब $(x + 5)^2 + \frac{1}{(x + 5)^2}$ का मान ज्ञात कीजिए।

- (a) 77 (b) 79
(c) 81 (d) 83

8. If $2a + 3b = 14$ and $2a - 3b = 10$, then find the value of 'ab'.

यदि $2a + 3b = 14$ और $2a - 3b = 10$ है, तो 'ab' का मान ज्ञात कीजिए।

SSC CHSL 03/08/2023 Shift-04

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

9. Simplify the given expression:

$$(5p + 3q)(5p - 3q)$$

दिए गए व्यंजक को सरल कीजिए।

$$(5p + 3q)(5p - 3q)$$

SSC CHSL, 17/08/2023 (Shift-2)

- (a) $25p^2 - 9q^2 + 30pq$
(b) $25p^2 - 9q^2$
(c) $25p^2 + 9q^2$
(d) $25p^2 + 9q^2 - 30pq$

10. If $x = \frac{1}{x-3}$, ($x > 0$), then the value of $x + \frac{1}{x}$ is:

यदि $x = \frac{1}{x-3}$, ($x > 0$) तो $x + \frac{1}{x}$ का मान क्या है?

SSC CGL 26/07/2023 (Shift-01)

- (a) $\sqrt{11}$ (b) $\sqrt{17}$
(c) $\sqrt{15}$ (d) $\sqrt{13}$

11. If $a - \frac{1}{a} = 4$, then the value of $a + \frac{1}{a}$ is:

यदि $a - \frac{1}{a} = 4$ है, तो $a + \frac{1}{a}$ का मान है:

SSC CPO 05/10/2023 (Shift-2)

- (a) $5\sqrt{5}$ (b) $4\sqrt{5}$
(c) $2\sqrt{5}$ (d) $3\sqrt{5}$

12. If $a = \frac{1}{a-\sqrt{6}}$ ($a > 0$), then the value of $\left(a + \frac{1}{a}\right)$ is:

यदि $a = \frac{1}{a-\sqrt{6}}$ ($a > 0$), तो $\left(a + \frac{1}{a}\right)$ का मान है:

SSC CHSL 02/08/2023 Shift-03

- (a) $\sqrt{6}$ (b) $\sqrt{10}$
(c) $\sqrt{15}$ (d) $\sqrt{7}$

13. If $x = \frac{1}{x-5}$ ($x > 0$), then the value of $x + \frac{1}{x}$ is:

यदि $x = \frac{1}{x-5}$ ($x > 0$), तो $x + \frac{1}{x}$ का मान है:

SSC CHSL 02/08/2023 Shift-03

- (a) $\sqrt{41}$ (b) $\sqrt{29}$
(c) $\sqrt{23}$ (d) $\sqrt{43}$

14. If $x^2 - 8x - 1 = 0$, what is the value of $x^2 + \frac{1}{x^2}$.

यदि $x^2 - 8x - 1 = 0$ है, तो $x^2 + \frac{1}{x^2}$ का मान क्या है?

SSC CGL 26/07/2023 (Shift-01)

- (a) 68 (b) 62
(c) 64 (d) 66

15. If $\left(a + \frac{1}{a}\right) = 6$, then what is the value of

$$\frac{3}{4}\left(a^2 + \frac{1}{a^2}\right)?$$

यदि $\left(a + \frac{1}{a}\right) = 6$, तो $\frac{3}{4}\left(a^2 + \frac{1}{a^2}\right)$ का मान क्या है?

SSC CHSL 02/08/2023 Shift-02

- (a) 22.5 (b) 34
(c) 25.5 (d) 36

16. If $\left(y^2 + \frac{1}{y^2}\right) = 167$ and $y > 0$, find the value of $\left(y + \frac{1}{y}\right)$.

यदि $\left(y^2 + \frac{1}{y^2}\right) = 167$ और $y > 0$, तो $\left(y + \frac{1}{y}\right)$ का मान ज्ञात कीजिए।

SSC CHSL 14/08/2023 (Shift-1)

- (a) 13 (b) $-\sqrt{165}$
(c) $\sqrt{165}$ (d) -13

17. If $\left(3y + \frac{3}{y}\right) = 8$, find the value of $\left(y^2 + \frac{1}{y^2}\right)$.

यदि $\left(3y + \frac{3}{y}\right) = 8$ तो $\left(y^2 + \frac{1}{y^2}\right)$ का मान ज्ञात कीजिए।

SSC CHSL 11/08/2023 (Shift-1)

- (a) $5\frac{1}{9}$ (b) $4\frac{5}{6}$
(c) $7\frac{1}{9}$ (d) $9\frac{1}{9}$

18. If $x^2 - 3.2x + 1 = 0$ and $x > 1$, the value of $\left(x^2 - \frac{1}{x^2}\right)$ is:

यदि $x^2 - 3.2x + 1 = 0$ और $x > 1$, तो $\left(x^2 - \frac{1}{x^2}\right)$ का मान क्या है?

SSC CHSL 11/08/2023 (Shift-3)

- (a) $16.8\sqrt{0.39}$ (b) $12.8\sqrt{0.39}$
(c) $16.8\sqrt{0.32}$ (d) $12.8\sqrt{0.32}$

19. If $x^2 - 7x + 1 = 0$, and $0 < x < 1$, what is the value of $x^2 - \frac{1}{x^2}$?

यदि $x^2 - 7x + 1 = 0$ और $0 < x < 1$ है, तो $x^2 - \frac{1}{x^2}$ का मान क्या होगा?

SSC CGL 19/07/2023 (Shift-03)

- (a) $21\sqrt{5}$ (b) $-21\sqrt{5}$
(c) $28\sqrt{5}$ (d) $-28\sqrt{5}$

20. If $\left(x^2 + \frac{1}{x^2}\right) = 7$, and $0 < x < 1$, find the value of $x^2 - \frac{1}{x^2}$.

यदि $\left(x^2 + \frac{1}{x^2}\right) = 7$, और $0 < x < 1$ है, तो $x^2 - \frac{1}{x^2}$ का मान ज्ञात करें।

SSC CGL 17/07/2023 (Shift-01)

- (a) $3\sqrt{5}$ (b) $4\sqrt{3}$
(c) $-4\sqrt{3}$ (d) $-3\sqrt{5}$

21. If $x^2 - 5\sqrt{5}x + 1 = 0$, and $x > 0$, what is the value of $\left(x^3 - \frac{1}{x^3}\right)$

यदि $x^2 - 5\sqrt{5}x + 1 = 0$ और $x > 0$, तो $\left(x^3 - \frac{1}{x^3}\right)$ का मान क्या है

SSC CHSL 08/08/2023 Shift-02

- (a) 1331 (b) 1364
(c) 1296 (d) 1244

22. If $\left(x + \frac{1}{x}\right) = 10$, what is the value of $\left(x^4 + \frac{1}{x^4}\right)$?

यदि $\left(x + \frac{1}{x}\right) = 10$, है तो $\left(x^4 + \frac{1}{x^4}\right)$ का मान क्या है ?

SSC CGL 17/07/2023 (Shift-04)

- (a) 9604 (b) 9602
(c) 9600 (d) 9606

23. If $x^4 + \frac{1}{x^4} = 194$, $x > 0$, then find the value of $x^3 + \frac{1}{x^3} + x + \frac{1}{x}$.

यदि $x^4 + \frac{1}{x^4} = 194$, $x > 0$ है, तो $x^3 + \frac{1}{x^3} + x + \frac{1}{x}$ का मान ज्ञात कीजिए।

SSC CHSL 08/08/2023 Shift-03

- (a) 76 (b) 66
(c) 56 (d) 46

24. If $a + \frac{1}{a} = 3$, then the value of $a^4 + \frac{1}{a^4}$ is:

यदि $a + \frac{1}{a} = 3$ है, तो $a^4 + \frac{1}{a^4}$ का मान क्या होगा?

SSC CPO 04/10/2023 (Shift-01)

- (a) 27 (b) 81
(c) 48 (d) 47

25. If $x > 0$, and $x^4 + \frac{1}{x^4} = 254$, What is the value of $x^5 + \frac{1}{x^5}$?

यदि $x > 0$ और $x^4 + \frac{1}{x^4} = 254$ है, तो $x^5 + \frac{1}{x^5}$ का मान क्या होगा?

SSC CGL 14/07/2023 (Shift-04)

- (a) $717\sqrt{2}$ (b) $723\sqrt{2}$
(c) $720\sqrt{2}$ (d) $726\sqrt{2}$

26. If $x + \frac{1}{x} = 7$, then the value of $x^6 + \frac{1}{x^6}$ is:

यदि $x + \frac{1}{x} = 7$ है, तो $x^6 + \frac{1}{x^6}$ का मान ज्ञात कीजिए।

SSC CGL 14/07/2023 (Shift-03)

- (a) 113682 (b) 103682
(c) 103882 (d) 103862

27. If $x + \frac{1}{x} = 1$, then the value of $\frac{x^2 + 7x + 1}{x^2 + 11x + 1} = ?$

यदि $x + \frac{1}{x} = 1$ है, तो $\frac{x^2 + 7x + 1}{x^2 + 11x + 1}$ का मान क्या है?

SSC CGL 26/07/2023 (Shift-02)

- (a) $\frac{3}{4}$ (b) $\frac{2}{3}$
(c) $\frac{1}{3}$ (d) $\frac{1}{4}$

28. If $P = 7 + 4\sqrt{3}$ and $PQ = 1$, then what is the value of $\frac{1}{P^2} + \frac{1}{Q^2}$?

यदि $P = 7 + 4\sqrt{3}$ और $PQ = 1$ हैं, तो $\frac{1}{P^2} + \frac{1}{Q^2}$ का मान क्या है?

- (a) 196 (b) 194
(c) 206 (d) 182

29. If $x = 2 + \sqrt{3}$, $y = 2 - \sqrt{3}$, then what will be the value of $x^2 + y^2$.

यदि $x = 2 + \sqrt{3}$, $y = 2 - \sqrt{3}$ तो $x^2 + y^2$ का मान क्या होगा।

UPSI 13/12/2017 (Shift-01)

- (a) 14 (b) 3
(c) 8 (d) 4

30. If $x = 1 + \sqrt{2}$ and $y = 1 - \sqrt{2}$ then what is the value of $x^2 + y^2$?

यदि $x = 1 + \sqrt{2}$ और $y = 1 - \sqrt{2}$ तो $x^2 + y^2$ का मान क्या होगा?

UPSI 13/12/2017 (Shift-01)

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

31. If $a + b = 10$ and $ab = 6$, then the value of $a^3 + b^3$ is:

यदि $a + b = 10$ और $ab = 6$ तो $a^3 + b^3$ का मान क्या होगा?

SSC CPO 03/10/2023 (Shift-01)

- (a) 860 (b) 820
(c) 800 (d) 840

32. If $\frac{x}{y} + \frac{y}{x} = 1$ and $x + y = 2$, then the value of $x^3 + y^3$ is:

यदि $\frac{x}{y} + \frac{y}{x} = 1$ और $x + y = 2$ है, तो $x^3 + y^3$ का मान क्या होगा?

SSC CPO 03/10/2023 (Shift-01)

- (a) 0 (b) 1
(c) 3 (d) 2

33. If $x^3 = 270 + y^3$ and $x = (6 + y)$ then what is the value of $(x + y)$? (given that $x > 0$ and $y > 0$)

यदि $x^3 = 270 + y^3$ और $x = (6 + y)$ तो $(x + y)$ का मान क्या है? (यह देखते हुए कि $x > 0$ and $y > 0$)

SSC CHSL 03/08/2023 Shift-04

- (a) $2\sqrt{3}$ (b) $\sqrt{3}$
(c) $3\sqrt{3}$ (d) $4\sqrt{3}$

34. If $a - b = 5$ and $ab = 24$, find the value of $a^3 - b^3$.

यदि $a - b = 5$ और $ab = 24$ है, तो $a^3 - b^3$ का मान ज्ञात कीजिए।

SSC CHSL 14/08/2023 (Shift-3)

- (a) 455 (b) 485
(c) 385 (d) 360

35. If $x + y = 25$ and $xy = 20$, then find the value of $x^3 + y^3$.

यदि $x + y = 25$ और $xy = 20$ है, तो $x^3 + y^3$ का मान ज्ञात कीजिए।

SSC CGL 27/07/2023 (Shift-01)

- (a) 13152 (b) 13125
(c) 14125 (d) 14152

36. If $a = 17$, $b = 13$, then find the value of the expression $(a^3 - b^3 - 3a^2b + 3ab^2)$

यदि $a = 17$, $b = 13$ हो, तो व्यंजक $(a^3 - b^3 - 3a^2b + 3ab^2)$ का मान ज्ञात कीजिए।

SSC CGL 14/07/2023 (Shift-04)

- (a) -64 (b) -2700
(c) 2700 (d) 64

37. If $a + b + c = 1$ and $a^3 + b^3 + c^3 = 4$, then

$$\frac{1}{a+b} + \frac{1}{b+a} + \frac{1}{c+a} = ?$$

यदि $a + b + c = 1$ और $a^3 + b^3 + c^3 = 4$ तो

$$\frac{1}{a+b} + \frac{1}{b+a} + \frac{1}{c+a} = ?$$

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

38. If $(a + b + c) = 19$, and $(a^2 + b^2 + c^2) = 155$, find the value of $(a - b)^2 + (b - c)^2 + (c - a)^2$.

यदि $(a + b + c) = 19$ और $(a^2 + b^2 + c^2) = 155$ है, तो $(a - b)^2 + (b - c)^2 + (c - a)^2$ का मान ज्ञात करें।

SSC CGL 18/07/2023 (Shift-02)

- (a) 104 (b) 108
(c) 100 (d) 98

39. If $a = 101$, $b = 102$ and $c = 103$, then $a^2 + b^2 + c^2 - ab - bc - ca$

यदि $a = 101$, $b = 102$ और $c = 103$ है, तो $a^2 + b^2 + c^2 - ab - bc - ca$ का मान क्या होगा?

SSC CGL 24/07/2023 (Shift-01)

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

40. If $(a + b + c) = 20$ and $a^2 + b^2 + c^2 = 262$, then find the value of $ab + bc + ca$.

यदि $(a + b + c) = 20$ और $a^2 + b^2 + c^2 = 262$, तो $ab + bc + ca$ का मान ज्ञात कीजिए।

SSC CHSL 10/08/2023 (Shift-2)

- (a) 48 (b) 84
(c) 72 (d) 69

41. If $(a + b + c) = 17$, and $(a^2 + b^2 + c^2) = 115$, find the value of $(a + b)^2 + (b + c)^2 + (c + a)^2$.

यदि $(a + b + c) = 17$, और $(a^2 + b^2 + c^2) = 115$, तो $(a + b)^2 + (b + c)^2 + (c + a)^2$ का मान ज्ञात कीजिए।

SSC CHSL 11/08/2023 (Shift-2)

- (a) 402 (b) 408
(c) 394 (d) 404

42. If $x + y + z = 22$ and $xy + yz + zx = 35$ then what is the value $(x - y)^2 + (y - z)^2 + (z - x)^2$

यदि $x + y + z = 22$ तथा $xy + yz + zx = 35$ है, तो $(x - y)^2 + (y - z)^2 + (z - x)^2$ का मान क्या होगा?

