

ALGEBRA

बीजगणित

Previous Year Questions 2017-2020

(SSC CPO-2020)

1. If $a^2 + b^2 + c^2 = 12(a + b - 2c)$, then $\sqrt{ab - bc + ca}$ is:

यदि $a^2 + b^2 + c^2 = 12(a + b - 2c)$ है तो $\sqrt{ab - bc + ca}$ का मान ज्ञात करें।

- (A) 6 (B) 4
(C) 3 (D) 8

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

यदि $(5\sqrt{5}x^3 - 3\sqrt{3}y^3) \div (\sqrt{5}x - \sqrt{3}y) = (Ax^2 + By^2 + Cxy)$ हैं, तो $(3A + B - \sqrt{15}C)$ का मान ज्ञात करें।

- (A) 3 (B) 12
(C) 8 (D) 5

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

यदि $x^1 + x^{-1} = 194$, $x > 0$ हैं, तो $x + \frac{1}{x}$ का मान ज्ञात करें।

- (A) 4 (B) 14
(C) 6 (D) 8

4. If $x^2 + 8y^2 - 12y - 4xy + 9 = 0$, then the value of $(7x - 8y)$ is:

यदि $x^2 + 8y^2 - 12y - 4xy + 9 = 0$ है, तो $(7x - 8y)$ का मान ज्ञात करें।

- (A) 9 (B) 5
(C) 12 (D) 21

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

यदि $x^2 - 5x + 1 = 0$ है तो $\left(x^1 + \frac{1}{x^2}\right) \div (x^2 + 1)$ का मान ज्ञात करें-

- (A) 21 (B) 25
(C) 24 (D) 22

6. If $x + y + z = 19$, $xyz = 216$ and $xy + yz + zx = 114$, then the value of $x^3 + y^3 + z^3 + xyz$ is:

यदि $x + y + z = 19$, $xyz = 216$ और $xy + yz + zx = 114$ है तो $x^3 + y^3 + z^3 + xyz$ का मान ज्ञात करें-

- (A) 1441 (B) 361
(C) 1225 (D) 577

7. If $x^2 - 3x + 1 = 0$, then the value of

$\left(x^4 + \frac{1}{x^2}\right) \div (x^2 + 1)$ is:

यदि $x^2 - 3x + 1 = 0$, है, तो $\left(x^4 + \frac{1}{x^2}\right) \div (x^2 + 1)$ का मान ज्ञात करें?

- (A) 5 (B) 6
(C) 7 (D) 9

8. If $x + y + z = 17$, $xyz = 171$ and $xy + yz + zx = 111$, then the value of $\sqrt[3]{(x^3 + y^3 + z^3 + xyz)}$ is:

यदि $x + y + z = 17$, $xyz = 171$ और $xy + yz + zx = 111$ है, तो $\sqrt[3]{(x^3 + y^3 + z^3 + xyz)}$ का मान ज्ञात करें?

- (A) -64 (B) 0
(C) 4 (D) -4

9. If $x^2 + 8y^2 + 12y - 4xy + 9 = 0$, then the value of $(7x + 8y)$ is:

यदि $x^2 + 8y^2 + 12y - 4xy + 9 = 0$ है, तो $(7x + 8y)$ का मान ज्ञात करें?

- (A) -33 (B) 9
(C) 33 (D) -9

10. If $x + y + z = 13$, $x^2 + y^2 + z^2 = 133$ and $x^3 + y^3 + z^3 = 847$, then the value of $\sqrt[3]{xyz}$ is:

यदि $x + y + z = 13$, $x^2 + y^2 + z^2 = 133$ और $x^3 + y^3 + z^3 = 847$ है, तो $\sqrt[3]{xyz}$ का मान ज्ञात करें।

- (A) 8 (B) 7
(C) -9 (D) -6

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11. If $a^3 + b^3 = 217$ and $a + b = 17$, then the value of ab is :
 यदि $a^3 + b^3 = 217$ और $a + b = 17$ है, तो ab का मान ज्ञात करें।
 (A) -6 (B) -1
 (C) 7 (D) 6
12. If $a^2 + b^2 + c^2 + 84 = 4(a - 2b + 4c)$, then $\sqrt{ab - bc + ca}$ is equal to :
 यदि $a^2 + b^2 + c^2 + 84 = 4(a - 2b + 4c)$ है, तो $\sqrt{ab - bc + ca}$ का मान ज्ञात करें।
 (A) $4\sqrt{10}$ (B) $\sqrt{10}$
 (C) $5\sqrt{10}$ (D) $2\sqrt{10}$
13. If $x + y + z = 19$, $x^2 + y^2 + z^2 = 133$ and $xz = y^2$, $x > z > 0$, what is the value of $(x - z)$?
 यदि $x + y + z = 19$, $x^2 + y^2 + z^2 = 133$ और $xz = y^2$, $x > z > 0$ हैं, तो $(x - z)$ का मान ज्ञात करें।
 (A) 0 (B) 5 (C) -2 (D) -5
14. If $(5\sqrt{5}x^3 - 3\sqrt{3}y^3) \div (\sqrt{5}x - \sqrt{3}y) = (Ax^2 + By^2 + Cxy)$ then what is the value of $(3A - 3B - \sqrt{15}C)$?
 यदि $(5\sqrt{5}x^3 - 3\sqrt{3}y^3) \div (\sqrt{5}x - \sqrt{3}y) = (Ax^2 + By^2 + Cxy)$ हैं, तो $(3A - 3B - \sqrt{15}C)$ का मान ज्ञात करें।
 (A) 12 (B) 8
 (C) -3 (D) -5
15. If $x^4 + x^{-4} = 194$, $x > 0$, then what is the value of $x + \frac{1}{x} + 2$?
 यदि $x^4 + x^{-4} = 194$, $x > 0$ है, तो $x + \frac{1}{x} + 2$ का मान ज्ञात करें।
 (A) 6 (B) 8
 (C) 4 (D) 14
16. If $a^2 + b^2 = 82$ and $ab = 9$, then a possible value of $a^3 + b^3$ is:
 यदि $a^2 + b^2 = 82$ और $ab = 9$ हैं, तो का संभाव्य मान ज्ञात करें।
 (A) 720 (B) 830
 (C) 750 (D) 730
17. If $x + y + z = 19$, $xyz = 216$ and $xy + yz + zx = 114$, then the value of $\sqrt{x^3 + y^3 + z^3 + xyz}$ is:
 यदि $x + y + z = 19$, $xyz = 216$ और $xy + yz + zx = 114$ है तो $\sqrt{x^3 + y^3 + z^3 + xyz}$ का मान ज्ञात करें।
 (A) 32 (B) 28
 (C) 30 (D) 35
18. If $a + b + c$ then the value of $\frac{a^2}{bc} + \frac{b^2}{ca} + \frac{c^2}{ab}$ is:
 यदि $a + b + c$ है तो $\frac{a^2}{bc} + \frac{b^2}{ca} + \frac{c^2}{ab}$ का मान ज्ञात करें।
 (A) 0 (B) 3
 (C) 1 (D) -1

Solution

1. (A) $a^2 + b^2 + c^2 + 216 = 12(a + b - 2c)$
 $a^2 + b^2 + c^2 - 12a - 12b + 24c + 216 = 0$
 $(a^2 - 12a + 36) + (b^2 - 12b + 36) + (c^2 + 24c + 144) = 0$
 $(a - 6)^2 + (b - 6)^2 + (c + 12)^2 = 0$
 $a = 6$
 $b = 6$
 $c = -12$
 $\sqrt{ab - bc + ca}$
 $\sqrt{6 \times 6 - 6 \times (-12) + (-12) \times 6}$
 $\sqrt{36 + 72 - 72}$
 $= 6$

