

ALGEBRA

बीजगणित

PRACTICE SHEET

WITH SOLUTIONS

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Maths By Aditya Ranjan



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ALGEBRA/बीजगणित

(Practice Sheet With Solution)

1. 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) $3\sqrt{5}$

2. 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

3. 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) $726\sqrt{2}$

4. 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) $128\sqrt{2}$

5. 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) $1562\sqrt{14}$

6. 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

7. 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

8. 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) $\frac{43}{9}$

9. 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) $1012\sqrt{15}$

10. 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

11. 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) $22\sqrt{2}$

12. 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) $-28\sqrt{5}$

13. 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

14. 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) $60725\sqrt{21}$

15. If $\left(x + \frac{1}{x}\right) = 2$, then $x^7 + \frac{1}{x^{117}} = \underline{\hspace{1cm}}$.

यदि $\left(x + \frac{1}{x}\right) = 2$ है, तो $x^7 + \frac{1}{x^{117}}$ का मान क्या होगा?

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

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

16. 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

17. 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) $\sqrt{13}$

18. 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) $\frac{1}{4}$

19. 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) $108\sqrt{3}$

20. 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 मूल्य क्या है ?

SSC CHSL 02/08/2023 Shift-02

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

21. 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) $22960\sqrt{23}$

22. 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) $\sqrt{7}$

23. 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) $\sqrt{43}$

24. 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

25. 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

26. 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

27. 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) $9\frac{1}{9}$

28. 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) $12.8\sqrt{0.32}$

29. 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

30. 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) $5\frac{1}{8}$

- 31.
- $x^2 + y^2 - 10x + 12y + 61 = 0$
- , then
- $2x + 3y = ?$

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

(a) -1 (b) -8

(c) 1 (d) 8

32. 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

33. 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

34. 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) $\frac{31}{52}$

35. 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

36. 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) $\frac{54}{25}$

37. 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

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

$\frac{1}{49b^2}$?

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) $\frac{7}{2}$

39. 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) $-3\sqrt{5}$

40. 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) $4\sqrt{3}$

41. 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) $\frac{99}{97}$

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

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

43. 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

44. 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

45. 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

46. 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

47. 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

48. 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

49. 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

50. 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) $\frac{-765}{262}$

51. 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

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

यदि $x^2 - 5\sqrt{5x} + 1 = 0$ 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

53. 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

54. 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

55. 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

56. 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

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

58. 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

59. 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

60. 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

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

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

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

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

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

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

62. 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

63. 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

64. 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

65. 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

66. 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) $a^3 + b^3 + c^3 + 3abc$

67. 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

68. 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

69. 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

70. 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

71. 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

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

73. 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

74. 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) $2\sqrt{3}$

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

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

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

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

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

76. 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

77. 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

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

यदि $a = 97.5$, $b = 100$, $c = 102.5$ है 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) $\frac{15}{4}$

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

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

होगा।

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

80. 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

81. 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 determind

82. 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

83. 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

84. 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

85. 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

86. 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) $\frac{5}{3}$

87. 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

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

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

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

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

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

89. 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

90. 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

91. 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

92. 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

93. 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

94. 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

95. 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

96. 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

97. 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) $-\frac{4}{19}$

98. 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

99. 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

100. 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

101. 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) $\frac{100}{7}$

102. 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

103. 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) $-\frac{12}{5}$

104. The value of $\frac{p^2 - (q-r)^2}{(p+r)^2 - q^2} + \frac{q^2 - (p-r)^2}{(p+q)^2 - r^2} +$

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

$\frac{p^2 - (q-r)^2}{(p+r)^2 - q^2} + \frac{q^2 - (p-r)^2}{(p+q)^2 - r^2} + \frac{r^2 - (p-q)^2}{(q+r)^2 - p^2}$ का मान ज्ञात कीजिए।

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

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

105. 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

106. 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

107. 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

108. 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) $\frac{1}{b^8+1}$

109. If $x = (\sqrt{6} - 1)^{\frac{1}{3}}$, then the value of

$$\left(x - \frac{1}{x}\right)^3 + 3\left(x - \frac{1}{x}\right) \text{ is:}$$

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) $\frac{4\sqrt{3}-6}{5}$

110. 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

111. 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) $25p^2 + 9q^2 - 30pq$