- (a) 793 (b) 681
(c) 758 (d) 715

43. a, b, c are three positive number such that $a + b + c = 20$, $a^2 + b^2 + c^2 = 152$ the value of $ab + bc + ca$ is equal to.

a, b, c तीन धनात्मक संख्याएँ इस प्रकार हैं कि $a + b + c = 20$, $a^2 + b^2 + c^2 = 152$ हैं। $ab + bc + ca$ का मान क्या होगा।

- (a) 124 (b) 110
(c) 112 (d) 102

44. If $a + b + c = 6$ and $ab + bc + ca = 1$ then find the value $bc(b + c) + ca(c + a) + ab(a + b) + 3abc$.

यदि $a + b + c = 6$ तथा $ab + bc + ca = 1$ है तो $bc(b + c) + ca(c + a) + ab(a + b) + 3abc$ का मान क्या होगा।

- (a) 3 (b) 6
(c) 5 (d) 2

45. If $(a+b+c) = 17$ and $(a^2 + b^2 + c^2) = 117$, what is the value of $(a - b)^2 + (b - c)^2 + (c - a)^2$

यदि $(a + b + c) = 17$ और $(a^2 + b^2 + c^2) = 117$, तो $(a - b)^2 + (b - c)^2 + (c - a)^2$ का मान क्या होगा?

- (a) 57 (b) 72
(c) 42 (d) 62

46. If $ab + bc + ca = 119$, $a^2 + b^2 + c^2 = 162$ and a, b & c are positive values then what is the value of $a^2(b + c) + b^2(c + a) + c^2(a + b) + 3abc$?

यदि $ab + bc + ca = 119$, $a^2 + b^2 + c^2 = 162$ और a, b और c धनात्मक हैं, तो $a^2(b + c) + b^2(c + a) + c^2(a + b) + 3abc$ का मान क्या है?

- (a) 2380 (b) 2499
(c) 2450 (d) 1760

47. If $(a + b + c) \neq 0$, then $(a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$ is equal to:

यदि $(a + b + c) \neq 0$, तो $(a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$ बराबर है:

SSC CHSL 03/08/2023 Shift-04

- (a) $a^3 + b^3 + c^3 - 3abc$
(b) $a^3 - b^3 + c^3 - 3abc$
(c) $a^3 + b^3 + c^3 - 3abc$
(d) $a^3 + b^3 + c^3 + 3abc$

48. If $(2a - 3)^2 + (3b + 4)^2 + (6c + 1)^2 = 0$, then the value of $\frac{a^3 + b^3 + c^3 - 3abc}{a^2 - b^2 + c^2} + 3$ is:

यदि $(2a - 3)^2 + (3b + 4)^2 + (6c + 1)^2 = 0$ है

तो $\frac{a^3 + b^3 + c^3 - 3abc}{a^2 - b^2 + c^2} + 3$ का मान है:

- (a) $abc + 3$ (b) 6
(c) 0 (d) 3

49. If $a + b + c = 5$ and $a^2 + b^2 + c^2 = 15$, then find the value of $a^3 + b^3 + c^3 - 3abc - 27$.

यदि $a + b + c = 5$ और $a^2 + b^2 + c^2 = 15$, तो $a^3 + b^3 + c^3 - 3abc - 27$ का मान ज्ञात करें

SSC CHSL 08/08/2023 Shift-03

- (a) 23 (b) 27
(c) 25 (d) 21

50. Simplify the given expression.

दिए गए व्यंजक को सरल कीजिए।

$$\frac{x^3 + y^3 + z^3 - 3xyz}{(x-y)^2 + (y-z)^2 + (z-x)^2}$$

SSC CHSL 07/08/2023 Shift-04

- (a) $\frac{1}{3}(x + y + z)$ (b) $(x + y + z)$

- (c) $\frac{1}{4}(x + y + z)$ (d) $\frac{1}{2}(x + y + z)$

51. $x^2 + y^2 - 10x + 12y + 61 = 0$, then $2x + 3y = ?$

$x^2 + y^2 - 10x + 12y + 61 = 0$, तो $2x + 3y = ?$

- (a) -1 (b) -8
(c) 1 (d) 8

52. $(a + 2)^2 + (b - 3)^2 + (c - 9)^2 = 0$. Find the value of $a + b + c = ?$

$(a + 2)^2 + (b - 3)^2 + (c - 9)^2 = 0$. $a + b + c$ का मान ज्ञात कीजिये?

- (a) 10 (b) 14
(c) 12 (d) 13

53. If $(a - 1)^2 + (b + 2)^2 + (c + 1)^2 = 0$, then $2a - 3b + 7c = ?$

यदि $(a - 1)^2 + (b + 2)^2 + (c + 1)^2 = 0$ तो $2a - 3b + 7c = ?$

- (a) 1 (b) 0
(c) 2 (d) 3

54. If $\left(x + \frac{1}{x}\right) = 2$, then $x^2 + \frac{1}{x^{117}} = \underline{\hspace{1cm}}$.

यदि $\left(x + \frac{1}{x}\right) = 2$ है, तो $x^2 + \frac{1}{x^{117}}$ का मान क्या होगा?

SSC CGL 19/07/2023 (Shift-04)

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

55. If $x + y = 41$, then find $(x - 20)^{2021} + (y - 21)^{2021}$

यदि $x + y = 41$ है, तो $(x - 20)^{2021} + (y - 21)^{2021}$ ज्ञात कीजिये?

- (a) 0 (b) 1
(c) 2 (d) 3

56. If $a^2 + b^2 + c^2 = ab + bc + ac$, then the value of

$$\frac{11a^4 + 13b^4 + 17c^4}{17a^2b^2 + 9b^2c^2 + 15c^2a^2} \text{ is:}$$

यदि $a^2 + b^2 + c^2 = ab + bc + ac$ है, तो

$$\frac{11a^4 + 13b^4 + 17c^4}{17a^2b^2 + 9b^2c^2 + 15c^2a^2} \text{ का मान ज्ञात कीजिए।}$$

SSC CGL 18/07/2023 (Shift-03)

- (a) 1 (b) 2
(c) 11 (d) 4

57. If $x^2 + y^2 + z^2 = xy + yz + zx$, then the value

$$\text{of } \frac{3x^4 + 7y^4 + 5z^4}{5x^2y^2 + 7y^2z^2 + 3z^2x^2} \text{ is}$$

यदि $x^2 + y^2 + z^2 = xy + yz + zx$ तो

$$\frac{3x^4 + 7y^4 + 5z^4}{5x^2y^2 + 7y^2z^2 + 3z^2x^2} \text{ का मान क्या होगा?}$$

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

58. If $x + y + z = 0$ then $\frac{3y^2 + x^2 + z^2}{2y - xz}$

यदि $x + y + z = 0$ है तो $\frac{3y^2 + x^2 + z^2}{2y - xz}$ का मान

क्या होगा।

- (a) 2 (b) 1
(c) $\frac{3}{2}$ (d) $\frac{5}{3}$

59. If $x + y + z = 0$, then $\frac{(3y^2 + x^2 + z^2)}{(2y^2 - xz)} = ?$

यदि $x + y + z = 0$ है, तो $\frac{(3y^2 + x^2 + z^2)}{(2y^2 - xz)} = ?$

- (a) 2 (b) 1
(c) $\frac{3}{2}$ (d) $\frac{5}{3}$

60. If $y = \frac{2-x}{1+x}$, then $\frac{1}{y+1} + \frac{2y+1}{y^2-1} = ?$

यदि $y = \frac{2-x}{1+x}$ तब $\frac{1}{y+1} + \frac{2y+1}{y^2-1}$ का मान ज्ञात कीजिए।

- (a) $\frac{(1-x)(2-x)}{2x-1}$ (b) $\frac{(1-x)(2-x)}{x-1}$
(c) $\frac{(1-x)(2-x)}{1-2x}$ (d) $\frac{(1-x)(1-2x)}{2-x}$

61. What is the value of $(27x^3 + 58x^2y + 31xy^2 + 8y^3)$, when $x = 5$ and $y = -7$?

जब $x = 5$ और $y = -7$ है, तब $(27x^3 + 58x^2y + 31xy^2 + 8y^3)$ का मान क्या होगा?

SSC CGL 21/07/2023 (Shift-02)

- (a) 1924 (b) -1926
(c) -1924 (d) 1926

62. If $x + 3y = 6$, what is the value of $x^3 + 27y^3 + 54xy$?

यदि $x + 3y = 6$ तो $x^3 + 27y^3 + 54xy$ का मान क्या है?

SSC CHSL 14/08/2023 (Shift-4)

- (a) 264 (b) 258
(c) 216 (d) 220

63. If $2x + 3y = 15$, then find the maximum value of x^2y^3 ?

यदि $2x + 3y = 15$ हो, तो x^2y^3 का अधिकतम मान ज्ञात कीजिये?

- (a) 243 (b) 81
(c) 27 (d) 15

64. If $a + b = 3$, then find the maximum value of a^2b^4 ?

यदि $a + b = 3$ हो, तो a^2b^4 का अधिकतम मान ज्ञात कीजिये?

- (a) 1 (b) 2
(c) 4 (d) 16

65. If $2x + y = 10$, then find the maximum value of x^2y^3 ?

यदि $2x + y = 10$ हो, तो x^2y^3 का अधिकतम मान ज्ञात कीजिये?

- (a) 684 (b) 864
(c) 846 (d) 468

66. The value of/का मान ज्ञात कीजिए।

$$\frac{p^2 - (q-r)^2}{(p+r)^2 - q^2} + \frac{q^2 - (p-r)^2}{(p+q)^2 - r^2} + \frac{r^2 - (p-q)^2}{(q+r)^2 - p^2} \text{ is:}$$

SSC CGL 24/07/2023 (Shift-01)

- (a) 1 (b) 2
(c) 0 (d) 3

67. If $ax + by = 1$ and $bx + ay = \frac{2ab}{a^2 + b^2}$, then the value of x (in terms of a and b) is:

यदि $ax + by = 1$ और $bx + ay = \frac{2ab}{a^2 + b^2}$, तो x का मान (a और b के संदर्भ में) ज्ञात कीजिए।

SSC CHSL 11/08/2023 (Shift-4)

- (a) $\frac{2b}{a^2 + b^2}$ (b) $\frac{a}{a^2 + b^2}$
(c) $\frac{b}{a^2 - b^2}$ (d) $\frac{2a}{a^2 - b^2}$

68. If $x + \frac{1}{x} = 1$, then $x^{53} + x^{50} = ?$

यदि $x + \frac{1}{x} = 1$ हो, तो $x^{53} + x^{50}$?

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

69. If $x + \frac{1}{x} = 1$, then $x^{28} + x^{25} + x^{21} + x^{18} + x^{12} + x^9 + x^6 + x^3 = ?$

यदि $x + \frac{1}{x} = 1$, हो, तो $x^{28} + x^{25} + x^{21} + x^{18} + x^{12} + x^9 + x^6 + x^3 = ?$

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

70. If $x + \frac{1}{x}$, find $x^{103} + x^{100} + x^{53} + x^{50} + x^{23} + x^{20} + x^{18} + x^{15} + x^{12} + x^9 + x^6 + x^3 + 1$

यदि $x + \frac{1}{x}$ तब $x^{103} + x^{100} + x^{53} + x^{50} + x^{23} + x^{20} + x^{18} + x^{15} + x^{12} + x^9 + x^6 + x^3 + 1$ का मान ज्ञात कीजिए।

- (a) 0 (b) 1
(c) 2 (d) 4

71. What is the value of $\frac{X}{Y}$ If $\frac{X-5Y}{X+5Y} = \frac{7}{13}$

यदि $\frac{X-5Y}{X+5Y} = \frac{7}{13}$ हो, तो $\frac{X}{Y}$ का मान ज्ञात कीजिए।

SSC CGL 17/07/2023 (Shift-04)

- (a) $\frac{27}{7}$ (b) $\frac{24}{9}$
(c) $\frac{50}{3}$ (d) $\frac{100}{7}$

72. Find the minimum value of $4x^2 - 2x + 5$?
 $4x^2 - 2x + 5$ का न्यूनतम मान ज्ञात कीजिये?

- (a) $\frac{19}{4}$ (b) $\frac{4}{19}$
(c) $-\frac{19}{4}$ (d) $-\frac{4}{19}$

Level-02

73. If $A = \frac{58^2 - 25^2}{46^2 - 37^2}$, $B = \frac{26^2 - 15^2}{56^2 - 15^2}$, then the value of $\frac{1}{B} - \frac{20}{A}$ is:

यदि $A = \frac{58^2 - 25^2}{46^2 - 37^2}$, $B = \frac{26^2 - 15^2}{56^2 - 15^2}$ है, तो $\frac{1}{B} - \frac{20}{A}$ का मान क्या होगा?

SSC CGL MAINS 26/10/2023

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

74. If $x = a + \frac{1}{a}$, $y = a - \frac{1}{a}$ then find the value $x^4 + y^4 - 2x^2y^2$

यदि $x = a + \frac{1}{a}$, $y = a - \frac{1}{a}$ तब $x^4 + y^4 - 2x^2y^2$ का मान ज्ञात कीजिए।

- (a) 15 (b) 21
(c) 16 (d) 32

75. If $\left(5a + \frac{4}{a} - 2\right) = 13$ and $a > 0$, what is the value of $\left(25a^2 + \frac{16}{a^2}\right)$?

यदि $\left(5a + \frac{4}{a} - 2\right) = 13$ और $a > 0$ है, तो $\left(25a^2 + \frac{16}{a^2}\right)$ का मान ज्ञात कीजिए।

SSC CHSL 10/08/2023 (Shift-4)

- (a) 158 (b) 157
(c) 185 (d) 175

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

यदि $x\left(5 - \frac{2}{x}\right) = \frac{5}{x}$ है, तो $x^2 + \frac{1}{x^2}$ का मान है:

SSC CPO 03/10/2023 (Shift-3)

- (a) $\frac{54}{23}$ (b) $\frac{53}{28}$
(c) $\frac{53}{27}$ (d) $\frac{54}{25}$

77. If $7b - \frac{1}{4b} = 7$, then what is the value of $16b^2 + \frac{1}{49b^2}$?

यदि $7b - \frac{1}{4b} = 7$ है, तो $16b^2 + \frac{1}{49b^2}$ का मान ज्ञात कीजिए।

SSC CGL 14/07/2023 (Shift-01)

- (a) $\frac{80}{49}$ (b) $\frac{104}{7}$
(c) $\frac{120}{7}$ (d) $\frac{7}{2}$

78. If $\left(x^2 - \frac{1}{x^2}\right) = 4\sqrt{6}$, and $x > 1$, what is the value of $\left(x^3 - \frac{1}{x^3}\right)$?

यदि $\left(x^2 - \frac{1}{x^2}\right) = 4\sqrt{6}$ और $x > 1$ है, तो $\left(x^3 - \frac{1}{x^3}\right)$ का मान क्या होगा?

SSC CGL 21/07/2023 (Shift-03)

- (a) $20\sqrt{2}$ (b) $24\sqrt{2}$
(c) $18\sqrt{2}$ (d) $22\sqrt{2}$

79. If $x^2 - \sqrt{9.76}x + 1 = 0$ and $x > 1$, the value of $x^3 - \frac{1}{x^3}$ is :

यदि $x^2 - \sqrt{9.76}x + 1 = 0$ और $x > 1$, तो $x^3 - \frac{1}{x^3}$ का मान क्या है?

SSC CHSL 10/08/2023 (Shift-3)

- (a) 21.042 (b) 24.024
(c) 21.024 (d) 24.042

80. If $7a - \frac{7}{a} + 4 = 0$, then find $a^3 - \frac{1}{a^3} - 1$.

यदि $7a - \frac{7}{a} + 4 = 0$ है, तो $a^3 - \frac{1}{a^3} - 1$ का मान ज्ञात कीजिए।

SSC CGL 25/07/2023 (Shift-02)

- (a) $\frac{-995}{343}$ (b) $\frac{-875}{248}$
(c) $\frac{-694}{315}$ (d) $\frac{-765}{262}$

81. If $a + \frac{1}{a} = 7$, then $a^5 + \frac{1}{a^5}$ is equal to:

यदि $a + \frac{1}{a} = 7$ है, तो $a^5 + \frac{1}{a^5}$ निम्न में से किसके बराबर है?