2. (A) $(5\sqrt{5}x^3 - 3\sqrt{3}y^3) \div (\sqrt{5}x - \sqrt{3}y)$
 $= Ax^2 + By^2 + cxy$
 $\frac{5\sqrt{5}x^3 - 3\sqrt{3}y^3}{\sqrt{5}x - \sqrt{3}y} = \frac{(\sqrt{5}x)^3 - (\sqrt{3}y)^3}{\sqrt{5}x - \sqrt{3}y}$
 $\frac{(\sqrt{5}x - \sqrt{3}y)(5x^2 + 3y^2 + \sqrt{15}xy)}{\sqrt{5}x - \sqrt{3}y}$
 $A = 5; B = 3; C = \sqrt{15}$
 $3A + B - \sqrt{15}C$
 $3 \times 5 + 3 - \sqrt{15} \times \sqrt{15}$
 $15 + 3 - 15 = 3$

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3. (A) $x^4 + \frac{1}{x^4} = 194 \Rightarrow x^4 + \frac{1}{x^4} + 2 = 194 + 2$

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

$$x^2 + \frac{1}{x^2} = 14 \Rightarrow x + \frac{1}{x} = 4$$

4. (A) $x^2 + 8y^2 - 12y - 4xy + 9 = 0$
 $(x^2 + 4y^2 - 4xy) + (4y^2 - 12y + 9)$
 $(x - 2y)^2 + (2y - 3)^2 = 0$
 $x - 2y = 0; \quad 2y - 3 = 0$

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

$$x = 2y$$

$$x = 3$$

5. (D) $x^2 - 5x + 1 = 0$

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

$$\frac{x \left[x^3 + \frac{1}{x^3} \right]}{x \left[x + \frac{1}{x} \right]} = \frac{125 - 15}{5}$$

$$= \frac{110}{5} = 22$$

6. (C) $x^2 + y^2 + z^2 = 361 - 2 \times 114$
 $= 361 - 228$
 $= 133$

$$x^3 + y^3 + z^3 + 3xyz = (x + y + z)[x^2 + y^2 + z^2 - (xy + yz + zx)] + 4xyz$$

$$= 19[133 - (114)] + 4 \times 216$$

$$= 361 + 864$$

$$= 1225$$

7. (B) $x^2 - 3x + 1 = 0$

$$\Rightarrow x + \frac{1}{x} = 3 \quad \dots (1)$$

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

$$\Rightarrow x^6 + 1 = 18x^3$$

$$\text{and } x^2 + 1 = 3x$$

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

$$\Rightarrow \frac{x^6 + 1}{x^3} \times \frac{1}{x^2 + 1} = \frac{18x^3}{x^2} \times \frac{1}{3x}$$

$$= \frac{18x^3}{3x^3} = 6$$

8. (D) $x + y + z = 17$

$$xyz = 171$$

$$xy + yz + zx = 111$$

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

$$= 17(289 - 333)$$

$$= 17(-44)$$

$$= -748$$

$$\therefore 4xyz = 684$$

$$\therefore \sqrt[3]{x^3 + y^3 + z^3 + xyz} = \sqrt[3]{-748 + 684}$$

$$= \sqrt[3]{-64}$$

$$= -4$$

9. (A) $x^2 + 8y^2 + 12y - 4xy + 9 = 0$

$$x^2 - 4xy + 4y^2 + y^2 - 12y + 9 = 0$$

$$(x - 2y)^2 + (2y - 3)^2 = 0$$

$$x = 2y$$

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

$$\therefore 7x + 8y$$

$$14y + 8y = 22y$$

$$= 22\left(\frac{-3}{2}\right)$$

$$= -33$$

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

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

$$133 + 2(xy + yz + zx) = 169$$

$$xy + yz + zx = 18$$

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

$$847 - 3xyz = 13[133 - 18]$$

$$847 - 1495 = 3xyz$$

$$3xyz = -648$$

$$xyz = -216$$

$$\sqrt[3]{xyz} = -6$$

11. (D) $a^3 + b^3 = 217$

$$a + b = 7$$

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

$$217 = 343 - 21ab$$

$$21ab = 126$$

$$ab = 6$$

12. (D) $a^2 + b^2 + c^2 + 84 = 49 - 86 + 16c$

$$a^2 + 4a + 4 + b^2 + 8b + 16 + c^2 - 16c + 64 = 0$$

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

$$a = 2, b = -4, c = 8$$

$$\sqrt{ab - bc + ca} = \sqrt{-8 + 32 + 16}$$

$$= \sqrt{40}$$

$$= 2\sqrt{10}$$

13.(B) $x + y + z = 19$
 $x^2 + y^2 + z^2 = 113$
 $xy = y^2, \quad x > z$
 Put $x = 9, y = 6, z = 4$
 $\therefore (x - z) = (9 - 4) = 5$

14.(C) $\frac{(\sqrt{5x})^3 - (\sqrt{3y})^3}{\sqrt{5x} - \sqrt{3y}} = Ax^2 + By^2 + cxy$
 $\Rightarrow \frac{(\sqrt{5x} - \sqrt{3y})(5x^2 + 3y^2 + \sqrt{5} \times \sqrt{3}xy)}{\sqrt{5x} - \sqrt{3y}}$

by comparison:

$A = 5 \quad \therefore 3A - B - \sqrt{15}C$
 $B = 3 \quad = 15 - 3 - 15$
 $C = \sqrt{15} \quad = -3$

15.(A) $x^4 + \frac{1}{x^4} = 194$

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

$\Rightarrow x + \frac{1}{x} + 2 = 4 + 2 = 6$

16. (D) $a^2 + b^2 = 82$
 $ab = 9, (a + b)^2 = 82 + 18 = 100, (a + b) = 10$
 $a^3 + b^3 = a + b (a^2 + b^2 - ab)$
 $= 10(82 - 9)$
 $= 730$

17. (D) $x + y + z = 19$
 $xyz = 216$
 $xy + yz + zx = 114$
 $\therefore x^3 + y^3 + z^3 - 3xyz = (x + y + z) [(x + y + z)^2 - 3(xy + yz + zx)]$
 $= 19 [(19)^2 - 3 \times 114]$
 $= 19[19]$
 $\Rightarrow \sqrt{x^3 + y^3 + z^3 + xyz} = \sqrt{361 + (4 \times 216)}$
 $= \sqrt{1225} = 35$

18. (B) $a + b + c = 0, \frac{a^2}{bc} + \frac{b^2}{ac} + \frac{c^2}{ab}$

Put

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

$\frac{(2)^2}{1} - \frac{1}{2} - \frac{1}{2} \Rightarrow 4 - 1 = 3$

1. What is the simplified value of :

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

$$\frac{1}{8} \left\{ \left(x + \frac{1}{y} \right)^2 - \left(x - \frac{1}{y} \right)^2 \right\} \text{ को सरल कीजिए ?}$$

(A) $\frac{x}{2y}$ (B) $\frac{x}{y}$ (C) $\frac{4x}{y}$ (D) $\frac{2x}{y}$

2. $(4x^3y - 6x^2y^2 + 4xy^3 - y^4)$ can be expressed as :
 $(4x^3y - 6x^2y^2 + 4xy^3 - y^4)$ को निम्न रूप से व्यक्त किया जा सकता है :

(A) $(x-y)^1 - x^1$ (B) $(x+y)^4 - y^4$
 (C) $(x+y)^1 - x^1$ (D) $x^1 - (x-y)^1$

3. If $0 \leq \theta \leq 90^\circ$, and $\sec^{107} \theta + \cos^{107} \theta = 2$, then $(\sec \theta + \cos \theta)$ is equal to :
 यदि $0 \leq \theta \leq 90^\circ$, और $\sec^{107} \theta + \cos^{107} \theta = 2$ है, तो $(\sec \theta + \cos \theta)$ का मान ज्ञात कीजिए ।

(A) 2^{-107} (B) 1

(C) 2 (D) $\frac{1}{2}$

4. $(320 + 342 + 530 + 915) + (20 + 22 - x + 18) = 43$, then the value of x is :
 यदि $(320 + 342 + 530 + 915) + (20 + 22 - x + 18) = 43$ है, तो x का मान क्या होगा ?