112. 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) $6x(5x-3)$

113. 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

114. If $x^2 - \sqrt{9.76}x + 1 = 0$ and $x > 1$, the value of

$$x^3 - \frac{1}{x^3} \text{ is:}$$

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

115. 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) $\frac{2a}{a^2 - b^2}$

116. 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

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

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

118. Find the value of the expression

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

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

119. 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

Answer Key

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

SOLUTIONS

1. (c)

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

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

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

2. (b)

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

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

$$= 343 - 21 = 322$$

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

$$= 103684 - 2 = 103682$$

3. (a)

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

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

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

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

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

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

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

$$= 239\sqrt{18}$$

$$= 717\sqrt{2}$$

4. (a)

$$\left(x + \frac{1}{x}\right) = 2\sqrt{2}, \quad x > 1,$$

$$\Rightarrow x^6 - \frac{1}{x^6} = \left(x^3 - \frac{1}{x^3}\right)\left(x^3 + \frac{1}{x^3}\right)$$

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

$$= 10\sqrt{2}$$

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

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

$$= \sqrt{(2\sqrt{2})^2 - 4} = 2$$

$$x^3 - \frac{1}{x^3} = 2^3 + 3 \times 2 = 14$$

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

$$= 14 \times 10\sqrt{2} = 140\sqrt{2}$$

5. (a)

$$\text{If } x > 0, \quad x^4 + \frac{1}{x^4} = 142,$$

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

$$\Rightarrow x^4 + \frac{1}{x^4} = 142$$

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

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

$$\Rightarrow x + \frac{1}{x} = \sqrt{14}$$

$$\Rightarrow x^3 + \frac{1}{x^3} = 14\sqrt{14} - 3\sqrt{14} = 11\sqrt{14}$$

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

$$= 142 \times 11\sqrt{14} - \sqrt{14}$$

$$= 1562\sqrt{14} - \sqrt{14}$$

$$= 1561\sqrt{14}$$

6. (a)

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

$$\Rightarrow a^2 + \frac{1}{a^2} = 47$$

$$\Rightarrow a^3 + \frac{1}{a^3} = \left(a + \frac{1}{a}\right)^3 - 3\left(a + \frac{1}{a}\right)$$

$$= (343 - 21) = 322$$

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

$$= (47 \times 322) - 7$$

$$= 15127$$

7. (c)

Given,

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

According to question,

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

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

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

8. (d)

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

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

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

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

9. (b)

$$\left(x - \frac{1}{x}\right) = \sqrt{6}$$

$$\Rightarrow x^8 - \frac{1}{x^8} = \left(x^4 + \frac{1}{x^4}\right)\left(x^4 - \frac{1}{x^4}\right)$$

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

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

$$x + \frac{1}{x} = \sqrt{6+4} = \sqrt{10}$$

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

$$x^4 + \frac{1}{x^4} = 62$$

$$\Rightarrow x^8 - \frac{1}{x^8} = 62 \times 8 \times \sqrt{10} \times \sqrt{6}$$

$$= 992\sqrt{15}$$

10. (b)

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

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

$$= 34 \times (-198) + 6$$

$$= -6726$$

11. (d)

$$x^2 - \frac{1}{x^2} = 4\sqrt{6}$$

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

$$\downarrow \quad \downarrow$$

$$\sqrt{12} \quad 2\sqrt{2} = \sqrt{8}$$

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

$$= (\sqrt{8})^3 + 3 \times \sqrt{8} = 8\sqrt{8} + 3\sqrt{8}$$

$$= 11\sqrt{8} = 22\sqrt{2}$$

12. (a)

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

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

$$\therefore 0 < x < 1$$

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

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

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

13. (b)

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

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

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

14. (a)

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

$$\Rightarrow \left(x^8 - \frac{1}{x^8}\right) = \left(x^4 + \frac{1}{x^4}\right)\left(x^2 + \frac{1}{x^2}\right)\left(x + \frac{1}{x}\right)\left(x - \frac{1}{x}\right)$$

$$x - \frac{1}{x} = \sqrt{21}$$

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

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

$$\Rightarrow x^8 + \frac{1}{x^8} = 527 \times 23 \times 5 \times \sqrt{21}$$

$$= 60605\sqrt{21}$$

15. (b)

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

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

$$\downarrow \quad \downarrow$$

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

$$x = 1$$

$$x^7 + \frac{1}{x^{17}}$$

$$= (1)^7 + \frac{1}{(1)^{17}} = 1 + 1 = 2$$

16. (d)

Given,

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

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

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

$$= 66$$

17. (d)

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

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

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

18. (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.