SSC CGL 17/07/2023 (Shift-02)

- (a) 15127 (b) 13127
(c) 14527 (d) 11512

82. If $x + \frac{1}{x} = -6$, what will be the value of $x^5 + \frac{1}{x^5}$?

यदि $x + \frac{1}{x} = -6$ है, तो $x^5 + \frac{1}{x^5}$ का मान क्या होगा?

SSC CGL 17/07/2023 (Shift-03)

- (a) -7776 (b) -6726
(c) -6730 (d) -6732

83. If $x^2 - 3\sqrt{7}x + 13 = 0$, then

$$(x - \sqrt{7})^6 - \frac{1}{(x - \sqrt{7})^6}$$

यदि $x^2 - 3\sqrt{7}x + 13 = 0$ तब

$(x - \sqrt{7})^6 - \frac{1}{(x - \sqrt{7})^6}$ का मान ज्ञात कीजिए।

- (a) $80\sqrt{77}$ (b) $-80\sqrt{77}$
(c) $\sqrt{77}$ (d) none

84. If $\left(x + \frac{1}{x}\right) = 5\sqrt{2}$, and $x > 1$, what is the value of $\left(x^6 - \frac{1}{x^6}\right)$?

यदि $\left(x + \frac{1}{x}\right) = 5\sqrt{2}$, और $x > 1$, तो $\left(x^6 - \frac{1}{x^6}\right)$ का मान क्या है?

SSC CHSL 02/08/2023 Shift-02

- (a) $22970\sqrt{23}$ (b) $23030\sqrt{23}$
(c) $23060\sqrt{23}$ (d) $22960\sqrt{23}$

85. If $\left(x + \frac{1}{x}\right) = 2\sqrt{2}$, and $x > 1$, what is the value of $\left(x^6 - \frac{1}{x^6}\right)$?

यदि $\left(x + \frac{1}{x}\right) = 2\sqrt{2}$ और $x > 1$, है, तो $\left(x^6 - \frac{1}{x^6}\right)$ का मान क्या होगा?

SSC CGL 19/07/2023 (Shift-01)

- (a) $140\sqrt{2}$ (b) $116\sqrt{2}$
(c) $144\sqrt{2}$ (d) $128\sqrt{2}$

86. If $x > 0$ and $x^4 + \frac{1}{x^4} = 142$, what is the value of $x^7 + \frac{1}{x^7}$?

यदि $x > 0$ और $x^4 + \frac{1}{x^4} = 142$ है, तो $x^7 + \frac{1}{x^7}$ का मान क्या होगा?

SSC CGL 20/07/2023 (Shift-02)

- (a) $1561\sqrt{14}$ (b) $1563\sqrt{14}$
(c) $1560\sqrt{14}$ (d) $1562\sqrt{14}$

87. If $\left(x - \frac{1}{x}\right) = \sqrt{6}$, and $x > 1$, what is the value of $\left(x^8 - \frac{1}{x^8}\right)$?

यदि $\left(x - \frac{1}{x}\right) = \sqrt{6}$ और $x > 1$ है, तो $\left(x^8 - \frac{1}{x^8}\right)$ का मान क्या होगा?

SSC CGL 17/07/2023 (Shift-02)

- (a) $1024\sqrt{15}$ (b) $992\sqrt{15}$
(c) $998\sqrt{15}$ (d) $1012\sqrt{15}$

88. If $\left(x + \frac{1}{x}\right) = 5$, and $x > 1$, what is the value of $\left(x^8 - \frac{1}{x^8}\right)$?

यदि $\left(x + \frac{1}{x}\right) = 5$ और $x > 1$ है, तो $\left(x^8 - \frac{1}{x^8}\right)$ का मान क्या होगा?

SSC CGL 18/07/2023 (Shift-03)

- (a) $60605\sqrt{21}$ (b) $60615\sqrt{21}$
(c) $60705\sqrt{21}$ (d) $60725\sqrt{21}$

89. If $\left(x + \frac{1}{x}\right) = \sqrt{6}$ and $x > 1$, what is the value of $x^8 - \frac{1}{x^8}$?

यदि $\left(x + \frac{1}{x}\right) = \sqrt{6}$ और $x > 1$ है, तो $x^8 - \frac{1}{x^8}$ का मान क्या होगा?

SSC CGL 26/07/2023 (Shift-03)

- (a) $120\sqrt{3}$ (b) $128\sqrt{3}$
(c) $112\sqrt{3}$ (d) $108\sqrt{3}$

90. If $x + \frac{1}{x} = 5$, then $\frac{x^4 + 3x^3 + 5x^2 + 3x + 1}{x^4 + 1} = ?$

यदि $x + \frac{1}{x} = 5$ तो $\frac{x^4 + 3x^3 + 5x^2 + 3x + 1}{x^4 + 1} = ?$

- (a) $\frac{12}{31}$ (b) $\frac{43}{23}$
(c) $\frac{15}{26}$ (d) $\frac{31}{52}$

91. If $x + \frac{1}{x} = 3$, then $\frac{x^4 + \frac{1}{x^2}}{x^2 - 2x + 1} = ?$

यदि $x + \frac{1}{x} = 3$, तो $\frac{x^4 + \frac{1}{x^2}}{x^2 - 2x + 1} = ?$

- (a) 0 (b) 18
(c) 21 (d) 20

92. If $a = \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}}$, $b = \frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}}$ then $\frac{a^2 + b^2 + ab}{a^2 + b^2 - ab} = ?$

यदि $a = \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}}$, $b = \frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}}$ है, तो $\frac{a^2 + b^2 + ab}{a^2 + b^2 - ab} = ?$

- (a) $\frac{97}{99}$ (b) $\frac{99}{98}$
(c) $\frac{98}{99}$ (d) $\frac{99}{97}$

93. If $y = 3 + 2\sqrt{2}$, then find the value (approximately) of $\sqrt{2}(y^2 - y^{-2})$

अगर $y = 3 + 2\sqrt{2}$, तो $\sqrt{2}(y^2 - y^{-2})$ का मान लगभग ज्ञात करें।

UPSI 12/12/2017 (Shift-02)

- (a) 48 (b) 96
(c) 24 (d) 28

94. If $\sqrt{\frac{a}{b}} = \frac{8}{3} + \sqrt{\frac{b}{a}}$ and $(a+b) = 30$, then what is the value of ab ?

यदि $\sqrt{\frac{a}{b}} = \frac{8}{3} + \sqrt{\frac{b}{a}}$ और $(a+b) = 30$ है, तो ab का मान क्या है?

SSC CHSL 03/08/2023 (Shift-01)

- (a) 64 (b) 28
(c) 81 (d) 36

95. $a = \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}}$, $b = \frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}}$ $a^3 + b^3 = ?$

- (a) 970 (b) 1000
(c) 1030 (d) 90

96. If $p = \frac{\sqrt{2} + 1}{\sqrt{2} - 1}$ and $q = \frac{\sqrt{2} - 1}{\sqrt{2} + 1}$ then find the

value of $\frac{p^2}{q} + \frac{q^2}{p}$.

यदि $p = \frac{\sqrt{2} + 1}{\sqrt{2} - 1}$ और $q = \frac{\sqrt{2} - 1}{\sqrt{2} + 1}$ है, तो $\frac{p^2}{q} + \frac{q^2}{p}$ का मान ज्ञात कीजिए।

SSC CGL 18/07/2023 (Shift-04)

- (a) 200 (b) 196
(c) 198 (d) 188

97. If $x = \sqrt{3} + \sqrt{2}$, then the value of $x^3 + x + \frac{1}{x} + \frac{1}{x^3}$ is "

यदि $x = \sqrt{3} + \sqrt{2}$, तो $x^3 + x + \frac{1}{x} + \frac{1}{x^3}$ का मान क्या है?

UPSC CDS 2015 (2)

(a) $10\sqrt{3}$ (b) $20\sqrt{3}$

(c) $10\sqrt{2}$ (d) $20\sqrt{2}$

98. If $343(x+y)^3 + 216(x-y)^3 = (13x+y)(Ax^2 + By^2 - 2Cxy)$, find $A + B + C$?

यदि $343(x+y)^3 + 216(x-y)^3 = (13x+y)(Ax^2 + By^2 - 2Cxy)$ तब $A + B + C$ का मान ज्ञात कीजिए।

(a) 157 (b) 147

(c) 137 (d) 167

99. If $A = \frac{x^3 - y^3}{x^2 - y^2}$, $B = \frac{x+y}{x^2 + y^2 + xy}$ and $C = \frac{3xy^2 - 3x^2y}{x^2 - y^2}$, then find the value of $AB(A+C)$

यदि $A = \frac{x^3 - y^3}{x^2 - y^2}$, $B = \frac{x+y}{x^2 + y^2 + xy}$ और $C = \frac{3xy^2 - 3x^2y}{x^2 - y^2}$

है, तो $AB(A+C)$ का मान ज्ञात करें

(a) $\frac{(x-y)}{(x+y)}$ (b) $\frac{(x-y)}{(x+y)^2}$

(c) $\frac{(x-y)^2}{(x+y)}$ (d) $\frac{(x-y)^2}{(x+y)^2}$

100. If $P = \frac{2x^2 + x - 6}{2(x+2)(x-2)}$, $Q = \frac{x^2 + 3x + 9}{(2x-3)(x^2 + 4)}$ and $R = \frac{x^3 - 27}{x^4 - 16}$, then find the value of $P \times Q \div R$.

यदि $P = \frac{2x^2 + x - 6}{2(x+2)(x-2)}$, $Q = \frac{x^2 + 3x + 9}{(2x-3)(x^2 + 4)}$

और $R = \frac{x^3 - 27}{x^4 - 16}$ है, तो $P \times Q \div R$ का मान ज्ञात करें।

(a) $\frac{(x+2)}{[2(x-3)]}$ (b) $\frac{(x+2)}{(x-3)}$

(c) $\frac{2(x+2)}{(x-3)}$ (d) $\frac{4(x+2)}{(x-3)}$

101. Find the value of/मान ज्ञात करें:

$$\frac{x^4 - 81}{2x^2 + 13x + 15} \times \frac{2x+3}{x^3 + 27} \times \frac{[(x-3)^2 + 3x](x+5)}{(x+3)^2 - 6x}$$

(a) $(x^2 - 9)$ (b) $(x-3)$

(c) $(x+5)$ (d) $(2x+3)$

102. If $a = 97.5$, $b = 100$, $c = 102.5$ then find $a^2 + b^2 + c^2 - ab - bc - ca$.

यदि $a = 97.5$, $b = 100$, $c = 102.5$ हैं तो $a^2 + b^2 + c^2 - ab - bc - ca$ का मान क्या होगा।

(a) $\frac{81}{4}$ (b) $\frac{70}{4}$

(c) $\frac{75}{4}$ (d) $\frac{15}{4}$

103. If $(Ax + By - Cz)^2 = 4x^2 + 3y^2 + 2z^2 + 4\sqrt{3}xy - 2\sqrt{6}yz - 4\sqrt{2}xz$, then find the value of $A^2 + B^2C^2$

यदि $(Ax + By - Cz)^2 = 4x^2 + 3y^2 + 2z^2 + 4\sqrt{3}xy - 2\sqrt{6}yz - 4\sqrt{2}xz$ है, तो $A^2 + B^2C^2$ का मान ज्ञात करें

(a) 16 (b) 8

(c) 12 (d) 10

104. If $a + b + c = 7$, $ab + bc + ca = 11$ and $abc = -1$, then $a^3 + b^3 + c^3$ is equal to:

यदि $a + b + c = 7$, $ab + bc + ca = 11$ और $abc = -1$ है, तो $a^3 + b^3 + c^3$ किसके बराबर होगा?

SSC CGL 20/07/2023 (Shift-03)

(a) 101

(b) 107

(c) 109

(d) 111

105. If $(a + b + c) = 12$, and $(a^2 + b^2 + c^2) = 50$, find the value of $(a^3 + b^3 + c^3 - 3abc)$.

यदि $(a + b + c) = 12$ और $(a^2 + b^2 + c^2) = 50$ है, तो $(a^3 + b^3 + c^3 - 3abc)$ का मान ज्ञात कीजिए।

SSC CGL 19/07/2023 (Shift-02)

(a) 36

(b) 24

(c) 42

(d) 48

106. If $x = (b - c)(a - d)$, $y = (c - a)(b - d)$, $z = (a - b)(c - d)$, then

$$\frac{(x+y)(y+z)(z+x)(x^3 + y^3 + z^3)}{9x^2y^2z^2} = ?$$

यदि $x = (b - c)(a - d)$, $y = (c - a)(b - d)$, $z = (a - b)$

$$(c - d) \text{ तब } \frac{(x+y)(y+z)(z+x)(x^3 + y^3 + z^3)}{9x^2y^2z^2}$$

का मान ज्ञात कीजिए।

(a) $\frac{1}{xyz}$

(b) 1

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

(d) $\frac{-1}{3}$

107. If $(a + b - c) = 20$, and $a^2 + b^2 + c^2 = 152$, find the value of $a^3 + b^3 - c^3 + 3abc$.

यदि $(a + b - c) = 20$, और $a^2 + b^2 + c^2 = 152$ है, तो $a^3 + b^3 - c^3 + 3abc$ का मान ज्ञात कीजिए।

SSC CGL 25/07/2023 (Shift-04)

(a) 480

(b) 720

(c) 640

(d) 560

108. If $(a^3 + b^3 + c^3 - 3abc) = 405$, and $(a - b)^2 + (b - c)^2 + (c - a)^2 = 54$, find the value of $(a + b + c)$.

यदि $(a^3 + b^3 + c^3 - 3abc) = 405$ और $(a - b)^2 + (b - c)^2 + (c - a)^2 = 54$ है, तो $(a + b + c)$ का मान ज्ञात कीजिए।

SSC CGL 26/07/2023 (Shift-02)

- (a) 15 (b) 45
(c) 9 (d) 27

109. Find the value of $(a^3 + b^3 + c^3 - 3abc)$, where $a = 335$, $b = 215$ and $c = 180$.

$(a^3 + b^3 + c^3 - 3abc)$ का मान ज्ञात कीजिए,

जहाँ $a = 335$, $b = 215$ और $c = 180$.

SSC CHSL 04/08/2023 Shift-03

- (a) 15452630 (b) 14502230
(c) 14472250 (d) 15421320

110. If $x = 999$, $y = 1000$, $z = 1001$, then the value of $\frac{x^3 + y^3 + z^3 - 3xyz}{x - y + z}$ is

यदि $x = 999$, $y = 1000$, $z = 1001$ तो $\frac{x^3 + y^3 + z^3 - 3xyz}{x - y + z}$ का मान ज्ञात करो?

- (a) 1000 (b) 6
(c) 1 (d) 9

111. If $a = 25$, $b = 15$, $c = -10$, then find the value of $\frac{a^3 + b^3 + c^3 - 3abc}{(a-b)^2 + (b-c)^2 + (c-a)^2}$?

यदि $a = 25$, $b = 15$, $c = -10$ है, तो $\frac{a^3 + b^3 + c^3 - 3abc}{(a-b)^2 + (b-c)^2 + (c-a)^2}$ का मान क्या होगा?

- (a) 30 (b) -15
(c) -30 (d) 15

112. If $a + b + c = 5$ and $ab + bc + ca = 7$, then the value of $a^3 + b^3 + c^3 - 3abc$ is:

यदि $a + b + c = 5$ और $ab + bc + ca = 7$ है, तो $a^3 + b^3 + c^3 - 3abc$ का मान क्या होगा?