(A) 11 (B) 23
 (C) 26 (D) 15

5. If $x^4 + x^2y^2 + y^4 = 21$ and $x^2 + xy + y^2 = 3$, then what is the value of $4xy$?
 यदि $x^4 + x^2y^2 + y^4 = 21$ और $x^2 + xy + y^2 = 3$ है, तो $4xy$ का मान क्या होगा ?

(A) 12 (B) 4
 (C) -8 (D) -4

6. If $x^2 - \sqrt{7}x + 1 = 0$, then $(x^3 + x^{-3}) = ?$

यदि $x^2 - \sqrt{7}x + 1 = 0$ है, तो $(x^3 + x^{-3}) = ?$

(A) $10\sqrt{7}$ (B) $4\sqrt{7}$
 (C) $7\sqrt{7}$ (D) $3\sqrt{7}$

7. If $x + y + z = 10$, $xy + yz + zx = 25$ and $xyz = 100$, then what is the value of $(x^3 + y^3 + z^3)$?

यदि $x + y + z = 10$, $xy + yz + zx = 25$ और $xyz = 100$ है, तो $(x^3 + y^3 + z^3)$ का मान क्या होगा ?

(A) 450 (B) 540
 (C) 550 (D) 570

8. If $x + y + z = 1$, $xy + yz + zx = -26$ and $x^3 + y^3 + z^3 = 151$, then what will be the value of xyz ?

यदि $x + y + z = 1$, $xy + yz + zx = -26$ और $x^3 + y^3 + z^3 = 151$ है, तो xyz का मान ज्ञात कीजिये ?

(A) 24 (B) -30
 (C) -18 (D) 32

9. If $a + b + c = 6$ and $a^2 + b^2 + c^2 = 38$, then what is the value of $a(b^2 + c^2) + b(c^2 + a^2) + c(a^2 + b^2) + 3abc$?

यदि $a + b + c = 6$ और $a^2 + b^2 + c^2 = 38$ है, तो $(b^2 + c^2) + b(c^2 + a^2) + c(a^2 + b^2) + 3abc$ मान ज्ञात कीजिये ?

(A) 3 (B) -3
 (C) 6 (D) -6

10. If $(2x - 5y)^3 - (2x + 5y)^3 = y [Ax^2 + By^2]$, then what is the value of $(2A - B)$?

यदि $(2x - 5y)^3 - (2x + 5y)^3 = y [Ax^2 + By^2]$ है, तो $(2A - B)$ का मान ज्ञात कीजिये ?

(A) 25 (B) 40
 (C) 15 (D) 10

11. If $\sqrt{x} + \frac{1}{\sqrt{x}} = 3$, $x > 0$, then $x^2(x^2 - 47) = ?$

यदि $\sqrt{x} + \frac{1}{\sqrt{x}} = 3$, $x > 0$ है, तो $x^2(x^2 - 47) = ?$

(A) 0 (B) 2
 (C) -2 (D) -1

12. If x and y are real numbers, then the least possible value of $4(x - 2)^2 + (y - 3)^2 - 2(x - 3)^2$ is :

यदि x और y वास्तविक संख्याएँ हैं, तो $4(x - 2)^2 + (y - 3)^2 - 2(x - 3)^2$ का न्यूनतम संभव मान क्या होगा ?

(A) 3 (B) -4
 (C) 1 (D) -8

13. If $x = 5.51$, $y = 5.52$ and $z = 5.57$, then what is the value of $x^3 + y^3 + z^3 - 3xyz$?

यदि $x = 5.51$, $y = 5.52$ और $z = 5.57$ है, तो $x^3 + y^3 + z^3 - 3xyz$ का मान ज्ञात कीजिये।

- (A) 5.146 (B) 51.46
(C) 0.05146 (D) 0.5146

14. If $a = 500$, $b = 502$ and $c = 504$, then the value of $a^3 + b^3 + c^3 - 3abc$?

यदि $a = 500$, $b = 502$ and $c = 504$ है, तो $a^3 + b^3 + c^3 - 3abc$ का मान ज्ञात कीजिए।

- (A) 15060 (B) 12048
(C) 18072 (D) 17040

15. If $x^1 + x^2 y^2 + y = \frac{21}{256}$ and $x^2 + xy + y^2 = \frac{3}{16}$, then $2(x^2 + y^2) = ?$

यदि $x^1 + x^2 y^2 + y = \frac{21}{256}$ और $x^2 + xy + y^2 = \frac{3}{16}$, है, तो $2(x^2 + y^2) = ?$

- (A) $\frac{5}{16}$ (B) $\frac{5}{8}$ (C) $\frac{3}{8}$ (D) $\frac{3}{4}$

16. If $\frac{8x}{2x^2 + 7x - 2} = 1$, $x > 0$, then what is the value of $x^3 + \frac{1}{x^3}$?

- (A) $\frac{5\sqrt{17}}{8}$ (B) $\frac{5}{8}$ (C) $\frac{3}{8}$ (D) $\frac{3}{4}$

17. If $x^4 + x^{-4} = 2599$, then what will be the value of $x - x^{-1}$ where $x > 0$?

यदि $x^4 + x^{-4} = 2599$ है, तो $x - x^{-1}$ का एक मान क्या होगा, जहाँ $x > 0$ है ?

- (A) 5 (B) 8
(C) 7 (D) 9

18. If $a + b + c = 9$ and $ab + bc + ca = 18$, then the value of $a^3 + b^3 + c^3 - 3abc$ is:

यदि $a + b + c = 9$ और $ab + bc + ca = 18$ है, तो $a^3 + b^3 + c^3 - 3abc$ का मान ज्ञात कीजिए।

- (A) 243 (B) 244
(C) 234 (D) 254

19. If $a - b = 5$ and $a^2 + b^2 = 45$, then the value of ab is ?

यदि $a - b = 5$ और $a^2 + b^2 = 45$ है, तो ab का मान क्या होगा ?

- (A) 20 (B) 10
(C) 25 (D) 15

20. The value of $\frac{(0.321)^3 + (0.456)^3 - (0.777)^3}{0.9 \times (0.107)(0.76)(0.777)}$

का मान ज्ञात कीजिए ?

- (A) 60 (B) -6
(C) -3 (D) 30

21. If $x^2 - 4x + 1 = 0$, then what is the value of $(x^6 + x^{-6})$?

यदि $x^2 - 4x + 1 = 0$ हो, तो $(x^6 + x^{-6})$ का मान कीजिए ?

- (A) 2786 (B) 2702
(C) 2716 (D) 2744

22. if $\left(x^3 + \frac{1}{x^3} - k\right)^2 + \left(x + \frac{1}{x} - p\right)^2 = 0$, where k and p are real numbers and $x \neq 0$, then $\frac{k}{p}$ is equal to:

यदि $\left(x^3 + \frac{1}{x^3} - k\right)^2 + \left(x + \frac{1}{x} - p\right)^2 = 0$ है, जिसमें k और

p वास्तविक संख्याएँ हैं और $x \neq 0$ है, तो $\frac{k}{p}$ का मान क्या होगा ?