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

19. (c)

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

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

$$\Rightarrow x^4 + \frac{1}{x^4} = 14$$

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

$$\Rightarrow x^8 + \frac{1}{x^8} = \left(x^4 + \frac{1}{x^4}\right) \times \left(x^4 - \frac{1}{x^4}\right)$$

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

$$= 14 \times 4 \times \sqrt{6} \times \sqrt{2}$$

$$= 112\sqrt{3}$$

20. (c)

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

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

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

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

21. (b)

$$x + \frac{1}{x} = 5\sqrt{2}$$

$$\Rightarrow x^3 + \frac{1}{x^3} = 250\sqrt{2} - 15\sqrt{2}$$

$$= 235\sqrt{2}$$

$$x - \frac{1}{x} = \sqrt{50 - 4} = \sqrt{46}$$

$$x^3 - \frac{1}{x^3} = 49\sqrt{46}$$

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

$$= 49 \times \sqrt{2} \times \sqrt{23} \times 235\sqrt{2}$$

$$= 23030\sqrt{23}$$

22. (b)

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

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

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

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

23. (b)

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

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

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

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

24. (c)

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

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

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

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

$$\begin{aligned} x^3 + \frac{1}{x^3} + x + \frac{1}{x} \\ = 52 + 4 = 56 \end{aligned}$$

25. (a)

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

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

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

$$= 167 + 2 = 169$$

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

$$\therefore y > 0$$

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

26. (c)

$$5a + \frac{4}{a} - 2 = 13, a > 0,$$

$$25a^2 + \frac{16}{a^2} = ?$$

$$5a + \frac{4}{a} = 15$$

$$\left(5a + \frac{4}{a}\right)^2 = 15^2$$

$$25a^2 + \frac{16}{a^2} + 2 \times 5a \times \frac{4}{a} = 225$$

$$25a^2 + \frac{16}{a^2} = 225 - 40 = 185$$

27. (a)

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

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

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

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

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

28. (b)

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

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

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

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

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

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

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

29. (c)
 $p + q = 12, pq = 14,$
 $p^2 - pq + q^2 = ?$
 $p^2 + q^2 - pq = (p + q)^2 - 3pq$
 $= 144 - 42 = 102$

30. (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,

$$4a^7 + b^7 + 8c^2 = 4 + 1 + \frac{1}{8} = 5\frac{1}{8}$$

31. (b)
 $x^2 + y^2 - 10x + 12y + 61 = 0$

Or

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

Then,

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

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

32. (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,

$$14x - 5y = (21 - 15) = 6$$

33. (b)

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

Then, the value of

$$\frac{x^4 + \frac{1}{x^2}}{x^2 - 2x + 1} \text{ or } \frac{x^3 + \frac{1}{x^3}}{x + \frac{1}{x} - 2} = \frac{27 - 9}{1} = 18$$

34. (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

$$\frac{x^2 + \frac{1}{x^2} + 3\left(x + \frac{1}{x}\right) + 5}{x^2 + \frac{1}{x^2}} = \frac{23 + 3 \times 5 + 5}{23} = \frac{43}{23}$$

35. (a)

Let,

$$x = 20, y = 21$$

Then,

The value of

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

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

36. (d)

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

$$\Rightarrow 5x - 2 = \frac{5}{x}$$

$$\Rightarrow 5x - \frac{5}{x} = 2$$

$$x - \frac{1}{x} = \frac{2}{5}$$

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

$$= \frac{4}{25} + 2 = \frac{54}{25}$$

37. (d)

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

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

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

38. (c)

$$7b - \frac{1}{4b} = 7$$

Multiply by $\frac{4}{7}$ both sides

$$\Rightarrow 4b - \frac{1}{7b} = 4$$

$$\Rightarrow 16b^2 + \frac{1}{49b^2} = 4^2 + 2 \times 4 \times \frac{1}{7}$$

$$= 16 + \frac{8}{7} = \frac{120}{7}$$

39. (d)

Given,

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

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

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

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

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

40. (d)

A.T.Q.