SSC CPO 05/10/2023 (Shift-01)

- (a) 20 (b) 25
(c) 15 (d) 30

113. If $(a^3 + b^3 + c^3 - 3abc) = 405$, and $(a + b + c) = 15$, find the value of $(a - b)^2 + (b - c)^2 + (c - a)^2$.

यदि $(a^3 + b^3 + c^3 - 3abc) = 405$ और $(a + b + c) = 15$ है, तो $(a - b)^2 + (b - c)^2 + (c - a)^2$ का मान ज्ञात कीजिए।

SSC CGL 20/07/2023 (Shift-01)

- (a) 27 (b) 54
(c) 18 (d) 45

114. If $8x^2 + y^2 - 12x - 4xy + 9 = 0$, then value of $(14x - 5y)$ is:

यदि $8x^2 + y^2 - 12x - 4xy + 9 = 0$ हो, तो $(14x - 5y)$ का मान ज्ञात कीजिये?

- (a) 9 (b) 6
(c) 5 (d) 3

115. If $a^2 + b^2 + c^2 + 96 = 8(a + b - 2c)$, then $\sqrt{ab - bc + ca}$ is equal to:

यदि $a^2 + b^2 + c^2 + 96 = 8(a + b - 2c)$, तो $\sqrt{ab - bc + ca}$ निम्न में से किसके बराबर है?

- (a) 6 (b) $2\sqrt{2}$
(c) 4 (d) $2\sqrt{3}$

116. If $a^2 + b^2 + 64c^2 + 16c + 3 - 2(a + b)$, then the value of $4a^7 + b^7 + 8c^2$ is:

यदि $a^2 + b^2 + 64c^2 + 16c + 3 - 2(a + b)$ है, तो $4a^7 + b^7 + 8c^2$ का मान ज्ञात कीजिये?

- (a) $3\frac{7}{8}$ (b) $4\frac{7}{8}$
(c) $4\frac{1}{8}$ (d) $5\frac{1}{8}$

117. If $ab + bc + ca = abc$ find

$$\left[\frac{(b+c)}{bc(a-1)} \right] + \left[\frac{(a+c)}{ac(b-1)} \right] + \left[\frac{(a+b)}{ab(c-1)} \right]$$

यदि $ab + bc + ca = abc$ तब $\left[\frac{(b+c)}{bc(a-1)} \right] + \left[\frac{(a+c)}{ac(b-1)} \right] + \left[\frac{(a+b)}{ab(c-1)} \right]$ का मान ज्ञात कीजिए।

- (a) 0 (b) 4
(c) 1 (d) -2

118. If $x_1 x_2 x_3 = 4(4 + x_1 + x_2 + x_3)$, then the what is the value of

$$\left[\frac{1}{(2+x_1)} \right] + \left[\frac{1}{(2+x_2)} \right] + \left[\frac{1}{(2+x_3)} \right]$$

यदि $x_1 x_2 x_3 = 4(4 + x_1 + x_2 + x_3)$ तब का मान ज्ञात कीजिए।

$$\left[\frac{1}{(2+x_1)} \right] + \left[\frac{1}{(2+x_2)} \right] + \left[\frac{1}{(2+x_3)} \right]$$

- (a) 1 (b) $\frac{1}{2}$
(c) 2 (d) $\frac{1}{3}$

119. What is the value of $(3x^3 + 5x^2y + 12xy^2 + 7y^3)$, when $x = -4$ and $y = -1$?

$x = -4$ और $y = -1$ होने पर $(3x^3 + 5x^2y + 12xy^2 + 7y^3)$ का मान ज्ञात कीजिए।

SSC CGL 14/07/2023 (Shift-01)

- (a) -329 (b) -359
(c) -361 (d) -327

120. What is the value of $64x^3 + 38x^2y + 20xy^2 + y^3$, when $x = 3$ and $y = -4$?

$x = 3$ और $y = -4$ होने पर $64x^3 + 38x^2y + 20xy^2 + y^3$ का मान ज्ञात कीजिए।

SSC CGL 14/07/2023 (Shift-02)

- (a) 1236 (b) 488
(c) 536 (d) 1256

121. What is the value of $(27x^3 - 58x^2y + 31xy^2 - 8y^3)$, when $x = -5$ and $y = -7$?

$x = -5$ और $y = -7$ होने पर $(27x^3 - 58x^2y + 31xy^2 - 8y^3)$ का मान ज्ञात कीजिए।

SSC CGL 17/07/2023 (Shift-04)

- (a) 1924 (b) -1924
(c) -1926 (d) 1928

122. If $p + q + r = 0$, then what is the simplified value of the expression

$$\left(\frac{p^2}{p^2 - qr} + \frac{q^2}{q^2 - pr} + \frac{r^2}{r^2 - pq} \right)$$

यदि $p + q + r = 0$ है, तो $\left(\frac{p^2}{p^2 - qr} + \frac{q^2}{q^2 - pr} + \frac{r^2}{r^2 - pq} \right)$ व्यंजक का सरलीकृत मान क्या है?

SSC CHSL 03/08/2023 (Shift-02)

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

123. If $abc = 1$ then find the value of

$$\frac{1}{(1+b+c^{-1})} + \frac{1}{(1+a+b^{-1})} + \frac{1}{(1+c+a^{-1})}$$

यदि $abc = 1$, तो $\frac{1}{(1+b+c^{-1})} + \frac{1}{(1+a+b^{-1})} + \frac{1}{(1+c+a^{-1})}$ का मान ज्ञात करें।

UPSI 20/12/2017 (Shift-02)

- (a) $a + b + c$ (b) 1
(c) $\frac{a}{b}$ (d) $\frac{1}{a + b + c}$

124. $a - \frac{1}{b} = m$, $b - \frac{1}{c} = n$, $c - \frac{1}{a} = p$

What is $abc - \frac{1}{abc}$?

यदि $a - \frac{1}{b} = m$, $b - \frac{1}{c} = n$, $c - \frac{1}{a} = p$ तब

$abc - \frac{1}{abc}$ का मान ज्ञात कीजिए।

- (a) $\frac{1}{2} - n$ (b) $\frac{3}{2} - n$
(c) $\frac{3}{2} - m$ (d) $\frac{4}{5} + p$

125. $a + \frac{1}{b} = \frac{7}{3}$, $b + \frac{1}{c} = \frac{13}{4}$, $c + \frac{1}{a} = \frac{9}{2}$ Find abc ?

यदि $a + \frac{1}{b} = \frac{7}{3}$, $b + \frac{1}{c} = \frac{13}{4}$, $c + \frac{1}{a} = \frac{9}{2}$ तब

abc का मान ज्ञात कीजिए।

- (a) 21 (b) 22
(c) 23 (d) 24

126. If $\frac{x}{(y+z)} = \frac{y}{(x+z)} = \frac{z}{(x+y)} = K$, the possible value of K is.....

$\frac{x}{(y+z)} = \frac{y}{(x+z)} = \frac{z}{(x+y)} = K$, K का संभावित मान है.....।

UPSI 15/12/2017 (Shift-03)

- (a) -2 (b) $\frac{1}{2}$ or -1
(c) $-\frac{1}{2}$ or 1 (d) -1

127. If $a + b + c = 20$ and $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 30$ then

find the value of $\frac{a}{b} + \frac{b}{a} + \frac{b}{c} + \frac{c}{b} + \frac{c}{a} + \frac{a}{c}$.

यदि $a + b + c = 20$ तथा $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 30$ है तो

$\frac{a}{b} + \frac{b}{a} + \frac{b}{c} + \frac{c}{b} + \frac{c}{a} + \frac{a}{c}$ का मान क्या होगा।

- (a) 597
(b) 600
(c) 599
(d) Can't be determined

128. Simplify the expression $\frac{l^2 - m^2}{(l+m)^2}$, provided $(l+m) \neq 0$.

व्यंजक $\frac{l^2 - m^2}{(l+m)^2}$ का मान ज्ञात कीजिए, यदि $(l+m) \neq 0$ हो।

SSC CGL 20/07/2023 (Shift-01)

- (a) $\frac{l+m}{l-m}$ (b) $\frac{l-m}{l+m}$
(c) 0 (d) l

129. What is the value of $\left(\frac{1}{a} - \frac{1}{b} - \frac{1}{c} \right)$ if

$$\frac{2a-5}{a} - \frac{4b-5}{b} + \frac{6c+5}{c} = 0?$$

$\left(\frac{1}{a} - \frac{1}{b} - \frac{1}{c}\right)$ का मान क्या है, यदि

$$\frac{2a-5}{a} - \frac{4b-5}{b} + \frac{6c+5}{c} = 0$$

SSC CGL 21/07/2023 (Shift-02)

- (a) $\frac{4}{5}$ (b) $-\frac{8}{5}$
(c) $\frac{2}{5}$ (d) $-\frac{12}{5}$

130. If $x^2 - 15x + 1 = 0$, what is the value of $x^4 - 223x^2 + 6$?

यदि $x^2 - 15x + 1 = 0$ है, तो $x^4 - 223x^2 + 6$ का मान क्या होगा ?

SSC CGL 25/07/2023 (Shift-01)

- (a) 9 (b) 5
(c) 6 (d) 0

131. If $x^2 - 11x + 1 = 0$, what is the value of $x^8 - 14159x^4 + 11$?

यदि $x^2 - 11x + 1 = 0$, तो $x^8 - 14159x^4 + 11$ का मान क्या है?

SSC CHSL 08/08/2023 Shift-01

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

132. Simplify the following expression

निम्नलिखित व्यंजक को सरल कीजिये।

$$[(x-5)(x-1)] - [(9x-5)(9x-1)] \div 16x$$

SSC CHSL 07/08/2023 Shift-01

- (a) $2x(5x-3)$ (b) $-(5x-3)$
(c) $x(5x-3)$ (d) $6x(5x-3)$

133. Simplify the expression

व्यंजक को सरल करें।

$$\frac{(u-v)^3 + (v-w)^3 + (w-u)^3}{(u^2-v^2)^3 + (v^2-w^2)^3 + (w^2-u^2)^3}$$

SSC CHSL 04/08/2023 Shift-01

- (a) $\frac{1}{(u+v)(v+w)(w+u)}$
(b) 1
(c) $\frac{3}{(u+v)(v+w)(w+u)}$
(d) 0

134. What is added in $x(x+3)(x+6)(x+9) = 0$ to make a perfect square.

$x(x+3)(x+6)(x+9) = 0$ में क्या जोड़ा जाये कि ये एक पूर्ण वर्ग हो जाये।

- (a) 3^4 (b) 3^5
(c) 3^6 (d) 3^7

135. Find the value of expression

व्यंजक का मान ज्ञात करें।

$$\sqrt{300 \times 301 \times 302 \times 303 + 1} = ?$$

- (a) 90101 (b) 900901
(c) 90091 (d) 90901

136. Find the value of the expression

व्यंजक का मान ज्ञात करें।

$$\sqrt{600 \times 601 \times 602 \times 603 + 1} = ?$$

- (a) 361801 (b) 360801
(c) 360180 (d) 36001

137. If $\frac{4x+x^2}{x^2-3x+4} = \frac{2}{3}$, then what is the value of $x - \frac{8}{x}$?

यदि $\frac{4x+x^2}{x^2-3x+4} = \frac{2}{3}$ है, तो $x - \frac{8}{x}$ का मान कितना होगा?

- (a) -24 (b) -18
(c) -36 (d) -42

138. If $(ab)^{\frac{1}{3}} = 5$ then which of the following is not $(a+b)$?

यदि $(ab)^{\frac{1}{3}} = 5$ तो निम्न में से कौन-सा $(a+b)$ नहीं है?

UPSI 13/12/2017 (Shift-01)

- (a) 30 (b) 126
(c) 47 (d) All of the above

139. If $\frac{a}{3} - \frac{a-2}{5} = 1$ then find 'a'.

यदि $\frac{a}{3} - \frac{a-2}{5} = 1$ तो 'a' ज्ञात करें।

UPSI 14/12/2017 (Shift-01)

- (a) $\frac{8}{3}$ (b) 3.5
(c) 4.5 (d) $\frac{16}{3}$

140. Simplify the following.

निम्नलिखित को सरल कीजिए।

$$\frac{3a+b}{2} - \frac{a-3b}{3} + 2b$$

SSC CGL 19/07/2023 (Shift-01)

- (a) $\frac{5(a+3b)}{6}$ (b) $\frac{7a+3b}{6}$
(c) $\frac{7(a+3b)}{6}$ (d) $\frac{a+3b}{6}$

Level -03

141. Simplify the expression:

$$\frac{1}{8} \left[\frac{1}{b-1} - \frac{1}{b+1} - \frac{2}{b^2+1} - \frac{4}{b^4+1} \right]$$

निम्नलिखित व्यंजक को सरल कीजिए।

SSC CHSL, 14/08/2023 (Shift-3)

- (a) $\frac{1}{b^8-1}$ (b) $\frac{8}{b^8+1}$
(c) $\frac{8}{b^8-1}$ (d) $\frac{1}{b^8+1}$

142. If $x = (\sqrt{6}-1)^{\frac{1}{3}}$, then the value of $\left(x - \frac{1}{x}\right)^3 + 3\left(x - \frac{1}{x}\right)$ is:

यदि $x = (\sqrt{6}-1)^{\frac{1}{3}}$ है, तो $\left(x - \frac{1}{x}\right)^3 + 3\left(x - \frac{1}{x}\right)$ का मान है:

SSC CHSL 09/08/2023 Shift-01

- (a) $\frac{2\sqrt{6}-6}{5}$ (b) $\frac{4\sqrt{6}-6}{5}$
(c) $\frac{4\sqrt{6}-6}{3}$ (d) $\frac{4\sqrt{3}-6}{5}$

143. If $abc=1$, then find the value of

$$\frac{123}{1+a+ab} + \frac{123}{1+b+bc} + \frac{123}{1+c+ca} ?$$

यदि $abc = 1$ है, तो $\frac{123}{1+a+ab} + \frac{123}{1+b+bc} + \frac{123}{1+c+ca}$

का मान ज्ञात कीजिये?

- (a) 3 (b) 41
(c) 123 (d) 369

144. If $\frac{A}{L} + \frac{M}{B} = 1$ and $\frac{B}{M} + \frac{N}{C} = 1$, then the value

of $\frac{L}{A} + \frac{C}{N}$ is :

यदि $\frac{A}{L} + \frac{M}{B} = 1$ और $\frac{B}{M} + \frac{N}{C} = 1$ है, तो $\frac{L}{A} + \frac{C}{N}$ का मान क्या होगा?