- (A) $p^2 + 1$ (B) $p^2 + 3$
(C) $p^2 - 1$ (D) $p^2 - 3$

23. If $x^4 + x^2 y^2 + y^4 = 133$ and $x^2 - xy + y^2 = 7$, then what is the value of xy ?

यदि $x^4 + x^2 y^2 + y^4 = 133$ और $x^2 - xy + y^2 = 7$ है, तो xy का मान ज्ञात कीजिए।

- (A) 8 (B) 12
(C) 4 (D) 6

24. If $a + b + c = 19$, $ab + bc + ca = 120$, then what is the value of $a^3 + b^3 + c^3 - 3abc$?

यदि $a + b + c = 19$, $ab + bc + ca = 120$ है, तो $a^3 + b^3 + c^3 - 3abc$ का मान ज्ञात कीजिए।

- (A) 18 (B) 23
(C) 31 (D) 19

25. Solve the following :

निम्नलिखित को हल करें :

$$(a + b + c)(ab + bc + ca) - abc = ?$$

- (A) $(a + b)(b + c)(c - a)$ (B) $(a + b)(b - c)(c + a)$
(C) $(a + b)(b + c)(c + a)$ (D) $(a - b)(b - c)(c - a)$

26. If $x^6 - 512y^6 = (x^2 + Ay^2)(x^4 - Bx^2y^2 + Cy^4)$, then what is the value of $(A + B - C)$?

यदि $x^6 - 512y^6 = (x^2 + Ay^2)(x^4 - Bx^2y^2 + Cy^4)$ है, तो $(A + B - C)$ का मान ज्ञात कीजिए।

- (A) -80 (B) -72
(C) 72 (D) 48

Solution

1. (A) As we know
 $(a + b)^2 - (a - b)^2 = 4ab$
 $\Rightarrow \frac{1}{8} \left\{ \left(x + \frac{1}{y} \right)^2 - \left(x - \frac{1}{y} \right)^2 \right\}$
 $= \frac{1}{8} \left\{ 4x \times \frac{1}{y} \right\} = \frac{4x}{8y} = \frac{x}{2y}$
2. (D) As we know,
 $(x + y)^4 = x^4 + 4x^3y + 6x^2y^2 + 4xy^3 + y^4$
 $(x - y)^4 = x^4 - 4x^3y + 6x^2y^2 - 4xy^3 + y^4$
 $-(x - y)^4 = -x^4 + 4x^3y - 6x^2y^2 + 4xy^3 - y^4$
 $\Rightarrow x^4 - (x - y)^4 = 4x^3y - 6x^2y^2 + 4xy^3 - y^4$
3. (C)
4. (A) $\left(\frac{2107}{60-x} \right) = 43$
 $49 = 60 - x$
 $\Rightarrow x = 11$
5. (C) As we know,
 $x^4 + x^2y^2 + y^4$
 $= (x^2 + xy + y^2)(x^2 - xy + y^2)$
 $\Rightarrow 21 = 3(x^2 - xy + y^2)$
 $\Rightarrow x^2 - xy + y^2 = 7$ (i)
 $x^2 + xy + y^2 = 3$ (ii)
 Eq. (i) & (ii) we get
 $\Rightarrow 2xy = 3 - 7$
 $\Rightarrow xy = -2$
 $\Rightarrow 4xy = 4(-2) = -8$
6. (B) $x^2 - \sqrt{7}x + 1 = 0$
 Divide equation by x
 $\Rightarrow x + \frac{1}{x} = \sqrt{7}$
 taking cube both sides
 $\Rightarrow x^3 + \frac{1}{x^3} + 3\left(x + \frac{1}{x}\right) = 7\sqrt{7}$
 $\Rightarrow x^3 + \frac{1}{x^3} = 7\sqrt{7} - 3\sqrt{7} = 4\sqrt{7}$
7. (C) As we know,
 $(x + y + z)^2 = x^2 + y^2 + z^2 + 2(xy + yz + zx)$
 $100 = x^2 + y^2 + z^2 + 2(25)$
 $\Rightarrow x^2 + y^2 + z^2 = 100 - 50 = 50$
 Also,
 $x^3 + y^3 + z^3 - 3xyz = (x + y + z)(x^2 + y^2 + z^2 - xy - yz - zx)$
 $\Rightarrow x^3 + y^3 + z^3 = 300 + 250 = 550$

8. (A) As we know,
 $(x + y + z)^2 = x^2 + y^2 + z^2 + 2(xy + yz + zx)$
 $1 = x^2 + y^2 + z^2 + 2(-26)$
 $\Rightarrow x^2 + y^2 + z^2 = 53$
 Also,
 $x^3 + y^3 + z^3 - 3xyz = (x + y + z)(x^2 + y^2 + z^2 - xy - yz - zx)$
 $151 - 3xyz = (1)(53 + 26)$
 $\Rightarrow 3xyz = 151 - 79$
 $3xyz = 72$
 $\Rightarrow xyz = 24$
9. (D) Put
 $A = 5$
 $B = 3$
 $C = -2$
 $\Rightarrow 5(9 + 4) + 3(4 + 25) + (-2)(25 + 9) + 3(5)(3)(-2)$
 $= 65 + 87 - 68 - 90$
 $= 6$
10. (D) $(a - b)^3 - (a + b)^3 = a^3 - b^3 - 3a^2b + 3b^2a - (a^3 + b^3 + 3a^2b + 3b^2a)$
 $= -2b^3 - 6a^2b$
 $= -2b(b^2 + 3a^2)$
 $\Rightarrow (2x - 5y)^3 - (2x + 5y)^3$
 $= -2(5y)(25y^2 + 3 \times 4x^2)$
 $= y(-250y^2 - 120x^2)$
 $= y(-120x^2 - 250y^2)$
 Comparing it with
 $y(Ax^2 + By^2)$
 $\Rightarrow A = -120 \quad B = -250$
 $\Rightarrow 2A - B = 2(-120) + 250$
 $= -240 + 250 = 10$
11. (D) $\sqrt{x} + \frac{1}{\sqrt{x}} = 3, \quad x > 0$
 $x + \frac{1}{x} = 7$
 $x^2 + \frac{1}{x^2} = 47$
 $x^2 - 47 = -\frac{1}{x^2}$
 $x^2(x^2 - 47) = -1$
12. (B) $4(x - 2)^2 + (y - 3)^2 - 2(x - 3)^2$
 y is not dependent on x so,
 $y - 3 = 0$
 $y = 3$
 $4(x - 2)^2 + 0 - 2(x - 3)^2$
 $2[2x^2 + 8 - 8x - x^2 - 9 + 6x]$
 $2[x^2 - 2x - 1]$
 $2[(x - 1)^2 - 2]$
 Minimum value of $(x - 1)^2 = 0$
 So, $2(0 - 2) = -4$

13. (C) $x = 5.51, y = 5.52, z = 5.57$

$$\begin{aligned} x^3 + y^3 + z^3 - 3xyz &= \frac{1}{2}(x + y + z) [(x-y)^2 + (y-z)^2 \\ &+ (z-x)^2] \\ &= \frac{1}{2} \times 16.6 [0.0001 + 0.0025 + 0.0036] \\ &= \frac{0.0062 \times 16.2}{2} \\ &= 0.05146 \end{aligned}$$

14. (C) $a^3 + b^3 + c^3 - 3abc = \frac{(a + b + c)}{2} [(a - b)^2 + (b - c)^2 + (c - a)^2]$
 here, $a = 500, b = 502, c = 504$
 $\Rightarrow \frac{(500 + 502 + 504)}{2} [4 + 4 + 16] \Rightarrow \frac{1506}{2} [24]$
 $\Rightarrow 753 \times 24 = 18072$

15. (B) As we know,
 $x^3 + x^2y^2 + y^3 = (x^2 + xy + y^2)(x^2 - xy + y^2)$

$$\frac{21}{256} = \frac{3}{16}(x^2 - xy + y^2)$$

$$\Rightarrow x^2 - xy + y^2 = \frac{7}{16} \quad \dots(i)$$

$$x^2 + xy + y^2 = \frac{3}{16} \quad \dots(ii)$$

Adding (i) and (ii)

$$\Rightarrow 2(x^2 + y^2) = \frac{10}{16} = \frac{5}{8}$$

16. (B) Divide numerator and denominator by x

$$\Rightarrow \frac{8}{2\left(x - \frac{1}{x}\right) + 7} = 1$$

$$\Rightarrow 8 = 2\left(x - \frac{1}{x}\right) + 7 \Rightarrow x - \frac{1}{x} = \frac{1}{2}$$