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

$$x - y = 6$$

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

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

$$45 = 36 + 3xy$$

$$3xy = 9$$

$$xy = 3$$

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

$$= 36 + 12$$

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

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

41. (d)

$$a = 5 + 2\sqrt{6}, b = 5 - 2\sqrt{6}$$

Then, the value of

$$\frac{a^2 + b^2 + ab}{a^2 + b^2 - ab} = \frac{(5 + 2\sqrt{6})^2 + (5 - 2\sqrt{6})^2 + 1}{(5 + 2\sqrt{6})^2 + (5 - 2\sqrt{6})^2 - 1} = \frac{99}{97}$$

42. (a)

$$a = 5 + 2\sqrt{6}, b = 5 - 2\sqrt{6}$$

Then,

The value of

$$a^3 + b^3 = (5 + 2\sqrt{6})^3 + (5 - 2\sqrt{6})^3 = 970$$

43. (b)

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

Then,

The value of

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

44. (b)

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

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

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

$$= 100 - 12 = 88$$

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

45. (a)

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

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

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

$$= 2(0) = 0$$

46. (a)

$$a + b + c = 5$$

$$ab + bc + ca = 7$$

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

$$= 25 - 14 = 11$$

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

$$= 5[11 - 7] = 20$$

47. (c)

$$p = \frac{\sqrt{2}+1}{\sqrt{2}-1}, q = \frac{\sqrt{2}-1}{\sqrt{2}+1}$$

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

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

$$\Rightarrow p = \frac{1}{q}$$

$$\Rightarrow q = 3 - 2\sqrt{2}$$

$$\Rightarrow \frac{p^2}{q} + \frac{q^2}{p} = \frac{p^3 + q^3}{pq}$$

$$= \frac{(p+q)(p^2 + q^2 - pq)}{pq} = \frac{6 \times 33}{1}$$

$$= 198$$

48. (a)

$$a + b + c = 12,$$

$$a^2 + b^2 + c^2 = 50,$$

$$\Rightarrow (a + b + c)^2$$

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

$$\Rightarrow 144 = 50 + 2(ab + bc + ca)$$

$$\Rightarrow ab + bc + ca = 47$$

$$\Rightarrow a^3 + b^3 + c^3 - 3abc$$

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

$$= 12[50 - 47]$$

$$= 12 \times 3 = 36$$

49. (b)

$$a^3 + b^3 + c^3 - 3abc = 405,$$

$$a + b + c = 15$$

$$\Rightarrow a^3 + b^3 + c^3 - 3abc$$

$$= (a + b + c) \times \frac{1}{2} [(a - b)^2 + (b - c)^2 + (c - a)^2]$$

$$\Rightarrow 405 = \frac{15}{2} \times [(a - b)^2 + (b - c)^2 + (c - a)^2]$$

$$\Rightarrow \frac{810}{15} = (a - b)^2 + (b - c)^2 + (c - a)^2$$

$$\therefore (a - b)^2 + (b - c)^2 + (c - a)^2 = 54$$

50. (a)

$$\Rightarrow 7a - \frac{7}{a} = -4$$

$$\Rightarrow a - \frac{1}{a} = -\frac{4}{7}$$

$$\Rightarrow a^3 - \frac{1}{a^3} = \frac{-64}{343} - \frac{12}{7} = \frac{-652}{343}$$

$$\Rightarrow a^3 - \frac{1}{a^3} - 1$$

$$\Rightarrow \frac{-652}{343} - 1 = \frac{-995}{343}$$

51. (c)

Given,

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

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

According to question,

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

$$= 25[625 - 60]$$

$$= 25 \times 565$$

$$= 14125$$

52. (b)

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

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

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

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

$$= 1364$$

53. (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,

$$ab = 9x = 81$$

54. (c)

We know that,

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

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

$$96 = 24ab$$

$$ab = 4$$

55. (c)

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

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

56. (c)

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

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

57. (d)

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

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

58. (b)