SSC CPO 03/10/2023 (Shift-02)

- (a) 1 (b) $\frac{B}{M}$
(c) $\frac{M}{B}$ (d) 0

145. If $p + q + r = pqr = \frac{1}{p} + \frac{1}{q} + \frac{1}{r} = 1$, then find $p^3 + q^3 + r^3$.

यदि $p + q + r = pqr = \frac{1}{p} + \frac{1}{q} + \frac{1}{r} = 1$ है, तो $p^3 + q^3 + r^3$ का मान ज्ञात कीजिए।

SSC CGL 25/07/2023 (Shift-02)

- (a) 1 (b) -1
(c) 5 (d) -5

146. If $25^{(3a-2b)} = 5^{(b-a)} = 5^2$ and $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = \frac{13}{35}$, then find the value of $ab - c$

यदि $25^{(3a-2b)} = 5^{(b-a)} = 5^2$ और $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = \frac{13}{35}$ है, तो $ab - c$ का मान ज्ञात करें

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

147. If $4^{(4b-3a)} = 2^{(2b+c)} = 8^{(c-a)}$ and $a + b + c = 11$,

then find the value of $4\left(\frac{1}{ab} + \frac{1}{bc} + \frac{1}{ca}\right)$

यदि $4^{(4b-3a)} = 2^{(2b+c)} = 8^{(c-a)}$ और $a + b + c = 11$

है, तो $4\left(\frac{1}{ab} + \frac{1}{bc} + \frac{1}{ca}\right)$ का मान ज्ञात करें

- (a) $\frac{11}{9}$ (b) $\frac{9}{11}$
(c) $\frac{6}{5}$ (d) $\frac{5}{6}$

148. If $a + a^2 + a^3 + a^4 - 2 = 0$, Find $\frac{a^4 + 2}{a}$?

यदि $a + a^2 + a^3 + a^4 - 2 = 0$ तब $\frac{a^4 + 2}{a}$ का

मान ज्ञात कीजिए।

(a) 1

(b) 2

(c) 3

(d) 4

149. $25x^4 - 9x^2y^2 + 49y^4 = 114$, $5x^2 + 3xy + 7y^2$

$= 19$ find $5\frac{x}{y} + 7\frac{y}{x}$

यदि $25x^4 - 9x^2y^2 + 49y^4 = 114$, $5x^2 + 3xy$

$+ 7y^2 = 19$ तब $5\frac{x}{y} + 7\frac{y}{x}$ का मान ज्ञात कीजिए।

(a) $\frac{25}{13}$

(b) $\frac{75}{13}$

(c) $\frac{150}{13}$

(d) $\frac{175}{13}$

150. If $a - \frac{1}{a} = b$, $b - \frac{1}{b} = c$, $c - \frac{1}{c} = a$, find

$\left(\frac{1}{ab} + \frac{1}{bc} + \frac{1}{ca}\right)$.

यदि $a - \frac{1}{a} = b$, $b - \frac{1}{b} = c$, $c - \frac{1}{c} = a$ तब

$\left(\frac{1}{ab} + \frac{1}{bc} + \frac{1}{ca}\right)$ का मान ज्ञात कीजिए।

(a) $\frac{-1}{2}\left(\frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2}\right)$

(b) $\frac{1}{2}\left(\frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2}\right)$

(c) $\frac{1}{3}\left(\frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2}\right)$

(d) $\frac{-1}{3}\left(\frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2}\right)$

Answer Key

1.(c)	2.(c)	3.(c)	4.(c)	5.(d)	6.(c)	7.(b)	8.(c)	9.(b)	10.(d)
11.(c)	12.(b)	13.(b)	14.(d)	15.(c)	16.(a)	17.(a)	18.(b)	19.(a)	20.(d)
21.(b)	22.(b)	23.(c)	24.(d)	25.(a)	26.(b)	27.(b)	28.(b)	29.(a)	30.(c)
31.(b)	32.(a)	33.(d)	34.(b)	35.(c)	36.(d)	37.(c)	38.(a)	39.(c)	40.(d)
41.(d)	42.(c)	43.(a)	44.(b)	45.(d)	46.(a)	47.(c)	48.(d)	49.(a)	50.(d)
51.(b)	52.(a)	53.(a)	54.(b)	55.(a)	56.(a)	57.(c)	58.(a)	59.(a)	60.(c)
61.(c)	62.(c)	63.(a)	64.(d)	65.(b)	66.(a)	67.(b)	68.(c)	69.(a)	70.(b)
71.(c)	72.(a)	73.(b)	74.(c)	75.(c)	76.(d)	77.(c)	78.(d)	79.(c)	80.(a)
81.(a)	82.(b)	83.(a)	84.(b)	85.(a)	86.(a)	87.(b)	88.(a)	89.(c)	90.(b)
91.(b)	92.(d)	93.(a)	94.(c)	95.(a)	96.(c)	97.(b)	98.(a)	99.(c)	100.(a)
101.(b)	102.(c)	103.(d)	104.(c)	105.(a)	106.(d)	107.(d)	108.(a)	109.(c)	110.(d)
111.(d)	112.(a)	113.(b)	114.(b)	115.(c)	116.(d)	117.(c)	118.(b)	119.(d)	120.(d)
121.(a)	122.(b)	123.(b)	124.(a)	125.(d)	126.(b)	127.(a)	128.(b)	129.(a)	130.(b)
131.(b)	132.(b)	133.(a)	134.(a)	135.(d)	136.(a)	137.(b)	138.(c)	139.(c)	140.(c)
141.(a)	142.(b)	143.(c)	144.(a)	145.(a)	146.(b)	147.(a)	148.(c)	149.(b)	150.(a)

SOLUTIONS

1. (c)

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

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

2. (c)

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

$$y^2 + \frac{1}{y^2} = 8^2 - 2 = 62$$

3. (c)

$$z + \frac{1}{z} = 4$$

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

Now,

$$\frac{1}{2} \left(z^2 + \frac{1}{z^2} \right) = \frac{1}{2} \times 14 = 7$$

4. (c)

Given,

$$x + y = 7, xy = 19$$

According to question,

$$\Rightarrow (x + y)^2 = x^2 + y^2 + 2xy$$

$$\Rightarrow 49 = x^2 + y^2 + 2 \times 19$$

$$\Rightarrow x^2 + y^2 = (49 - 38) = 11$$

5. (d)

$$3y - \frac{3}{y} = 5, \quad y^2 + \frac{1}{y^2} = ?$$

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

$$\Rightarrow y^2 + \frac{1}{y^2} - 2 = \frac{25}{9}$$

$$\Rightarrow y^2 + \frac{1}{y^2} = \frac{25}{9} + 2 = \frac{43}{9}$$

6. (c)

$$p + q = 12, pq = 14,$$

$$p^2 - pq + q^2 = ?$$

$$p^2 + q^2 - pq = (p + q)^2 - 3pq$$

$$= 144 - 42 = 102$$

7. (b)

$$x^2 + x = 19$$

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

$$\text{Put } x + 5 = y$$

$$x = (y - 5)$$

$$(y - 5)^2 + (y - 5) = 19$$

$$y^2 + 25 - 10y + y - 5 = 19$$

$$\Rightarrow y^2 - 9y + 1 = 0$$

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

$$y^2 + \frac{1}{y^2} = 81 - 2 = 79$$

$$(x + 5)^2 + \frac{1}{(x + 5)^2} = 79$$

8. (c)

We know that,

$$(2a + 3b)^2 - (2a - 3b)^2 = 24ab$$

$$(14)^2 - (10)^2 = 24ab$$

$$96 = 24ab$$

$$ab = 4$$

9. (b)

$$(5p + 3q)(5p - 3q)$$

$$= (25p^2 - 9q^2)$$

10. (d)

$$(x - 3) = \frac{1}{x}$$

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

$$\Rightarrow x + \frac{1}{x} = \sqrt{3^2 + 4} = \sqrt{13}$$

11. (c)

$$a - \frac{1}{a} = 4$$

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

$$= \sqrt{16 + 4} = \sqrt{20} = 2\sqrt{5}$$

12. (b)

$$a = \frac{1}{a - \sqrt{6}}$$

$$a - \sqrt{6} = \frac{1}{a}$$

$$\Rightarrow a - \frac{1}{a} = \sqrt{6}$$

$$\Rightarrow a + \frac{1}{a} = \sqrt{(\sqrt{6})^2 + 4} = \sqrt{10}$$

13. (b)

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

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

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

$$\Rightarrow x + \frac{1}{x} = \sqrt{(5)^2 + 4} = \sqrt{29}$$

14. (d)

Given,

$$x^2 - 8x - 1 = 0$$

$$\Rightarrow x - \frac{1}{x} = 8$$

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

$$= 66$$

15. (c)

$$a + \frac{1}{a} = 6$$

$$\Rightarrow a^2 + \frac{1}{a^2} = 6^2 - 2 = 34$$

$$\Rightarrow \frac{3}{4} \left(a^2 + \frac{1}{a^2} \right)$$

$$= \frac{3}{4} \times 34 = \frac{51}{2} = 25.5$$

16. (a)

$$y^2 + \frac{1}{y^2} = 167, y > 0,$$

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

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

$$= 167 + 2 = 169$$

$$\left(y + \frac{1}{y} \right) = \pm 13$$

$$\because y > 0$$

$$y + \frac{1}{y} = +13$$

17. (a)

$$3y + \frac{3}{y} = 8, y^2 + \frac{1}{y^2} = ?$$

$$y + \frac{1}{y} = \frac{8}{3}$$

$$\left(y + \frac{1}{y} \right)^2 = \left(\frac{8}{3} \right)^2$$

$$y^2 + \frac{1}{y^2} = \frac{64}{9} - 2$$

$$= \frac{46}{9} = 5\frac{1}{9}$$

18. (b)

$$x^2 - 3.2x + 1 = 0, x > 1, x^2 - \frac{1}{x^2} = ?$$

$$x + \frac{1}{x} = 3.2 = \frac{16}{5}$$

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

$$= \sqrt{\frac{256}{25} - 4} = \sqrt{\frac{156}{25}} = \frac{2\sqrt{39}}{5}$$

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

$$= \frac{2}{5} \sqrt{39} \times \frac{16}{5} = \frac{32\sqrt{39}}{25}$$

$$= \frac{128\sqrt{39}}{100} = 12.8\sqrt{0.39}$$

19. (a)

$$x^2 - 7x + 1 = 0, \quad 0 < x < 1,$$

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

$$\therefore 0 < x < 1$$

$$\left(x - \frac{1}{x}\right) = \sqrt{(7)^2 - 4} = \sqrt{45} = 3\sqrt{5}$$

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

$$= 7 \times 3\sqrt{5} = 21\sqrt{5}$$

20. (d)

Given,

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

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

$$\Rightarrow x - \frac{1}{x} = \pm\sqrt{5} \quad [0 < x < 1]$$

$$\Rightarrow x^2 - \frac{1}{x^2} = \left[x + \frac{1}{x}\right]\left[x - \frac{1}{x}\right]$$

$$= 3 \times (-\sqrt{5}) = (-3\sqrt{5})$$

21. (b)

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

$$x - \frac{1}{x} = 11$$

$$\therefore x^3 - \frac{1}{x^3}$$

$$= (11)^3 + 3 \times 11 = 1364$$

22. (b)

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

$$\Rightarrow x^2 + \frac{1}{x^2} = 10^2 - 2 = 98$$

$$\Rightarrow x^4 + \frac{1}{x^4} = 98^2 - 2 = 9602$$

23. (c)

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

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

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

$$x^3 + \frac{1}{x^3} = 52$$

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

$$= 52 + 4 = 56$$

24. (d)

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

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

$$a^4 + \frac{1}{a^4} = (7)^2 - 2 = 47$$

25. (a)

$$x^4 + \frac{1}{x^4} = 254$$

$$\Rightarrow x^2 + \frac{1}{x^2} = \sqrt{254 + 2}$$

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

$$x + \frac{1}{x} = \sqrt{18}$$

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

$$= 16 \times 15\sqrt{18} - \sqrt{18}$$

$$= 240\sqrt{18} - \sqrt{18}$$

$$= 239\sqrt{18}$$

$$= 717\sqrt{2}$$

26. (b)

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

$$\Rightarrow x^3 + \frac{1}{x^3} = 7^3 - 3 \times 7$$

$$= 343 - 21 = 322$$

$$x^6 + \frac{1}{x^6} = (322)^2 - 2$$

$$= 103684 - 2 = 103682$$

27. (b)

Given,

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

According to question,

$$= \frac{x^2 + 7x + 1}{x^2 + 11x + 1}$$

Divided by x in nomi. and denomi.

$$= \frac{x + \frac{1}{x} + 7}{x + \frac{1}{x} + 11} = \frac{8}{12} = \frac{2}{3}$$

28. (b)

$$P = 7 + 4\sqrt{3}, Q = 7 - 4\sqrt{3}$$

Then,

The value of

$$\frac{P^2 + Q^2}{P^2 \times Q^2} = \frac{2(49 + 48)}{1} = 194$$

29. (a)

$$x = 2 + \sqrt{3}$$

$$y = 2 - \sqrt{3}$$

$$\Rightarrow x + y = 4$$

$$xy = 4 - 3 = 1$$

We know

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

$$\therefore x^2 + y^2 = 4^2 - 2 \times 1$$

$$= 16 - 2 = 14$$

30. (c)

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

$$y = 1 - \sqrt{2} \Rightarrow y^2 = 3 - 2\sqrt{2}$$

$$x^2 + y^2 = (3 + 2\sqrt{2}) + (3 - 2\sqrt{2}) = 6$$

31. (b)

$$a + b = 10, ab = 6$$

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

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

$$= 100 - 12 = 88$$

$$\therefore a^3 + b^3 = 10(88 - 6) = 820$$

32. (a)

$$\frac{x}{y} + \frac{y}{x} = 1, x + y = 2$$

$$\Rightarrow x^2 + y^2 = xy$$

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

$$= 2(0) = 0$$

33. (d)

A.T.Q.

$$x^3 - y^3 = 270$$

$$x - y = 6$$

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

$$270 = 6[36 + 3xy]$$

$$45 = 36 + 3xy$$

$$3xy = 9$$

$$xy = 3$$

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

$$= 36 + 12$$

$$(x + y) = \sqrt{48}$$

$$(x + y) = 4\sqrt{3}$$

34. (b)

$$a - b = 5, ab = 24, a^3 - b^3 = ?$$

By value putting

$$a = 8$$

$$b = 3$$

$$a^3 - b^3 = (8^3 - 3^3)$$

$$= (512 - 27) = 485$$

35. (c)

Given,

$$x + y = 25, xy = 20,$$

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

According to question,

$$x^3 + y^3 = 25[25^2 - 3 \times 20]$$

$$= 25[625 - 60]$$

$$= 25 \times 565 = 14125$$

36. (d)

According to question,

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

$$= (a - b)^3$$

$$= (17 - 13)^3 = 64$$

37. (c)

Let,

$$c = 0$$

$$a + b = 1$$

$$a^3 + b^3 = 4$$

Then,

$$4 = 1(1 - 3ab)$$

$$ab = -1$$

The value of

$$\frac{1}{a} + \frac{1}{b} + \frac{1}{ab} \text{ Or } \frac{a+b+1}{ab} = -2$$

38. (a)

$$(a + b + c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca)$$

$$361 = 155 + 2(ab + bc + ca)$$

$$\Rightarrow 206 = 2(ab + bc + ca)$$

$$\Rightarrow 103 = (ab + bc + ca)$$

$$\Rightarrow (a - b)^2 + (b - c)^2 + (c - a)^2 = 2(155 - 103)$$

$$= 2 \times 52 = 104$$

39. (c)

Given,

$$a = 101, b = 102, c = 103,$$

$$\text{Diff.} = 102 - 101 = 1$$

$$\text{then, } a^2 + b^2 + c^2 - ab - bc - ca = 3d^2$$

$$= 3 \times 1 = 3$$

40. (d)

$$a + b + c = 20,$$

$$a^2 + b^2 + c^2 = 262,$$

$$ab + bc + ca = ?$$

$$400 - 262 = 2(ab + bc + ca)$$

$$ab + bc + ca = 69$$

41. (d)

Let,

$$c = 0$$

$$a + b = 17$$

$$a^2 + b^2 = 115$$

then,

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

$$= (289 + 115) = 404$$

42. (c)

$$\text{Let, } z = 0$$

$$x + y = 22, xy = 35$$

Then,

$$(x - y)^2 = (484 - 140) = 344$$

&

$$x^2 + y^2 = 484 - 70 = 414$$

$$\text{The value of } (x - y)^2 + x^2 + y^2 = (344 + 414)$$

$$= 758$$

43. (a)