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

$$\Rightarrow \left(x + \frac{1}{x}\right)^2 = 4 + \frac{1}{4} = \frac{17}{4} \Rightarrow x + \frac{1}{x} = \frac{\sqrt{17}}{2}$$

taking cube both sides

$$\Rightarrow x^3 + \frac{1}{x^3} + \frac{3\sqrt{17}}{2} = \frac{17\sqrt{17}}{8}$$

$$\Rightarrow x^3 + \frac{1}{x^3} = \frac{5\sqrt{17}}{8}$$

17. (C) $x^4 + \frac{1}{x^4} = 2599, x - \frac{1}{x} = ?$

$$x^2 + \frac{1}{x^2} = 51$$

$$x - \frac{1}{x} = \sqrt{51 - 2}$$

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

18. (A) $a + b + c = 9$

$$ab + bc + ca = 18$$

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

$$81 = a^2 + b^2 + c^2 + 36$$

$$a^2 + b^2 + c^2 = 45$$

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

$$= 9(45 - 18)$$

$$= 9(27)$$

$$= 243$$

19. (B) $a - b = 5, a^2 + b^2 = 45$

$$a^2 + b^2 - 2ab = 25$$

$$45 - 25 = 2ab$$

$$ab = 20$$

$$ab = 10$$

20. (B) $\frac{(0.321)^3 + (0.456)^3 - (0.777)^3}{0.9 \times (0.107)(0.76)(0.777)}$

$$= \frac{10 \times [(0.321)^3 + (0.456)^3 - (0.777)^3]}{3 \times 0.3 \times 10(0.107)(0.76)(0.777)}$$

$$= \frac{10[(0.321)^3 + (0.456)^3 + (-0.777)^3]}{3 \times (0.321)(0.76)(0.777)}$$

$$= \frac{2 \times 10[(0.321)^3 + (0.456)^3 + (-0.777)^3]}{(3 \times 2 \times 0.76)(0.321)(0.777)}$$

$$= \frac{2 \times 10[(0.321)^3 + (0.456)^3 + (-0.777)^3]}{(0.456)(0.321)(0.777)}$$

Now, $0.321 + 0.456 - 0.777 = 0$

If $a + b + c = 0$

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

$$= \frac{-2 \times 10 \times 3(0.321)(0.456)(0.777)}{(0.321 \times 0.456 \times 0.777)}$$

$$= -60$$

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21. (B) $x^2 - 4x + 1 = 0$
 $x^2 + 1 = 4x$
 $x + \frac{1}{x} = 4, \quad x^6 + \frac{1}{x^6} = ?$
 $x^2 + \frac{1}{x^2} = 14 = m$
 $x^6 + \frac{1}{x^6} = m^3 - 3m$
 $= (14)^3 - 42 = 2744 - 42$
 $= 2702$

22. (D) $\left(x^3 + \frac{1}{x^3} - k\right)^2 + \left(x + \frac{1}{x} - P\right)^2 = 0$
 So, $x^3 + \frac{1}{x^3} - k = 0 \Rightarrow x^3 + \frac{1}{x^3} = k$
 $x + \frac{1}{x} - P = 0 \Rightarrow x + \frac{1}{x} = P$
 If $x + \frac{1}{x} = P, \Rightarrow x^3 + \frac{1}{x^3} = P^3 - 3P$
 $P^3 - 3P = K, \quad K = P(P^2 - 3)$
 $\frac{K}{P} = P^2 - 3$

23. (D) $x^2 - xy + y^2 = 7$
 After squaring of both sides
 $x^4 + x^2y^2 + y^2 - 2x^3y - 2xy^3 + 2x^2y^2 = 49$
 $133 - 2xy(x^2 - xy + y^2) = 49$
 $2xy(x^2 - xy + y^2) = 84$
 $2xy(7) = 84$
 $xy = 6$

24. (D) $a + b + c = 19, ab + bc + ca = 120$
 तो $a^3 + b^3 + c^3 - 3abc = ?$
 $(a + b + c)^2 = 361$
 $a^2 + b^2 + c^2 + 2[120] = 361$
 $a^2 + b^2 + c^2 = 121$
 Now, $a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - (ab + bc + ca))$
 $= 19 \times [121 - 120] = 19$

25. (C) Solve this :
 $(a + b + c)(ab + bc + ca) - abc$
 By value putting method
 $a = 1, b = 1, c = 1$
 So, $(1 + 1 + 1)(1 + 1 + 1) - 1$
 $\Rightarrow 3 \times 3 - 1 = 8$
 Now, we put the value in options
 A, B, D \rightarrow By value putting is 0
 and C is $2 \times 2 \times 2 = 8,$
 So, answer is (C)

26. (A) $x^6 - 512y^6 = (x^2 + Ay^2)(x^4 - Bx^2y^2 + cy^4)$
 So find = $A + B - C = ?$
 LHS, $x^6 - 512y^6 = [x^2 - (-8)y^2][(x^2)^2 - (8)x^2y^2 + 8^2y^2]$
 LHS = RHS with compare
 $A = -8, B = -8, C = 64$
 Now, $A + B + C = -8 - 8 + 64 = -80$

1. If $a^3 - b^3 = 208$ and $a - b = 4$, then $(a + b)^2 - ab$ is equal to:
यदि $a^3 - b^3 = 208$ तथा $a - b = 4$ हो, तो $(a + b)^2 - ab$ निम्नलिखित में से किसके बराबर होगा:
(A) 52 (B) 38
(C) 32 (D) 42
2. If $x + \frac{1}{x} = 5$, then $x^3 + \frac{1}{x^3}$ is equal to:
यदि $x + \frac{1}{x} = 5$, तो $x^3 + \frac{1}{x^3}$ निम्नलिखित में से किसके बराबर होगा:
(A) 110 (B) 130
(C) 145 (D) 125
3. If $(x-5)^3 + (x-6)^3 + (x-7)^3 = 3(x-5)(x-6)(x-7)$, then what is the value of x ?
यदि $(x-5)^3 + (x-6)^3 + (x-7)^3 = 3(x-5)(x-6)(x-7)$ हो, तो x का मान क्या होगा?
(A) 6 (B) 7
(C) 5 (D) 18
4. If $(2x+3)^3 + (x-8)^3 + (x+13)^3 = (2x+3)(3x-24)(x+13)$, then what is the value of x ?
यदि $(2x+3)^3 + (x-8)^3 + (x+13)^3 = (2x+3)(3x-24)(x+13)$ है, तो x का मान है—
(A) -1.5 (B) -2.5
(C) -2 (D) -1
5. If $a^3 + b^3 = 5824$ and $a + b = 28$ then $(a - b)^2 + ab$ is equal to:
यदि $a^3 + b^3 = 5824$ तथा $a + b = 28$ तो $(a - b)^2 + ab$
(A) 208 (B) 152
(C) 180 (D) 236
6. If $x - \frac{1}{x} = 6$, then $x^3 - \frac{1}{x^3}$ is equal to:
यदि $x - \frac{1}{x} = 6$ है तो $x^3 - \frac{1}{x^3}$ होगा—
(A) 216 (B) 176
(C) 234 (D) 198
7. If $a^3 - b^3 = 1603$ and $(a - b) = 7$, then $(a + b)^2 - ab$ is equal to:
यदि $a^3 - b^3 = 1603$ और $(a - b) = 7$ तो $(a + b)^2 - ab$ बराबर है —
(A) 458 (B) 338
(C) 229 (D) 64
8. If $(x + 4)^3 + (2x + 1)^3 + (2x + 5)^3 = (3x + 12)(2x + 1)(2x + 5)$, then what is the value of x ?
यदि $(x + 4)^3 + (2x + 1)^3 + (2x + 5)^3 = (3x + 12)(2x + 1)(2x + 5)$, तो x का मान क्या होगा?
(A) -3 (B) -2
(C) 2 (D) 3
9. If $x + \frac{1}{x} = 8$, then $x^2 + \frac{1}{x^2}$ is equal to:
यदि $x + \frac{1}{x} = 8$ तो $x^2 + \frac{1}{x^2}$ बराबर है —
(A) 62 (B) 68
(C) 64 (D) 66
10. If $x + \frac{1}{x} = 7$, then $x^3 + \frac{1}{x^3}$ is equal to :
यदि $x + \frac{1}{x} = 7$, तो $x^3 + \frac{1}{x^3}$ बराबर है:
(A) 364 (B) 385
(C) 343 (D) 322
11. If $a^3 - b^3 = 3552$ and $(a - b) = 6$, then $(a + b)^2 - ab$ is equal to:
यदि $a^3 - b^3 = 3552$ और $(a - b) = 6$ तो $(a + b)^2 - ab$ बराबर है—
(A) 618 (B) 636
(C) 592 (D) 568.
12. If $(x - 3)^2 + (2x - 5)^2 + (x - 4)^2 = (3x - 9)(2x - 5)(x - 4)$, then what is the value of x ?
यदि $(x - 3)^2 + (2x - 5)^2 + (x - 4)^2 = (3x - 9)(2x - 5)(x - 4)$ तो x का मान क्या होगा?
(A) 4 (B) 5
(C) 2 (D) 3