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

By value putting

$$a = 8$$

$$b = 3$$

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

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

59. (a)

$$\frac{A}{L} + \frac{M}{B} = 1$$

Let,

$$\frac{A}{L} = x, \quad \frac{B}{M} = y, \quad \frac{C}{N} = z$$

Then,

$$x + \frac{1}{y} = 1, \quad y + \frac{1}{z} = 1$$

$$\text{Let, } x = \frac{1}{2}, \quad z = -1$$

$$y = 2$$

$$\therefore \frac{L}{A} + \frac{C}{N} = \frac{1}{x} + z = 2 - 1 = 1$$

60. (a)

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

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

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

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

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

$$= 2 \times 52 = 104$$

61. (a)

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

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

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

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

62. (c)

Given,

$$a + b + c = 7,$$

$$ab + bc + ca = 11,$$

$$abc = -1,$$

according to question,

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

$$\Rightarrow 49 = a^2 + b^2 + c^2 + 2 \times 11$$

$$\Rightarrow a^2 + b^2 + c^2 = 27$$

$$\Rightarrow a^3 + b^3 + c^3 - 3abc = (a + b + c)$$

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

$$\Rightarrow a^3 + b^3 + c^3 - 3 \times -1 = 7(27 - 11)$$

$$\Rightarrow a^3 + b^3 + c^3 = 112 - 3 = 109$$

63. (c)

Given,

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

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

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

$$= 3 \times 1 = 3$$

64. (d)

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

$$= \frac{(a + b - c)}{2} [3(a^2 + b^2 + c^2) - (a + b - c)^2]$$

$$= \frac{20}{2} [3 \times 152 - 400]$$

$$= 10 \times (456 - 400)$$

$$= 560$$

65. (a)

We know that

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

$$= \frac{(a+b+c)}{2} [(a-b)^2 + (b-c)^2 + (c-a)^2]$$

$$\Rightarrow 405 = \frac{(a+b+c)}{2} [54]$$

$$\Rightarrow (a + b + c) = \frac{405}{27} = 15$$

66. (c)

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

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

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

67. (c)

$$a = 335, b = 215, c = 180$$

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

$$= \frac{(a+b+c)}{2} [(a-b)^2 + (b-c)^2 + (c-a)^2]$$

$$= \frac{730}{2} \times [(120)^2 + (35)^2 + (155)^2]$$

$$= 365[14400 + 1225 + 24025]$$

$$= 365 \times [39650]$$

$$= 14472250$$

68. (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,

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

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

69. (c)

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

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

Now,

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

70. (d)

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

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

$$ab + bc + ca = ?$$

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

$$ab + bc + ca = 69$$

71. (d)

Let,

$$c = 0$$

$$a + b = 17$$

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

then,

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

$$= (289 + 115)$$

$$= 404$$

72. (a)

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

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

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

73. (a)

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

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

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

74. (c)

$$a^2 + b^2 + c^2 + 96 = 2(4a + 4b - 8c)$$

$$a^2 + b^2 + c^2 - 2(4a + 4b - 8c) + 96$$

$$(a - 4)^2 + (b - 4)^2 + (c + 8)^2 = 0$$

$$a = 4, b = 4, c = -8$$

$$\sqrt{ab - bc + ca} = \sqrt{16 + 32 - 32} = 4$$

75. (c)

Let,

$$x = y = z = 1$$

Then,

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

76. (c)

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

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

Then,

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

&

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

$$\text{The value of } (x - y)^2 + x^2 + y^2 = (344 + 414) = 758$$

77. (a)

Let,

$$c = 0$$

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

Then,

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

78. (c)

$$a^2 + b^2 + c^2 - ab - bc - ca = \frac{1}{2} (a - b)^2 + (b - c)^2 +$$

$$(c - a)^2$$

$$= \frac{1}{2} (97.5 - 100)^2 + (100 - 102.5)^2 + (102.5 - 97.5)^2$$

$$= \frac{1}{2} (-2.5)^2 + (-2.5)^2 + (5)^2$$

$$= \frac{1}{2} (6.25 + 6.25 + 25)$$

$$= \frac{75}{4}$$

79. (a)

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

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

Then the value of

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

80. (b)