Let,

$$c = 0$$

$$a + b = 20, a^2 + b^2 = 152$$

Then,

$$ab = \frac{400 - 152}{2} = 124$$

44. (b)

$$\text{Let, } c = 0$$

$$a + b = 6, ab = 1$$

Then,

The value of

$$ab(a + b) = 1 \times 6 = 6$$

45. (d)

$$\text{Let, } c = 0$$

$$a + b = 17$$

$$a^2 + b^2 = 117$$

Then,

$$2ab = 289 - 117$$

$$2ab = 172$$

$$(a - b)^2 = 289 - 344 = -55$$

The value of

$$(a - b)^2 + a^2 + b^2 = -55 + 117 = 62$$

46. (a)

Let,

$$c = 0$$

Given that,

$$a^2 + b^2 = 162, ab = 119$$

We know,

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

$$= 162 + 238$$

$$a + b = 20$$

Then, the value of

$$a^2(b + c) + b^2(c + a) + c^2(a + b) - 3abc$$

Or

$$ab(a + b) = 119(20) = 2380$$

47. (c)

Here, $(a + b + c) \neq 0$

$$(a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$$

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

48. (d)

Given that,

$$a = \frac{3}{2}, b = \frac{-4}{3}, c = \frac{-1}{6}$$

ATQ,

$$a + b + c = 0$$

Then,

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

$$\text{Then, the value of } \frac{a^3 + b^3 + c^3 - 3abc}{a^2 + b^2 + c^2} + 3$$

$$= 0 + 3 = 3$$

49. (a)

$$(a + b + c)^2 = (5)^2$$

$$a^2 + b^2 + c^2 + 2(ab + bc + ca) = 25$$

$$15 + 2(ab + bc + ca) = 25$$

$$ab + bc + ca = 5$$

Now,

$$a^3 + b^3 + c^3 - 3abc - 27$$

$$= 5(15 - 5) - 27 = 23$$

50. (d)

$$= \frac{(x + y + z) \frac{1}{2} [(x - y)^2 + (y - z)^2 + (z - x)^2]}{(x - y)^2 + (y - z)^2 + (z - x)^2}$$

$$= \frac{1}{2}(x + y + z)$$

51. (b)

$$x^2 + y^2 - 10x + 12y + 61 = 0$$

Or

$$(x - 5)^2 + (y + 6)^2 = 0$$

Then,

$$x = 5, y = -6$$

$$2x + 3y = (10 - 18) = -8$$

52. (a)

$$(a + 2)^2 = 0, (b - 3)^2 = 0, (c - 9)^2 = 0$$

$$a = -2, b = 3, c = 9$$

$$a + b + c = (-2 + 3 + 9) = 10$$

53. (a)

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

$$a = 1, b = -2, c = -1$$

$$2a - 3b + 7c = (2 + 6 - 7) = 1$$

54. (b)

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

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

$$\downarrow \quad \downarrow$$

$$(1) \quad (1)$$

$$x = 1$$

$$x^7 + \frac{1}{x^{117}}$$

$$= (1)^7 + \frac{1}{(1)^{117}} = 1 + 1 = 2$$

55. (a)

Let,

$$x = 20, y = 21$$

Then,

The value of

$$(x - 20)^{2021} + (y - 21)^{2021}$$

$$= (20 - 20)^{2021} + (21 - 21)^{2021} = 0$$

56. (a)

$$a^2 + b^2 + c^2 = ab + bc + ac$$

$$\text{Let, } a = b = c = 1$$

$$= \frac{11a^4 + 13b^4 + 17c^4}{17a^2b^2 + 9b^2c^2 + 15c^2a^2}$$

$$= \frac{11 + 13 + 17}{17 + 9 + 15} = \frac{41}{41} = 1$$

57. (c)

Let,

$$x = y = z = 1$$

Then,

$$\frac{3x^4 + 7y^4 + 5z^4}{5x^2y^2 + 7y^2z^2 + 3z^2x^2} = \frac{3 + 7 + 5}{5 + 7 + 3} = \frac{15}{15} = 1$$

58. (a)

$$\text{If } x + y + z = 0$$

$$\text{let } x = 1, y = 1, z = -2$$

Then the value of

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

59. (a)

Let,

$$x = 1, y = 1, z = -2$$

Then,

$$\text{The value of } \frac{3y^2 + x^2 + z^2}{2y^2 - xz}$$

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

60. (c)

$$\text{If } y = \frac{2-x}{1+x}$$

Find,

$$\frac{1}{y+1} + \frac{2y+1}{(y^2-1)}$$

$$\text{Put } x = 0$$

Then,

$$y = \frac{2}{1} = 2$$

By option (c)

$$\frac{(1+0)(2-0)}{(1-0)} = 2 \text{ (Verify)}$$

61. (c)

$$(3x + 2y)^3 + xy(4x - 5y)$$

$$1 + (5 \times -7) \text{ (55)}$$

$$1 + (-35 \times 55)$$

$$1 - 1925$$

$$= -1924$$

62. (c)

$$x + 3y = 6,$$

$$x^3 + 27y^3 + 54xy = ?$$

$$\text{Let, } x = 3, y = 1$$

$$x^3 + 27y^3 + 54xy$$

$$= 27 + 27 + 54 \times 3 = 216$$

63. (a)

$$2x + 3y = 15$$

Let,

$$\text{The value of } x \text{ \& } y = 3, 3$$

Then,

$$\text{The value of } x^2y^3 = 9 \times 27 = 243$$

64. (d)

Given that

$$a + b = 3$$

Let,

$$a \text{ \& } b = 1 \text{ \& } 2$$

$$\text{Then the value of } a^2b^4 = 1 \times 16 = 16$$

65. (b)

Given that,

$$2x + y = 10$$

Let,

$$x = 2, y = 6$$

Then,

The value of

$$x^2y^3 = 4 \times 216 = 864$$

66. (a)

$$\text{Let, } p = q = r = 1$$

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

67. (b)

$$\text{Let } x = y = 1 \text{ \& } a = b = \frac{1}{2}$$

Value of $x = 1$

by option

Option (ii)

$$\frac{a}{a^2 + b^2} = \frac{\frac{1}{2}}{\frac{1}{4} + \frac{1}{4}} = \frac{\frac{1}{2}}{\frac{2}{4}} = 1$$

68. (c)

$$\text{If } x + \frac{1}{x} = 1$$

$$\text{Then, } x^3 + 1 = 0$$

The value of

$$x^{53} + x^{50} = x^{50}(x^3 + 1) = 0$$

69. (a)

$$\text{If } x + \frac{1}{x} = 1, \text{ then } x^3 + 1 = 0$$

Then the value of

$$x^{28} + x^{25} + x^{21} + x^{18} + x^{12} + x^9 + x^6 + x^3$$

Or

$$x^{25}(x^3+1) + x^{18}(x^3+1) + x^9(x^3+1) + x^3(x^3+1) = 0$$

70. (b)

We know,

$$\text{If } x + \frac{1}{x} = 1 \text{ then } x^3 + 1 = 0$$

ATQ,

$$\begin{aligned} &= x^{100}(x^3 + 1) + x^{50}(x^3 + 1) + x^{20}(x^3 + 1) + \\ &x^{15}(x^3 + 1) + x^9(x^3 + 1) + x^3(x^3 + 1) + 1 \\ &= x^{100}(0) + x^{50}(0) + x^{20}(0) + x^{15}(0) + x^9(0) + x^3(0) + 1 = 1 \end{aligned}$$

71. (c)

$$\frac{X - 5Y}{X + 5Y} = \frac{7}{13}$$

$$\frac{X + 5Y}{X - 5Y} = \frac{13}{7}$$

using comp. and divid.

$$\frac{X}{5Y} = \frac{20}{6}$$

$$\frac{X}{Y} = \frac{50}{3}$$

72. (a)

Given that,

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

For minimum value of the expression

$$\frac{4ac - b^2}{4a} = \frac{4 \times 4 \times 5 - 4}{4 \times 4} = \frac{76}{16} = \frac{19}{4}$$

73. (b)

$$A = \frac{58^2 - 25^2}{46^2 - 37^2} = \frac{83 \times 33}{83 \times 9} = \frac{11}{3}$$

$$B = \frac{26^2 - 15^2}{56^2 - 15^2} = \frac{41 \times 11}{71 \times 41} = \frac{11}{71}$$

$$\therefore \frac{1}{B} - \frac{20}{A} = \frac{71}{11} - \frac{20 \times 3}{11} = 1$$

74. (c)

ATQ,

$$x^4 + y^4 - 2x^2y^2$$

$$(x^2)^2 + (y^2)^2 - 2x^2y^2$$

$$(x^2 - y^2)^2$$

$$\left[\left(a + \frac{1}{a} \right)^2 - \left(a - \frac{1}{a} \right)^2 \right]^2$$

$$\left(4 \times a \times \frac{1}{a} \right)^2 = 1$$

75. (c)

$$5a + \frac{4}{a} - 2 = 13, a > 0,$$

$$25a^2 + \frac{16}{a^2} = ?$$

$$5a + \frac{4}{a} = 15$$

$$\left(5a + \frac{4}{a} \right)^2 = 15$$

$$25a^2 + \frac{16}{a^2} + 2 \times 5a \times \frac{4}{a} = 225$$

$$25a^2 + \frac{16}{a^2} = 225 - 40 = 185$$

76. (d)

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

$$\Rightarrow 5x - 2 = \frac{5}{x}$$

$$\Rightarrow 5x - \frac{5}{x} = 2$$

$$x - \frac{1}{x} = \frac{2}{5}$$

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

$$= \frac{4}{25} + 2 = \frac{54}{25}$$

77. (c)

$$7b - \frac{1}{4b} = 7$$

Multiply by $\frac{4}{7}$ both sides

$$\Rightarrow 4b - \frac{1}{7b} = 4$$

$$\Rightarrow 16b^2 + \frac{1}{49b^2} = 4^2 + 2 \times 4 \times \frac{1}{7}$$

$$= 16 + \frac{8}{7} = \frac{120}{7}$$

78. (d)

$$x^2 - \frac{1}{x^2} = 4\sqrt{6}$$

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

$$\downarrow \quad \downarrow$$

$$\sqrt{12} \quad 2\sqrt{2} = \sqrt{8}$$

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

$$= (\sqrt{8})^3 + 3 \times \sqrt{8} = 8\sqrt{8} + 3\sqrt{8}$$

$$= 11\sqrt{8} = 22\sqrt{2}$$

79. (c)

$$x^2 - \sqrt{9.76}x + 1 = 0, \quad x > 1,$$

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

$$x^2 + 1 = \sqrt{9.76}x$$

$$x + \frac{1}{x} = \sqrt{9.76}$$

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

$$= \sqrt{9.76 - 4}$$

$$= \sqrt{5.76} = 2.4$$

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

$$= (2.4)^3 + 3 \times 2.4$$

$$= 13.824 + 7.2 = 21.024$$

80. (a)

$$\Rightarrow 7a - \frac{7}{a} = -4$$

$$\Rightarrow a - \frac{1}{a} = -\frac{4}{7}$$

$$\Rightarrow a^3 - \frac{1}{a^3} = \frac{-64}{343} - \frac{12}{7} = \frac{-652}{343}$$

$$\Rightarrow a^3 - \frac{1}{a^3} - 1$$

$$\Rightarrow \frac{-652}{343} - 1 = \frac{-995}{343}$$

81. (a)

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

$$\Rightarrow a^2 + \frac{1}{a^2} = 47$$

$$\Rightarrow a^3 + \frac{1}{a^3} = \left(a + \frac{1}{a}\right)^3 - 3\left(a + \frac{1}{a}\right)$$

$$= (343 - 21) = 322$$

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

$$= (47 \times 322) - 7 = 15127$$

82. (b)

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

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

$$= 34 \times (-198) + 6$$

$$= -6726$$

83. (a)

$$x^2 - 3\sqrt{7}x + 13 = 0$$

$$\text{Put, } x - \sqrt{7} = y$$

$$x = (y + \sqrt{7})$$

$$(y + \sqrt{7})^2 - 3\sqrt{7}(y + \sqrt{7}) + 13 = 0$$

$$\Rightarrow y^2 + 7 + 2\sqrt{7}y - 3\sqrt{7}y - 21 + 13 = 0$$

$$\Rightarrow y^2 - \sqrt{7}y - 1 = 0$$

$$y - \frac{1}{y} = \sqrt{7}$$

$$y^3 - \frac{1}{y^3} = 7\sqrt{7} + 3\sqrt{7} = 10\sqrt{7}$$

$$y + \frac{1}{y} = \sqrt{(\sqrt{7})^2 + 4} = \sqrt{11}$$

$$y^3 + \frac{1}{y^3} = 11\sqrt{11} - 3\sqrt{11} = 8\sqrt{11}$$

$$y^6 - \frac{1}{y^6} \text{ Or } (x - \sqrt{7})^6 - \frac{1}{(x - \sqrt{7})^6} = 80\sqrt{77}$$

84. (b)

$$x + \frac{1}{x} = 5\sqrt{2}$$

$$\Rightarrow x^3 + \frac{1}{x^3} = 250\sqrt{2} - 15\sqrt{2}$$

$$= 235\sqrt{2}$$

$$x - \frac{1}{x} = \sqrt{50-4} = \sqrt{46}$$

$$x^3 - \frac{1}{x^3} = 49\sqrt{46}$$

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

$$= 49 \times \sqrt{2} \times \sqrt{23} \times 235\sqrt{2}$$

$$= 23030\sqrt{23}$$

85. (a)

$$\left(x + \frac{1}{x}\right) = 2\sqrt{2}, \quad x > 1,$$

$$\Rightarrow x^6 - \frac{1}{x^6} = \left(x^3 - \frac{1}{x^3}\right)\left(x^3 + \frac{1}{x^3}\right)$$

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

$$= 10\sqrt{2}$$

$$\therefore x + \frac{1}{x} = 2\sqrt{2}$$

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

$$= \sqrt{(2\sqrt{2})^2 - 4} = 2$$

$$x^3 - \frac{1}{x^3} = 2^3 + 3 \times 2 = 14$$

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

$$= 14 \times 10\sqrt{2} = 140\sqrt{2}$$

86. (a)

$$\text{If } x > 0, \quad x^4 + \frac{1}{x^4} = 142,$$

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

$$\Rightarrow x^4 + \frac{1}{x^4} = 142$$

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

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

$$\Rightarrow x + \frac{1}{x} = \sqrt{14}$$

$$\Rightarrow x^3 + \frac{1}{x^3} = 14\sqrt{14} - 3\sqrt{14} = 11\sqrt{14}$$

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

$$= 142 \times 11\sqrt{14} - \sqrt{14}$$

$$= 1562\sqrt{14} - \sqrt{14}$$

$$= 1561\sqrt{14}$$

87. (b)

$$\left(x - \frac{1}{x}\right) = \sqrt{6}$$

$$\Rightarrow x^8 - \frac{1}{x^8} = \left(x^4 + \frac{1}{x^4}\right)\left(x^4 - \frac{1}{x^4}\right)$$

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

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

$$x + \frac{1}{x} = \sqrt{6+4} = \sqrt{10}$$

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

$$x^4 + \frac{1}{x^4} = 62$$

$$\Rightarrow x^8 - \frac{1}{x^8} = 62 \times 8 \times \sqrt{10} \times \sqrt{6}$$

$$= 992\sqrt{15}$$

88. (a)

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

$$\Rightarrow \left(x^8 - \frac{1}{x^8}\right) = \left(x^4 + \frac{1}{x^4}\right)\left(x^2 + \frac{1}{x^2}\right)\left(x + \frac{1}{x}\right)\left(x - \frac{1}{x}\right)$$

$$x - \frac{1}{x} = \sqrt{21}$$

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

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

$$\Rightarrow x^8 + \frac{1}{x^8} = 527 \times 23 \times 5 \times \sqrt{21}$$

$$= 60605\sqrt{21}$$

89. (c)