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13. यदि $(2x - 5)^3 + (x + 2)^3 + (3x - 9)^3 = (2x - 5)(3x - 9)(3x + 6)$ है, तो x का मान क्या होगा ?
 (A) 7 (B) 5
 (C) 2 (D) 18
14. If $x^2 + \frac{1}{x^2} = 11$, then $x - \frac{1}{x}$ is equal to—
 यदि $x^2 + \frac{1}{x^2} = 11$ है, तो $x - \frac{1}{x}$ का मान ज्ञात कीजिये ?
 (A) 2 (B) 3
 (C) 5 (D) 4
15. If $x - \frac{1}{x} = 4$, then $x^3 - \frac{1}{x^3}$ is equal to—
 यदि $x - \frac{1}{x} = 4$ है, तो $x^3 - \frac{1}{x^3}$ का मान ज्ञात कीजिये ?
 (A) 72 (B) 68
 (C) 76 (D) 64
16. If $ab + bc + ca = 8$ and $a + b + c = 12$, then $(a^2 + b^2 + c^2)$ is equal to—
 यदि $ab + bc + ca = 8$ और $a + b + c = 12$ है, तो $(a^2 + b^2 + c^2)$ का मान ज्ञात कीजिये ?
 (A) 160 (B) 144
 (C) 134 (D) 128
17. If $(2x - 5)^3 + (x - 4)^3 + (x - 11)^3 = 3(2x - 5)(x - 4)(x - 11)$, then find the value of x —
 यदि $(2x - 5)^3 + (x - 4)^3 + (x - 11)^3 = 3(2x - 5)(x - 4)(x - 11)$, तो x का मान क्या है ?
 (A) 3 (B) 5
 (C) 7 (D) 18
18. If $a^3 - b^3 = 416$ and $a - b = 8$, then find the value of $(a + b)^2 - ab$?
 यदि $a^3 - b^3 = 416$ तथा $a - b = 8$, तो $(a + b)^2 - ab$ का मान ज्ञात कीजिये ?
 (A) 52 (B) 42
 (C) 38 (D) 32
19. If $x + \frac{1}{x} = 4\sqrt{3}$, then find the value of $x^2 + \frac{1}{x^2}$?
 यदि $x + \frac{1}{x} = 4\sqrt{3}$, तो $x^2 + \frac{1}{x^2}$ मान क्या है ?
 (A) 46 (B) 44
 (C) 56 (D) 52
20. If $x + \frac{1}{x} = 2\sqrt{3}$, then $x^2 + \frac{1}{x^2}$ is equal to :
 यदि $x + \frac{1}{x} = 2\sqrt{3}$ है, तो $x^2 + \frac{1}{x^2}$ का मान ज्ञात कीजिये ?
 (A) 8 (B) 16
 (C) 10 (D) 12
21. If $(2x - 1)^3 + (3x - 4)^3 + (x - 7)^3 = (6x - 3)(3x - 4)(x - 7)$, then what is the value of x ?
 यदि $(2x - 1)^3 + (3x - 4)^3 + (x - 7)^3 = (6x - 3)(3x - 4)(x - 7)$ है, तो x का मान ज्ञात कीजिये ?
 (A) 5 (B) 8
 (C) 2 (D) 3
22. If $a^3 + b^3 = 416$ and $a + b = 16$, then $(a - b)^2 + ab$ is equal to :
 यदि $a^3 + b^3 = 416$ और $a + b = 16$ है, तो $(a - b)^2 + ab$ का मान ज्ञात कीजिये ?
 (A) 32 (B) 22
 (C) 24 (D) 26
23. If $(x - 6)^3 + (x - 4)^3 + (x - 5)^3 = (3x - 15)(x - 4)(x - 6)$, then find value of x ?
 यदि $(x - 6)^3 + (x - 4)^3 + (x - 5)^3 = (3x - 15)(x - 4)(x - 6)$ तो x का मान क्या होगा ?
 (A) 3 (B) 5
 (C) 7 (D) 18
24. If $a^3 - b^3 = 216$ and $a - b = 6$, then find value of $(a + b)^2 - ab$?
 यदि $a^3 - b^3 = 216$ तथा $a - b = 6$ तो $(a + b)^2 - ab$ का मान क्या होगा ?
 (A) 38 (B) 42
 (C) 52 (D) 36
25. If $x + \frac{1}{x} = 3\sqrt{2}$, then find value of $x^2 + \frac{1}{x^2}$?
 यदि $x + \frac{1}{x} = 3\sqrt{2}$ तो $x^2 + \frac{1}{x^2}$ का मान क्या होगा ?
 (A) 22 (B) 26
 (C) 16 (D) 14
26. यदि $(2x - 5)^3 + (x + 2)^3 + (3x - 9)^3 = (2x - 5)(3x - 9)(3x + 6)$ है, तो x का मान क्या होगा ?
 (A) 7 (B) 5
 (C) 2 (D) 18
27. यदि $a^3 - b^3 = 208$ तथा $a - b = 8$ तो $(a + b)^2 - ab$ बराबर है:
 (A) 42 (B) 52
 (C) 26 (D) 38

28. यदि $x - \frac{1}{x} = 3\sqrt{2}$ है, तो $x^2 + \frac{1}{x^2}$ बराबर है :

- (A) 56 (B) 52
(C) 20 (D) 46

29. If $x - \frac{1}{x} = 2\sqrt{2}$, then $x^2 + \frac{1}{x^2}$ is equal to :

यदि $x - \frac{1}{x} = 2\sqrt{2}$ है, तो $x^2 + \frac{1}{x^2}$ बराबर होगा।

- (A) 16 (B) 12
(C) 11 (D) 10

30. If $(x-2)^3 + (x-3)^3 + (x-10)^3 = (x-2)(x-3)(3x-30)$, then what is the value of x ?

यदि $(x-2)^3 + (x-3)^3 + (x-10)^3 = (x-2)(x-3)(3x-30)$ है, तो x का मान ज्ञात कीजिये ?

- (A) 7 (B) 5
(C) 18 (D) 3

31. If $a^3 + b^3 = 432$ and $a + b = 12$, then $(a+b)^2 - 3ab$ is equal to :

यदि $a^3 + b^3 = 432$ और $a + b = 12$ है, तो $(a+b)^2 - 3ab$ बराबर होगा।

- (A) 42 (B) 52
(C) 36 (D) 38

32. If $x^2 - 4x + a = 0$ root are equal, then a = _____

यदि $x^2 - 4x + a = 0$ के मूल बराबर हैं, तो a = _____ होगा।

- (A) -4 (B) 8
(C) -8 (D) 4

33. If $x + x^{-1} = 2$, then $x^3 + x^{-3}$

यदि $x + x^{-1} = 2$ है, तो $x^3 + x^{-3}$ है।

- (A) 1 (B) 3
(C) $\frac{1}{2}$ (D) 2

34. If $a + b - c = 7$, $ab - bc - ca = 21$, then $a^3 + b^3 - c^3 + 3abc = \dots\dots\dots$

यदि $a + b - c = 7$, $ab - bc - ca = 21$ है तो $a^3 + b^3 - c^3 + 3abc = \dots\dots\dots$ है।

- (A) 124 (B) 117
(C) -98 (D) 98

Solution

1. (A) $(a+b)^2 - ab = a^2 + b^2 + ab$
 $a^3 - b^3 = (a-b)(a^2 + b^2 + ab)$
 $208 = 4(a^2 + b^2 + ab)$
 $\Rightarrow a^2 + b^2 + ab = 52$