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

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

Then,

The value of

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

81. (a)

$$(a+b+c) \left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c} \right) = 30 \times 20$$

$$a \left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c} \right) + b \left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c} \right) + c \left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c} \right) = 600$$

$$1 + \frac{a}{b} + \frac{a}{c} + \frac{b}{a} + 1 + \frac{b}{c} + \frac{c}{a} + \frac{c}{b} + 1 = 600$$

$$3 + \frac{a}{b} + \frac{a}{c} + \frac{b}{a} + \frac{b}{c} + \frac{c}{a} + \frac{c}{b} = 600$$

$$\frac{a}{b} + \frac{b}{a} + \frac{a}{c} + \frac{c}{a} + \frac{b}{c} + \frac{c}{b} = 597$$

82. (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

$$= \frac{x^3 + y^3 + z^3 - 3xyz}{x+y-z}$$

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

$$\frac{\frac{1}{2} [(999+1000+1001)(999+1000)^2 + (1000-1001)^2 + (1001-999)^2]}{999+1001-1000} = 9$$

83. (d)
 Given that,

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

ATQ,

$$a + b + c = 0$$

Then,

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

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

$$= 0 + 3 = 3$$

84. (d)

$$= \frac{(a+b+c) \frac{1}{2} [(a-b)^2 + (b-c)^2 + (c-a)^2]}{(a-b)^2 + (b-c)^2 + (c-a)^2}$$

$$= \frac{25+15-10}{2} = 15$$

85. (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

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

86. (a)

Let,

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

Then,

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

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

87. (d)

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

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

88. (c)

Let,

$$c = 0$$

$$a+b = 1$$

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

Then,

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

$$ab = -1$$

The value of

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

89. (d)

$$(3x^3 + 5x^2y + 12xy^2 + 7y^3)$$

$$\Rightarrow x = -4$$

$$\Rightarrow y = -1$$

$$= 3(-4)^3 + 5(-4)^2(-1) + 12(-4)(-1)^2 + 7(-1)^3$$

$$= -192 - 80 - 48 - 7 = -327$$

90. (d)

$$64x^3 + 38x^2y + 20xy^2 + y^3$$

$$\Rightarrow x = 3, y = -4$$

$$64(3)^3 + 38(3)^2(-4) + 20(3)(-4)^2 + (-4)^3$$

$$= 1728 - 1368 + 960 - 64$$

$$= 1256$$

91. (d)

According to question,

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

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

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

$$= 64$$

92. (a)

$$27x^3 - 58x^2y + 31xy^2 - 8y^3$$

$$\Rightarrow x = -5, y = -7$$

$$= 27(-5)^3 - 58(-5)^2(-7) + 31(-5)(-7)^2 - 8(-7)^3$$

$$= -3375 + 10,150 - 7595 + 2744 = 1924$$

93. (c)

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

$$1 + (5 \times -7)(55)$$

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

$$1 - 1925$$

$$= -1924$$

94. (c)

$$x + 3y = 6,$$

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

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

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

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

95. (c)

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

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

The value of

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

96. (a)

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

Then the value of

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

Or

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

97. (a)

Given that,

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

The minimum value of the expression

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

98. (a)

$$2x + 3y = 15$$

Let,

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

Then,

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

99. (d)

Given that

$$a + b = 3$$

Let,

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

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

100. (b)

Given that,

$$2x + y = 10$$

Let,

$$x = 2, y = 6$$

Then,

The value of

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

101. (c)

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

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

using comp. and divid.

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

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

102. (b)

$$\frac{l^2 - m^2}{(l + m)^2} = ? \quad \text{If } l + m \neq 0$$

$$\frac{l^2 - m^2}{(l + m)^2} = \frac{(l - m)(l + m)}{(l + m)^2}$$

$$= \frac{(l - m)}{(l + m)}$$

103. (a)

ATQ,

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

$$\text{Or } \left(2 - \frac{5}{a}\right) - \left(4 - \frac{5}{b}\right) + \left(6 + \frac{5}{c}\right) = 0$$

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

$$= -5\left(\frac{1}{a} - \frac{1}{b} - \frac{1}{c}\right) = -4$$

$$= \frac{1}{a} - \frac{1}{b} - \frac{1}{c} = \frac{4}{5}$$

104. (a)