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

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

$$\Rightarrow x^4 + \frac{1}{x^4} = 14$$

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

$$\Rightarrow x^8 + \frac{1}{x^8} = \left(x^4 + \frac{1}{x^4}\right) \times \left(x^4 - \frac{1}{x^4}\right)$$

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

$$= 14 \times 4 \times \sqrt{6} \times \sqrt{2}$$

$$= 112\sqrt{3}$$

90. (b)

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

Then, the value of

$$\frac{x^4 + 3x^3 + 5x^2 + 3x + 1}{x^4 + 1}$$

On dividing numerator and denominator by x^2

$$\frac{x^2 + \frac{1}{x^2} + 3\left(x + \frac{1}{x}\right) + 5}{x^2 + \frac{1}{x^2}} = \frac{23 + 3 \times 5 + 5}{23} = \frac{43}{23}$$

91. (b)

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

Then, the value of

$$\frac{x^4 + \frac{1}{x^2}}{x^2 - 2x + 1} \text{ or } \frac{x^3 + \frac{1}{x^3}}{x + \frac{1}{x} - 2} = \frac{27 - 9}{1} = 18$$

92. (d)

$$a = 5 + 2\sqrt{6}, b = 5 - 2\sqrt{6}$$

Then, the value of

$$\frac{a^2 + b^2 + ab}{a^2 + b^2 - ab} = \frac{(5 + 2\sqrt{6})^2 + (5 - 2\sqrt{6})^2 + 1}{(5 + 2\sqrt{6})^2 + (5 - 2\sqrt{6})^2 - 1} = \frac{99}{97}$$

93. (a)

$$y = 3 + 2\sqrt{2}$$

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

$$\Rightarrow y - \frac{1}{y} = 4\sqrt{2}$$

$$y + \frac{1}{y} = 6$$

$$\therefore y^2 - y^{-2} = \left(y - \frac{1}{y}\right) \left(y + \frac{1}{y}\right)$$

$$= 24\sqrt{2}$$

$$\text{Now, } \sqrt{2}(y^2 - y^{-2}) = 48$$

94. (c)

A.T.Q.

$$\sqrt{\frac{a}{b}} - \sqrt{\frac{b}{a}} = \frac{8}{3}$$

$$\Rightarrow \frac{a}{b} + \frac{b}{a} = \frac{64}{9} + 2$$

$$\frac{a^2 + b^2}{ab} = \frac{82}{9}$$

We know

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

$$900 = 100x$$

$$x = 9$$

then,

$$ab = 9x = 81$$

95. (a)

$$a = 5 + 2\sqrt{6}, b = 5 - 2\sqrt{6}$$

Then,

The value of

$$a^3 + b^3 = (5 + 2\sqrt{6})^3 + (5 - 2\sqrt{6})^3 \\ = 970$$

96. (c)

$$p = \frac{\sqrt{2}+1}{\sqrt{2}-1}, q = \frac{\sqrt{2}-1}{\sqrt{2}+1}$$

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

$$\Rightarrow p = \frac{1}{q}$$

$$\Rightarrow q = 3-2\sqrt{2}$$

$$\Rightarrow \frac{p^2}{q} + \frac{q^2}{p} = \frac{p^3 + q^3}{pq}$$

$$= \frac{(p+q)(p^2+q^2-pq)}{pq} = \frac{6 \times 33}{1} \\ = 198$$

97. (b)

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

then,

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

$$= (\sqrt{3} + \sqrt{2})^3 + (\sqrt{3} - \sqrt{2})^3 + \sqrt{3} + \sqrt{2} + \sqrt{3} - \sqrt{2}$$

$$= 2(3\sqrt{3} + 3 \times \sqrt{3} \times 2) + 2\sqrt{3}$$

$$= 20\sqrt{3}$$

98. (a)

$$[7(x+y)]^3 + [6(x-y)]^3$$

$$\text{Let, } P = 7(x+y)$$

$$Q = 6(x-y)$$

We know,

$$P^3 + Q^3 = (P+Q)(P^2+Q^2-PQ)$$

then,

$$\Rightarrow [7(x+y) + 6(x-y)][7(x+y)]^2 + [6(x-y)]^2 - 42(x^2-y^2) \\ [(13x+y)][(49x^2+49y^2+98xy+36x^2+36y^2-72xy-42x^2+42y^2)]$$

$$36y^2 - 72xy - 42x^2 + 42y^2]$$

$$[(13x+y)][(43x^2+127y^2+2 \times 13xy)]$$

$$A = 43, B = 127, C = -13$$

then,

$$A+B+C = (170-13) = 157$$

99. (c)

$$A = \frac{x^3-y^3}{x^2-y^2}, B = \frac{x+y}{x^2+y^2+xy}, \text{ and } C$$

$$= \frac{3xy^2-3x^2y}{x^2-y^2}$$

then,

$$AB(A+C)$$

$$= \frac{x^3-y^3}{x^2-y^2} \times \frac{x+y}{x^2+y^2+xy} \left(\frac{x^3-y^3}{x^2-y^2} + \frac{3xy(y-x)}{(x^2-y^2)} \right)$$

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

$$\times \left(\frac{x^3-y^3-3xy(x-y)}{x^2-y^2} \right)$$

$$= \frac{(x-y)^2}{(x+y)}$$

100. (a)

ATQ,

$$P \times Q \div R =$$

$$= \frac{2x^2+x-6}{2(x+2)(x-2)} \times \frac{x^2+3x+9}{(2x-3)(x^2+4)} \times \frac{(x^2)^2-(4)^2}{x^3-27}$$

$$\frac{(2x-3)(x+2)}{2(x+2)(x-2)} \times \frac{x^2+3x+9}{(2x-3)(x^2+4)} \times \frac{(x^2+4)(x+2)(x-2)}{(x-3)(x^2+3x+9)}$$

$$\Rightarrow \frac{x+2}{2(x-3)}$$

101. (b)

$$\frac{x^4-81}{2x^2+13x+15} \times \frac{2x+3}{x^3+27} \times \frac{[(x-3)^2+3x](x+5)}{(x+3)^2-6x}$$

$$= \frac{(x^2-9)(x^2+9)}{(x+5)(2x+3)} \times \frac{2x+3}{(x+3)(x^2+9-3x)} \times \frac{[x^2+9-6x+3x](x+5)}{(x^2+9+6x-6x)}$$

$$= \frac{(x-3)(x+3)(x^2+9)}{1} \times \frac{1}{(x+3)(x^2+9-3x)} \times \frac{(x^2+9-3x)}{(x^2+9)}$$

$$= (x-3)$$

102. (c)

$$\begin{aligned}
 a^2 + b^2 + c^2 - ab - bc - ca &= \frac{1}{2} (a-b)^2 + (b-c)^2 + (c-a)^2 \\
 &= \frac{1}{2} (97.5 - 100)^2 + (100 - 102.5)^2 + (102.5 - 97.5)^2 \\
 &= \frac{1}{2} (-2.5)^2 + (-2.5)^2 + (5)^2 \\
 &= \frac{1}{2} (6.25 + 6.25 + 25) \\
 &= \frac{75}{4}
 \end{aligned}$$

103. (d)

We know that,

$$(a + b - c)^2 = a^2 + b^2 + c^2 + 2ab - 2bc - 2ca$$

Given that

$$\begin{aligned}
 (Ax + By - Cz)^2 &= 4x^2 + 3y^2 + 2z^2 + 4\sqrt{3}xy - 2\sqrt{6}yz - 4\sqrt{2}xz
 \end{aligned}$$

Then,

$$(Ax + By - Cz)^2 = (2x + \sqrt{3}y - \sqrt{2}z)^2$$

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

the value of $A^2 + B^2 + C^2$

$$= 4 + 3 + 2 = 9$$

104. (c)

Given,

$$a + b + c = 7,$$

$$ab + bc + ca = 11,$$

$$abc = -1,$$

according to question,

$$\Rightarrow (a + b + c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca)$$

$$\Rightarrow 49 = a^2 + b^2 + c^2 + 2 \times 11$$

$$\Rightarrow a^2 + b^2 + c^2 = 27$$

$$\Rightarrow a^3 + b^3 + c^3 - 3abc = (a + b + c)$$

$$\Rightarrow [a^2 + b^2 + c^2 - (ab + bc + ca)]$$

$$\Rightarrow a^3 + b^3 + c^3 - 3 \times -1 = 7(27 - 11)$$

$$\Rightarrow a^3 + b^3 + c^3 = 112 - 3 = 109$$

105. (a)

$$a + b + c = 12,$$

$$a^2 + b^2 + c^2 = 50,$$

$$\Rightarrow (a + b + c)^2$$

$$= a^2 + b^2 + c^2 + 2(ab + bc + ca)$$

$$\Rightarrow 144 = 50 + 2(ab + bc + ca)$$

$$\Rightarrow ab + bc + ca = 47$$

$$\Rightarrow a^3 + b^3 + c^3 - 3abc$$

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

$$= 12[50 - 47]$$

$$= 12 \times 3 = 36$$

106. (d)

$$x = (b - c)(a - d) = ab - bd - ca + cd$$

$$y = (c - a)(b - d) = cb - cd - ab + ad$$

$$z = (a - b)(c - d) = ac - ad - bc + bd$$

$$x + y + z = 0$$

Then,

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

Required,

$$\frac{(x + y)(y + z)(z + x)(x^3 + y^3 + z^3)}{9x^2y^2z^2}$$

$$= \frac{-z \times (-x) \times (-y) \times 3xyz}{9x^2y^2z^2} = -\frac{1}{3}$$

107. (d)

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

$$= \frac{(a + b - c)}{2} [3(a^2 + b^2 + c^2) - (a + b - c)^2]$$

$$= \frac{20}{2} [3 \times 152 - 400]$$

$$= 10 \times (456 - 400)$$

$$= 560$$

108. (a)

We know that

$$(a^3 + b^3 + c^3 - 3abc)$$

$$= \frac{(a + b + c)}{2} [(a - b)^2 + (b - c)^2 + (c - a)^2]$$

$$\Rightarrow 405 = \frac{(a + b + c)}{2} [54]$$

$$\Rightarrow (a + b + c) = \frac{405}{27} = 15$$

109. (c)

$$a = 335, b = 215, c = 180$$

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

$$= \frac{(a + b + c)}{2} [(a - b)^2 + (b - c)^2 + (c - a)^2]$$

$$= \frac{730}{2} \times [(120)^2 + (35)^2 + (155)^2]$$

$$= 365[14400 + 1225 + 24025]$$

$$= 365 \times [39650]$$

$$= 14472250$$

110. (d)

$$x = 999, y = 1000, z = 1001$$

We know,

$$x^3 + y^3 + z^3 - 3xyz = \frac{1}{2} [(x+y+z)(x-y)^2 + (y-z)^2 + (z-x)^2]$$

Then, the value of

$$= \frac{x^3 + y^3 + z^3 - 3xyz}{x + z - y}$$

$$= \frac{\frac{1}{2} [(x+y+z)(x-y)^2 + (y-z)^2 + (z-x)^2]}{x + z - y}$$

$$= \frac{3000 \times 3 \times 1}{999 + 1001 - 1000} = 9$$

111. (d)

$$= \frac{(a+b+c) \frac{1}{2} [(a-b)^2 + (b-c)^2 + (c-a)^2]}{(a-b)^2 + (b-c)^2 + (c-a)^2}$$

$$= \frac{25 + 15 - 10}{2} = 15$$

112. (a)

$$a + b + c = 5$$

$$ab + bc + ca = 7$$

$$a^2 + b^2 + c^2 = (a + b + c)^2 - 2(ab + bc + ca) \\ = 25 - 14 = 11$$

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

$$[a^2 + b^2 + c^2 - ab - bc - ca]$$

$$= 5[11 - 7] = 20$$

113. (b)

$$a^3 + b^3 + c^3 - 3abc = 405,$$

$$a + b + c = 15$$

$$\Rightarrow a^3 + b^3 + c^3 - 3abc$$

$$= (a + b + c) \times \frac{1}{2} [(a-b)^2 + (b-c)^2 + (c-a)^2]$$

$$\Rightarrow 405 = \frac{15}{2} \times [(a-b)^2 + (b-c)^2 + (c-a)^2]$$

$$\Rightarrow \frac{810}{15} = (a-b)^2 + (b-c)^2 + (c-a)^2$$

$$\therefore (a-b)^2 + (b-c)^2 + (c-a)^2 = 54$$

114. (b)

$$8x^2 + y^2 - 12x - 4xy + 9 = 0$$

$$4x^2 + y^2 - 4xy + 4x^2 - 12x + 9 = 0$$

$$(2x - y)^2 + (2x - 3)^2 = 0$$

$$2x = y, 2x = 3$$

$$x = \frac{3}{2}, y = 3$$

Then,

$$14x - 5y = (21 - 15) = 6$$

115. (c)

$$a^2 + b^2 + c^2 + 96 = 2(4a + 4b - 8c)$$

$$a^2 + b^2 + c^2 - 2(4a + 4b - 8c) + 96$$

$$(a - 4)^2 + (b - 4)^2 + (c + 8)^2 = 0$$

$$a = 4, b = 4, c = -8$$

$$\sqrt{ab - bc + ca} = \sqrt{16 + 32 - 32} = 4$$

116. (d)

$$a^2 + b^2 + 64c^2 + 16c + 3 - 2(a + b) = 0$$

$$(a - 1)^2 + (b - 1)^2 + (8c + 1)^2 = 0$$

$$a = 1, b = 1, c = \frac{-1}{8}$$

Then,

$$4a^7 + b^7 + 8c^2 = 4 + 1 + \frac{1}{8} = 5\frac{1}{8}$$

117. (c)

$$\text{If, } ab + bc + ca = abc$$

(Symmetry case)

$$\text{Put, } a = b = c = k \text{ (Let)}$$

$$K^3 = 3K^2$$

$$\boxed{k = 3}$$

$$\text{Now, Required, } \frac{(b+c)}{bc(a-1)} \times 3$$

$$= \frac{6}{9 \times 2} \times 3 = 1$$

118. (b)

Let,

$$x_1 = x_2 = x_3 = 4$$

then,

$$\frac{1}{2+x_1} + \frac{1}{2+x_2} + \frac{1}{2+x_3} = \frac{1}{6} + \frac{1}{6} + \frac{1}{6} = \frac{3}{6} = \frac{1}{2}$$

119. (d)

$$(3x^3 + 5x^2y + 12xy^2 + 7y^3)$$

$$\Rightarrow x = -4$$

$$\Rightarrow y = -1$$

$$= 3(-4)^3 + 5(-4)^2(-1) + 12(-4)(-1)^2 + 7(-1)^3$$

$$= -192 - 80 - 48 - 7 = -327$$

120. (d)

$$64x^3 + 38x^2y + 20xy^2 + y^3$$

$$\Rightarrow x = 3, y = -4$$

$$64(3)^3 + 38(3)^2(-4) + 20(3)(-4)^2 + (-4)^3$$

$$= 1728 - 1368 + 960 - 64$$

$$= 1256$$

121. (a)

$$27x^3 - 58x^2y + 31xy^2 - 8y^3$$

$$\Rightarrow x = -5, y = -7$$

$$= 27(-5)^3 - 58(-5)^2(-7) + 31(-5)(-7)^2 - 8(-7)^3$$

$$= -3375 + 10,150 - 7595 + 2744 = 1924$$

122. (b)

$$(p + q + r) = 0$$

$$\text{Put } p = 1, q = 1, r = -2$$

$$\Rightarrow \left(\frac{p^2}{p^2 - qr} \right) + \left(\frac{q^2}{q^2 - pr} \right) + \left(\frac{r^2}{r^2 - pq} \right)$$

$$\Rightarrow \frac{1}{3} + \frac{1}{3} + \frac{4}{3}$$

$$= \frac{6}{3} = 2$$

123. (b)