2. (A) $x + \frac{1}{x} = 5$
 $\Rightarrow x^3 + \frac{1}{x^3} = (5)^3 - 3 \times 5$
 $= 125 - 15 = 110$

3. (A) $a^3 + b^3 + c^3 = 3abc$
 $\Rightarrow a + b + c = 0$
 $\Rightarrow (x-5) + (x-6) + (x-7) = 0$
 $3x - 18 = 0$
 $\Rightarrow x = 6$

4. (C) $a^3 + b^3 + c^3 = 3abc$
 $\Rightarrow a + b + c = 0$
 $\Rightarrow (2x+3) + (x-8) + (x+13) = 0$
 $\Rightarrow 4x + 8 = 0$
 $\Rightarrow x = -2$

5. (A) $a^3 + b^3 = (a+b)(a^2 + b^2 - ab)$
 $5824 = 28[(a-b)^2 + ab]$
 $\Rightarrow (a-b)^2 + ab = \frac{5824}{28} = 208$

6. (C) $x - \frac{1}{x} = 6$
 $x^3 - \frac{1}{x^3} = \left(x - \frac{1}{x}\right)^3 + 3\left(x - \frac{1}{x}\right)$
 $= (6)^3 + 3(6)$
 $= 216 + 18 = 234$

7. (C) $a^3 - b^3 = 1603$
 $a - b = 7$
 Now, $(a+b)^2 - ab = (a^2 + ab + b^2)$
 $= \frac{(a^3 - b^3)}{(a-b)} = \frac{1603}{7}$
 $= 229$

8. (B) $(x+4)^3 + (2x+1)^3 + (2x+5)^3$
 $= (3x+12)(2x+1)(2x+5)$
 $= 3(3x+4)(2x+1)(2x+5)$
 $\therefore a + b + c = 0$
 $(x+4) + (2x+1) + (2x+5) = 0$

9. (A) $x + \frac{1}{x} = 8$
 $5x + 10 = 0$
 $\Rightarrow x = -2$
 $\Rightarrow x^2 + \frac{1}{x^2} + 2 = 64$
 $x^2 + \frac{1}{x^2} = 62$

10. (D) $x + \frac{1}{x} = 7$
 (Given)
 Taking cube both sides
 $x^3 + \frac{1}{x^3} + 3\left(x + \frac{1}{x}\right) = 343$

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$$\Rightarrow x^3 + \frac{1}{x^3} + 3 \times 7 = 343$$

$$\Rightarrow x^3 + \frac{1}{x^3} = 343 - 21$$

$$= 322$$

11. (C) $a^3 - b^3 = 3552$

$$a - b = 6$$

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

$$= \frac{a^3 - b^3}{a - b} = \frac{3552}{6}$$

$$= 592$$

12. (D) $(x-3)^2 + (2x-5)^3 + (x-4)^3$
 $= (3x-9)(2x-5)(x-4)$
 $= 3(x-3)(2x-5)(x-4)$

here,

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

$$\therefore a + b + c = 0$$

$$(x-3) + (2x-5) + (x-4) = 0$$

$$\Rightarrow 4x - 12 = 0$$

$$x = 3$$

13. (C) $(2x-5)^3 + (x+2)^3 + (3x-9)^3$
 $= (2x-5)(3x-9)(3x+6)$
 $= 3(2x-5)(3x-9)(x+2)$

here,

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

$$\therefore a + b + c = 0$$

$$(2x-5) + (x+2) + (3x-9) = 0$$

$$x = 2$$

14. (B) $x^2 + \frac{1}{x^2} = 11$

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

$$\Rightarrow \left(x - \frac{1}{x}\right)^2 = 11 - 2 = 9$$

$$\Rightarrow x - \frac{1}{x} = \sqrt{9} = 3$$

15. (C) $x - \frac{1}{x} = 4$

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

$$= 76$$

16. (A) $ab + bc + ca = 8$

$$a + b + c = 12$$

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

$$= (12)^2 - 2 \times 8$$

$$= 144 - 16$$

$$= 128$$

17. (B) $(2x-5)^3 + (x-4)^3 + (x-11)^3$
 $= 3(2x-5)(x-4)(x-11)$

here, $a^3 + b^3 + c^3 = 3abc$

it means $a + b + c = 0$

$$\Rightarrow (2x-5) + (x-4) + (x-11) = 0$$

$$\Rightarrow 4x - 20 = 0$$

$$\Rightarrow x = 5$$

18. (A) $a^3 - b^3 = 416, a - b = 8$

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

$$\Rightarrow 416 = 8(a^2 + ab + b^2)$$

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

$$= \frac{416}{8} = 52$$

19. (A) $x + \frac{1}{x} = 4\sqrt{3}$

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

$$\Rightarrow x^2 + \frac{1}{x^2} = 48 - 2 = 46$$

20. (C) $x + \frac{1}{x} = 2\sqrt{3}$

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

$$= 12 - 2 = 10$$

21. (C) $(2x-1)^3 + (3x-4)^3 + (x-7)^3$
 $= (6x-3)(3x-4)(x-7)$
 $= 3(2x-1)(3x-4)(x-7)$

$$\therefore a + b + c = 0$$

$$(2x-1) + (3x-4) + (x-7) = 0$$

$$\therefore 6x - 12 = 0$$

$$x = 2$$

22. (D) $a^3 + b^3 = 416$

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

$$= \frac{(a^3 + b^3)}{(a + b)}$$

$$= \frac{416}{16} = 26$$

23. (B) $(x-6)^3 + (x-4)^3 + (x-5)^3 = (3x-15)(x-4)(x-6)$
 $= 3(x-5)(x-4)(x-6)$

here, $a^3 + b^3 + c^3 = 3abc$

$$\therefore a + b + c = 0$$

$$\Rightarrow (x-6) + (x-4) + (x-5) = 0$$

$$\Rightarrow 3x - 15 = 0$$

$$\Rightarrow x = 5$$

24. (D) $a^3 - b^3 = 216$
 $a - b = 6$
 $(a + b)^2 - ab = (a^2 + ab + b^2)$
 $= \frac{(a^3 - b^3)}{a - b}$
 $= \frac{216}{6} = 36$

25. (C) $x + \frac{1}{x} = 3\sqrt{2}$
 $x^2 + \frac{1}{x^2} = (3\sqrt{2})^2 - 2$
 $= 18 - 2 = 16$

26. (C) $a^3 + b^3 + c^3 = 3abc$
 $\therefore a + b + c = 0$
 $\Rightarrow (2x - 5) + (x + 2) + (3x - 9) = 0$
 $\Rightarrow 6x - 12 = 0$
 $\Rightarrow x = 2$

27. (C) $(a + b)^2 - ab = a^2 + ab + b^2$
 $= \frac{a^3 - b^3}{a - b}$
 $= \frac{208}{8} = 26$

28. (C) $x - \frac{1}{x} = 3\sqrt{2}$
 $x + \frac{1}{x} = \sqrt{18 + 4} = \sqrt{22}$
 $x^2 + \frac{1}{x^2} = 22 - 2 = 20$

29. (D) $x - \frac{1}{x} = 2\sqrt{2}$
 $x + \frac{1}{x} = \sqrt{8 + 4} = 2\sqrt{3}$
 $x^2 + \frac{1}{x^2} = 12 - 2 = 10$

30. (B) $a + b + c = 0$
 $(x - 2) + (x - 3) + (x - 10) = 0$
 $x = 5$

31. (C) $a^3 + b^3 = 432$
 $a + b = 12$
 $(a + b)^2 - 3ab = a^2 + 2ab + b^2 - 3ab$
 $= a^2 + b^2 - ab$
 $= \frac{a^3 + b^3}{a + b}$
 $= \frac{432}{12} = 36$

32. (D) $x^2 - 4x + a = 0$
 roots are equal
 so, $d = 0$
 $b^2 - 4ac = 0$
 $\Rightarrow (-4)^2 - 4 \times a \times 1 = 0$
 $4a = 16$
 $a = 4$