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

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

105. (b)

$$x^2 - 15x + 1 = 0$$

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

$$\Rightarrow x^2 + \frac{1}{x^2} = 225 - 2 = 223$$

$$\Rightarrow x^4 + 1 = 223x^2$$

$$\Rightarrow x^4 - 223x^2 + 1 = 0$$

$$\Rightarrow x^4 - 223x^2 = -1$$

According to question,

$$= \frac{x^4 - 223x^2 + 6}{x^2}$$

$$= -1 + 6 = 5$$

106. (a)

$$p + q + r = pqr$$

$$\frac{1}{p} + \frac{1}{q} + \frac{1}{r} = 1$$

$$pq + qr + rp = pqr$$

$$\Rightarrow (p + q + r)^2 = p^2 + q^2 + r^2 + 2(pq + qr + rp)$$

$$\Rightarrow 1 = p^2 + q^2 + r^2 + 2 \times 1$$

$$\Rightarrow p^2 + q^2 + r^2 = -1$$

$$\Rightarrow p^3 + q^3 + r^3 - 3pqr = (p + q + r) [(p^2 + q^2 + r^2) - (pq + qr + rp)]$$

$$\Rightarrow p^3 + q^3 + r^3 - 3 \times 1 = 1 [-1 - 1]$$

$$\Rightarrow p^3 + q^3 + r^3 - 3 = -2$$

$$= p^3 + q^3 + r^3 = +1$$

107. (b)

$$(p + q + r) = 0$$

$$\text{Put } p = 1, q = 1, r = -2$$

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

$$\Rightarrow \frac{1}{3} + \frac{1}{3} + \frac{4}{3}$$

$$= \frac{6}{3} = 2$$

108. (a)

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

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

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

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

109. (b)

$$x = (\sqrt{6}-1)^{\frac{1}{3}},$$

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

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

$$\frac{1}{x^3} = \frac{1}{\sqrt{6}-1} = \frac{\sqrt{6}+1}{5}$$

$$x^3 - \frac{1}{x^3} = \sqrt{6} - 1 - \frac{(\sqrt{6}+1)}{5}$$

$$= \frac{5\sqrt{6} - 5 - \sqrt{6} - 1}{5}$$

$$= \frac{4\sqrt{6} - 6}{5}$$

110. (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,

$$x^8 - 14159x^4 + 11 = -1 + 11 = 10$$

111. (b)

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

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

112. (b)

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

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

113.(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,

$$u - v + v - w + w - u = 0$$

$$\text{So, } (u-v)^3 + (v-w)^3 + (w-u)^3$$

$$= 3(u-v)(v-w)(w-u)$$

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

$$= \frac{1}{(u+v)(v+w)(w+u)}$$

114.(c)

$$x^2 - \sqrt{9.76}x + 1 = 0, \quad x > 1,$$

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

$$x^2 + 1 = \sqrt{9.76}x$$

$$x + \frac{1}{x} = \sqrt{9.76}$$

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

$$= \sqrt{9.76 - 4}$$

$$= \sqrt{5.76} = 2.4$$

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

$$= (2.4)^3 + 3 \times 2.4$$

$$= 13.824 + 7.2 = 21.024$$

115.(b)

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

Value of $x = 1$

by option

Option (ii)

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

116. (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

$$y^2 + 18y + 81 = 81$$

$$\text{Required answer} = 81 = 3^4$$

117. (d)

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 ($a = 300$)

$$(90000 + 900 + 1) = 90901$$

118. (a)

Given that,

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

ATQ,

Value of the expression

$$(600)^2 + 3(600) + 1 = (360000 + 1800 + 1)$$

$$= 361801$$

119. (c)

Given that,

$$abc = 1$$

Then,

Find the value of

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

$$= \frac{123}{1+a+ab} + \frac{123}{1+b+\frac{1}{a}} + \frac{123}{1+c+\frac{1}{b}}$$

$$= \frac{123}{1+a+ab} + \frac{123 \times a}{a+ab+1} + \frac{123}{1+\frac{1}{ab}+\frac{1}{b}}$$

$$= \frac{123}{1+a+ab} + \frac{123 \times a}{a+ab+1} + \frac{123 \times ab}{a+ab+1}$$

$$= 123 \times \frac{1+a+ab}{1+a+ab} = 123$$