Given that,

$$\frac{1}{1+b+\frac{1}{c}} + \frac{1}{1+a+\frac{1}{b}} + \frac{1}{1+c+\frac{1}{a}}$$

$$\text{Let, } a = b = c = 1$$

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

124. (a)

$$a - \frac{1}{b} = m$$

$$b - \frac{1}{c} = n$$

$$c - \frac{1}{a} = p$$

Put,

$$a = 2, b = 1, c = -1$$

$$m = 1$$

$$n = 2$$

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

$$abc - \frac{1}{abc} = 2 \times 1 \times (-1) - \frac{1}{2 \times 1 \times (-1)}$$

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

Option (A) is correct

125. (d)

$$a + \frac{1}{b} = \frac{7}{3}$$

$$b + \frac{1}{c} = \frac{13}{4}$$

$$c + \frac{1}{a} = \frac{9}{2}$$

$$a = 2, b = 3, c = 4$$

$$abc = 24$$

126. (b)

$$\frac{x}{y+z} = \frac{y}{x+z} = \frac{z}{x+y} = k$$

Therefore

$$x = k(y+z) \quad (1)$$

$$y = k(x+z) \quad (2)$$

$$z = k(x+y) \quad (3)$$

therefore

$$x + y + z = k[y + z + x + z + x + y]$$

$$\Rightarrow x + y + z = 2k[x + y + z]$$

$$\Rightarrow k = \frac{1}{2}$$

From eq.(1)

$$x = ky + kz$$

$$\Rightarrow kz = x - ky \quad (4)$$

From eq.(2)

$$y = kx + kz$$

$$kz = y - kx \quad (5)$$

From eq.(4) and (5)

$$x - ky = y - kx$$

$$x - y = ky - kx$$

$$x - y = -k(x - y)$$

$$\Rightarrow k = -1$$

127. (a)

$$(a+b+c)\left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right) = 30 \times 20$$

$$a\left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right) + b\left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right) + c\left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right)$$

$$= 600$$

$$1 + \frac{a}{b} + \frac{a}{c} + \frac{b}{a} + 1 + \frac{b}{c} + \frac{c}{a} + \frac{c}{b} + 1 = 600$$

$$3 + \frac{a}{b} + \frac{a}{c} + \frac{b}{a} + \frac{b}{c} + \frac{c}{a} + \frac{c}{b} = 600$$

$$\frac{a}{b} + \frac{b}{a} + \frac{a}{c} + \frac{c}{a} + \frac{b}{c} + \frac{c}{b} = 597$$

128. (b)

$$\frac{l^2 - m^2}{(l + m)^2} = ? \quad \text{If } l + m \neq 0$$

$$\frac{l^2 - m^2}{(l + m)^2} = \frac{(l - m)(l + m)}{(l + m)^2}$$

$$= \frac{(l - m)}{(l + m)}$$

129. (a)

ATQ,

$$\frac{2a-5}{a} - \frac{4b-5}{b} + \frac{6c+5}{c} = 0$$

$$\text{Or } \left(2 - \frac{5}{a}\right) - \left(4 + \frac{5}{b}\right) + \left(6 + \frac{5}{c}\right) = 0$$

$$= \frac{-5}{a} + \frac{5}{b} + \frac{5}{c} = -2 + 4 - 6$$

$$= -5\left(\frac{1}{a} - \frac{1}{b} - \frac{1}{c}\right) = -4$$

$$= \frac{1}{a} - \frac{1}{b} - \frac{1}{c} = \frac{4}{5}$$

130. (b)

$$x^2 - 15x + 1 = 0$$

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

$$\Rightarrow x^2 + \frac{1}{x^2} = 225 - 2 = 223$$

$$\Rightarrow x^4 + 1 = 223x^2$$

$$\Rightarrow x^4 - 223x^2 + 1 = 0$$

$$\Rightarrow x^4 - 223x^2 = -1$$

ATQ,

$$\text{The value of expression } x^4 - 223x^2 + 6$$

$$= -1 + 6 = 5$$

131. (b)

$$x^2 - 11x + 1 = 0$$

$$x + \frac{1}{x} = 11$$

$$x^2 + \frac{1}{x^2} = 119$$

$$x^4 + \frac{1}{x^4} = 14159$$

$$x^8 + 1 = 14159x^4$$

$$x^8 - 14159x^4 = -1$$

Now,

$$x^8 - 14159x^4 + 11 = -1 + 11 = 10$$

132. (b)

$$\begin{aligned} & [(x-5)(x-1)] - [(9x-5)(9x-1)] \div 16x \\ & [(x^2 - 6x + 5) - (81x^2 - 54x + 5)] \div 16x \\ & (-5x^2 + 3x) \div 16x \\ & = -(5x - 3) \end{aligned}$$

133. (a)

A.T.Q.

$$\frac{(u-v)^3 + (v-w)^3 + (w-u)^3}{(u^2-v^2)^3 + (v^2-w^2)^3 + (w^2-u^2)^3}$$

Here,

$$u - v + v - w + w - u = 0$$

$$\text{So, } (u-v)^3 + (v-w)^3 + (w-u)^3$$

$$= 3(u-v)(v-w)(w-u)$$

$$\Rightarrow \frac{3(u-v)(v-w)(w-u)}{3(u^2-v^2)(v^2-w^2)(w^2-u^2)}$$

$$= \frac{1}{(u+v)(v+w)(w+u)}$$

134. (a)

Given that,

$$x(x+3)(x+6)(x+9) = 0$$

Or

$$x(x+9)(x+3)(x+6) = 0$$

$$(x^2 + 9x)(x^2 + 9x + 18) = 0$$

Let,

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

$$y(y+18) = 0$$

$$y^2 + 18y = 0$$

Add 81 both sides

$$y^2 + 18y + 81 = 81$$

$$\text{Required answer} = 81 = 3^4$$

135. (d)

$$\text{Let, } 300 = a$$

Then,

$$\sqrt{300 \times 301 \times 302 \times 303 + 1} = \sqrt{a(a+1)(a+2)(a+3) + 1}$$

$$\sqrt{(a^2 + 3a)(a^2 + 3a + 2) + 1}$$

Let,

$$a^2 + 3a = b$$

$$\sqrt{b(b+2) + 1} = \sqrt{(b^2 + 2b + 1)} = b + 1 \dots\dots(i)$$

Put the value of b in equ.1

$$a^2 + 3a + 1$$

Put the value of a (a = 300)

$$(90000 + 900 + 1) = 90901$$

136. (a)

Given that,

$$\sqrt{600 \times 601 \times 602 \times 60 + 1}$$

ATQ,

Value of the expression

$$(600)^2 + 3(600) + 1 = (360000 + 1800 + 1) \\ = 361801$$

137. (b)

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

$$12x + 3x^2 = 2x^2 - 6x + 8$$

$$x^2 = 8 - 18x$$

divided by x both the sides

$$x = \frac{8}{x} - 18$$

$$x - \frac{8}{x} = -18$$

138. (c)

$$(ab)^{\frac{1}{3}} = 5$$

$$\Rightarrow ab = 5^3 = 125$$

Possible value of a and b

a	b	a + b
5	25	30
1	125	126

47 is not possible

139. (c)

$$\frac{a}{3} - \frac{a-2}{5} = 1$$

$$\Rightarrow 5a - 3a + 6 = 15$$

$$\Rightarrow 2a = 9$$

$$\Rightarrow a = 4.5$$

140. (c)

$$\frac{3a+b}{2} - \frac{a-3b}{3} + 2b$$

$$= \frac{9a+3b-2a+6b}{6} + 2b$$

$$= \frac{7a+9b+12b}{6} = \frac{7a+21b}{6}$$

$$= \frac{7(a+3b)}{6}$$

141. (a)

$$\frac{1}{8} \left[\frac{1}{(b-1)} - \frac{1}{(b+1)} - \frac{2}{(b^2+1)} - \frac{4}{(b^4+1)} \right] = ?$$

$$\Rightarrow \frac{1}{8} \left[\frac{b+1-b+1}{b^2-1} - \frac{2}{b^2+1} - \frac{4}{b^4+1} \right]$$

$$\Rightarrow \frac{1}{8} \left[2 \left(\frac{b^2+1-b^2+1}{b^4-1} \right) - \frac{4}{b^4+1} \right]$$

$$\Rightarrow \frac{1}{8} \left[\frac{4}{b^4-1} - \frac{4}{b^4+1} \right] \Rightarrow \left(\frac{1}{b^8-1} \right)$$

142. (b)

$$x = (\sqrt{6}-1)^{\frac{1}{3}}$$

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

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

$$\frac{1}{x^3} = \frac{1}{\sqrt{6}-1} = \frac{\sqrt{6}+1}{5}$$

$$x^3 - \frac{1}{x^3} = \sqrt{6}-1 - \frac{(\sqrt{6}+1)}{5}$$

$$= \frac{5\sqrt{6}-5-\sqrt{6}-1}{5}$$

$$= \frac{4\sqrt{6}-6}{5}$$

143. (c)

Given that,

$$abc = 1$$

Then,

$$\frac{123}{1+a+ab} + \frac{123}{1+b+bc} + \frac{123}{1+c+ac} \\ = \frac{123}{1+a+ab} + \frac{123}{1+b+\frac{1}{a}} + \frac{123}{1+c+\frac{1}{b}}$$

$$= \frac{123}{1+a+ab} + \frac{123 \times a}{a+ab+1} + \frac{123}{1+\frac{1}{ab}+\frac{1}{b}}$$

$$= \frac{123}{1+a+ab} + \frac{123 \times a}{a+ab+1} + \frac{123 \times ab}{a+ab+1}$$

$$= 123 \times \frac{1+a+ab}{1+a+ab} = 123$$

144. (a)

$$\frac{A}{L} + \frac{M}{B} = 1$$

Let,

$$\frac{A}{L} = x, \quad \frac{B}{M} = y, \quad \frac{C}{N} = z$$

Then,

$$x + \frac{1}{y} = 1, \quad y + \frac{1}{z} = 1$$

$$\text{Let, } x = \frac{1}{2}, \quad z = -1$$

$$y = 2$$

$$\therefore \frac{L}{A} + \frac{C}{N} = \frac{1}{x} + z = 2 - 1 = 1$$

145. (a)

$$p + q + r = pqr \quad \frac{1}{p} + \frac{1}{q} + \frac{1}{r} = 1$$

$$\Rightarrow pq + qr + rp = pqr$$

$$\Rightarrow (p + q + r)^2 = p^2 + q^2 + r^2 + 2(pq + qr + rp)$$

$$\Rightarrow 1 = p^2 + q^2 + r^2 + 2 \times 1$$

$$\Rightarrow p^2 + q^2 + r^2 = -1$$

$$\text{Now, } p^3 + q^3 + r^3 - 3pqr = (p + q + r) [(p^2 + q^2 + r^2) - (pq + qr + rp)]$$

$$\Rightarrow p^3 + q^3 + r^3 - 3 \times 1 = 1 [-1 - 1]$$

$$\Rightarrow p^3 + q^3 + r^3 - 3 = -2$$

$$= p^3 + q^3 + r^3 = +1$$

146. (b)

$$25^{(3a-2b)} = 5^{(b-a)} = 5^2$$

$$5^{2(3a-2b)} = 5^{(b-a)} = 5^2$$

$$5^{(6a-4b)} = 5^{(b-a)} = 5^2$$

$$5^{(6a-4b)} = 5^2$$

$$6a - 4b = 2$$

$$3a - 2b = 1 \quad \dots\dots(i)$$

$$5^{(b-a)} = 5^2$$

$$b - a = 2$$

$$2b - 2a = 4 \quad \dots\dots(ii)$$

From (i) and (ii), we get

$$a = 5$$

$$b = 7$$

Now,

$$\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = \frac{13}{35}, \quad \frac{1}{5} + \frac{1}{7} + \frac{1}{c} = \frac{13}{35}$$

$$\frac{1}{c} = \frac{13}{35} - \frac{1}{5} - \frac{1}{7} = \frac{13-7-5}{35}$$

$$c = 35$$

Value of $ab - c$

$$= 5 \times 7 - 35$$

$$= 35 - 35 = 0$$

147. (a)

$$4^{(4b-3a)} = 2^{(2b+c)} = 8^{(c-a)}$$

$$2^{2(4b-3a)} = 2^{(2b+c)} = 2^{3(c-a)}$$

$$2^{(8b-6a)} = 2^{(2b+c)} = 2^{(3c-3a)}$$

$$2^{(8b-6a)} = 2^{(3c-3a)}$$

$$8b - 6a = 3c - 3a$$

$$8b = 3a + 3c \quad \dots\dots(i)$$

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

$$2b + c = 3c - 3a$$

$$3a + 2b = 2c \quad \dots\dots(ii)$$

$$2^{(8b-6a)} = 2^{(2b+c)}$$

$$8b - 6a = 2b + c$$

$$6b = 6a + c \quad \dots\dots(iii)$$

From (i) and (ii)

$$8b = 2c - 2b + 3c$$

$$\Rightarrow 10b = 5c$$

$$\Rightarrow c = 2b$$

$$\Rightarrow b = \frac{c}{2}$$

From (i) and (iii)

$$8b = 3a + 3(6b - 6a) \Rightarrow 15a = 10b \Rightarrow 3a$$

$$= 2b \Rightarrow a = \frac{2b}{3} = \frac{c}{3}$$

$$a + b + c = 11$$

$$\left(\frac{c}{3}\right) + \left(\frac{c}{2}\right) + c = 11$$

$$c = 6, b = 3 \text{ and } a = 2$$

$$\text{Value of } 4 \left[\frac{1}{ab} + \frac{1}{bc} + \frac{1}{ac} \right]$$

$$= 4 \left[\frac{1}{ab} + \frac{1}{bc} + \frac{1}{ac} \right]$$

$$= 4 \left[\frac{1}{6} + \frac{1}{18} + \frac{1}{12} \right]$$

$$= 4 \left[\frac{6+2+3}{36} \right] = \frac{11}{9}$$

148. (c)

Given,

$$a + a^2 + a^3 + a^4 - 2 = 0$$

$$a + a^2 + a^3 + a^4 = 2$$

$$\frac{a(a^4 - 1)}{a - 1} = 2 \quad (\text{G.P. series})$$

$$a^5 - a = 2a - 2$$

$$a^4 + \frac{2}{a} = 3$$

149. (b)

$$\text{If } 25x^4 - 9x^2y^2 + 49y^4 = 114 \dots\dots(i)$$

$$\& 5x^2 + 3xy + 7y^2 = 19 \dots\dots(ii)$$

By (i) & (ii)

$$5x^2 + 7y^2 - 3xy = \frac{114}{19} = 6 \dots\dots(iii)$$

Then, from (ii) & (iii)

$$5x^2 + 7y^2 = \frac{25}{2}$$

$$\& 6xy = 13$$

$$xy = \frac{13}{6}$$

$$\text{Now, } 5\frac{x}{y} + 7\frac{y}{x}$$

$$= \frac{5x^2 + 7y^2}{xy} = \frac{75}{13}$$

150. (a)

$$a - \frac{1}{a} = b \dots\dots\dots(i),$$

$$b - \frac{1}{b} = c \dots\dots\dots(ii),$$

$$c - \frac{1}{c} = a \dots\dots\dots(iii)$$

Add all

$$\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = (a - b) + (b - c) + (c - a)$$

$$\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 0$$

$$\begin{aligned} & \left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c} \right)^2 \\ &= \frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2} + 2 \left(\frac{1}{ab} + \frac{1}{bc} + \frac{1}{ca} \right) \\ & \left(\frac{1}{ab} + \frac{1}{bc} + \frac{1}{ca} \right) \\ &= \frac{-1}{2} \left(\frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2} \right) \end{aligned}$$