33. (B) $x + x^{-1} = 2$
 $x + \frac{1}{x} = 2$

It is possible when $x = 1$

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

$$= 1 + 1 = 2$$

34. (C) $a + b - c = 7$
 $\therefore a^3 + b^3 + c^3 - 3abc$
 $= (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$
 $= (a + b + c) - 3 [(a + b + c)^2 - 3(ab + bc + ca)]$
 \therefore Now, $a^2 + b^3 - c^3 + 3abc = 7[(7)^2 - 3 \times 21]$
 $= -98$

1. If $(p^2 + q^2)/(r^2 + s^2) = (pq)/(rs)$, then what is the value of $(p - q)/(p + q)$ in terms of r and s ?
यदि $(p^2 + q^2)/(r^2 + s^2) = (pq)/(rs)$ है, तो r तथा s के पद में $(p - q)/(p + q)$ का मान क्या है?
(A) $(r + s)/(r - s)$ (B) $(r - s)/(r + s)$
(C) $(r + s)/(rs)$ (D) $(rs)/(r - s)$
2. If the expression $(px^3 - 8x^2 - qx + 1)$ is completely divisible by the expression $(3x^2 - 4x + 1)$, then what will be the value of p and q respectively?
यदि व्यंजक $(px^3 - 8x^2 - qx + 1)$, व्यंजक $(3x^2 - 4x + 1)$ से पूर्णतः विभाजित होता है, तो क्रमशः p तथा q का मान क्या होगा?
(A) $(21/4, 15/8)$ (B) $(6, 1)$
(C) $(33/4, 5/4)$ (D) $(1, 6)$
3. If $a = 2017$, $b = 2016$ and $c = 2015$, then what is the value of $a^2 + b^2 + c^2 - ab - bc - ca$?
यदि $a = 2017$, $b = 2016$ and $c = 2015$ है, तो $a^2 + b^2 + c^2 - ab - bc - ca$ का मान क्या होगा?
(A) -2 (B) 0
(C) 3 (D) 4
4. If $x^2 - 3x + 1 = 0$, then what is the value of $x^3 + \frac{1}{x^3}$?
यदि $x^2 - 3x + 1 = 0$ हो, तो $x^3 + \frac{1}{x^3}$ का मान क्या है?
(A) 3 (B) 7
(C) 11 (D) 18
5. If $\frac{6x-1}{x} + \frac{7y-1}{y} + \frac{8z-1}{z} = 0$, then what is the value of $\frac{1}{x} + \frac{1}{y} + \frac{1}{z}$?
यदि $\frac{6x-1}{x} + \frac{7y-1}{y} + \frac{8z-1}{z} = 0$ हो, तो $\frac{1}{x} + \frac{1}{y} + \frac{1}{z}$ का मान क्या है?
(A) 1 (B) 3
(C) 0 (D) 21
6. If $x^2 - x\sqrt{68} + 1 = 0$ then what is the value of $x - \frac{1}{x}$?
यदि $x^2 - x\sqrt{68} + 1 = 0$ हो, तो $x - \frac{1}{x}$ का मान क्या है?
(A) $\sqrt{66}$ (B) 8
(C) $\sqrt{62}$ (D) 6
7. If $x + y = 7$, then what is the value of $x^3 + y^3 + 21xy$?
यदि $x + y = 7$ हो, तो $x^3 + y^3 + 21xy$ का मान क्या होगा?
(A) 343 (B) 49
(C) 294 (D) 288
8. If $2a - (2/a) + 4 = 0$, then what is the value of $a^3 - (1/a^3) + 14$?
यदि $2a - (2/a) + 4 = 0$ है, तो $a^3 - (1/a^3) + 14$ का मान क्या होगा?
(A) -14 (B) -12 (C) 0 (D) 14
9. If α and β are the roots of the equation $x^2 - x + 3 = 0$, then what is the value of $\alpha^4 + \beta^4$?
यदि α तथा β समीकरण $x^2 - x + 3 = 0$ के मूल हैं, तो $\alpha^4 + \beta^4$ का मान क्या होगा?
(A) 7 (B) 9 (C) 11 (D) 13
10. If $x^2 + \frac{1}{x^2} = 2$, then what is the value of x^6 ?
यदि $x^2 + \frac{1}{x^2} = 2$ हो, तो x^6 का मान क्या है?
(A) 6 (B) 0 (C) 1 (D) 3
11. When $a = 61$, $b = 63$ and $c = 65$, then what is the value of $a^3 + b^3 + c^3 - 3abc$?
जब $a = 61$, $b = 63$ तथा $c = 65$ है, तो $a^3 + b^3 + c^3 - 3abc$ का मान क्या होगा?
(A) 1456 (B) 2268
(C) 4536 (D) 5460

12. If $x = 3 - 2\sqrt{2}$, then $\sqrt{x} + \left(\frac{1}{\sqrt{x}}\right)$ is equal to ____.

यदि $x = 3 - 2\sqrt{2}$ है, तो $\sqrt{x} + \left(\frac{1}{\sqrt{x}}\right)$ का मान ____ है।

(A) 0 (B) 1 (C) 2 (D) $2\sqrt{2}$

13. If $\frac{1}{x+2} = \frac{3}{y+3} = \frac{1331}{z+1331} = \frac{1}{3}$, then what is the

value of $\frac{x}{x+1} + \frac{4}{y+2} + \frac{z}{z+2662}$?

यदि $\frac{1}{x+2} = \frac{3}{y+3} = \frac{1331}{z+1331} = \frac{1}{3}$ है, तो

$\frac{x}{x+1} + \frac{4}{y+2} + \frac{z}{z+2662}$ का मान क्या होगा?

(A) 0 (B) 1 (C) $3/2$ (D) 3

14. If $x^2 + \frac{1}{x^2} = \frac{7}{4}$ for $x > 0$, then what is the value of

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

यदि $x > 0$ के लिए $x^2 + \frac{1}{x^2} = \frac{7}{4}$ हो, तो $x + \frac{1}{x}$ का मान क्या है?

(A) 2 (B) $\frac{\sqrt{15}}{2}$

(C) $\sqrt{5}$ (D) $\sqrt{3}$

15. If $x + y + z = 0$, then what is the value of

$\frac{x^2}{yz} + \frac{y^2}{xz} + \frac{z^2}{xy}$?

यदि $x + y + z = 0$ हो, तो $\frac{x^2}{yz} + \frac{y^2}{xz} + \frac{z^2}{xy}$ का मान क्या है?

(A) 0 (B) $1/3$
(C) 1 (D) 3

16. If $(1/x) + (1/y) + (1/z) = 0$ and $x + y + z = 11$, then what is the value of $x^3 + y^3 + z^3 - 3xyz$?

यदि $(1/x) + (1/y) + (1/z) = 0$ तथा $x + y + z = 11$ है, तो $x^3 + y^3 + z^3 - 3xyz$ का मान क्या होगा?

(A) 1331 (B) 2662
(C) 3993 (D) 14641

17. What is the simplified value of

$$\left[\frac{(1+x^3)}{(x^2-1)} + \frac{(x^2+1-x)}{(x+1)} \right] \times (x-1)?$$

$$\left[\frac{(1+x^3)}{(x^2-1)} + \frac{(x^2+1-x)}{(x+1)} \right] \times (x-1) \text{ का सरलीकृत मान क्या है?}$$

(A) 1 (B) x
(C) $x+1$ (D) $1/(x-1)$

18. If $\frac{x + \sqrt{x^2-1}}{x - \sqrt{x^2-1}} + \frac{x - \sqrt{x^2-1}}{x + \sqrt{x^2-1}} = 62$ then what is the value of $x(x < 0)$?

यदि $\frac{x + \sqrt{x^2-1}}{x - \sqrt{x^2-1}} + \frac{x - \sqrt{x^2-1}}{x + \sqrt{x^2-1}} = 62$ है, तो $x(x < 0)$ का

मान क्या होगा?

(A) -4 (B) 0
(C) 3 (D) 16

19. If $x^2 - 3x + 1 = 0$, then what is the value of $x^2 + \frac{1}{x^2}$?

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

(A) 3 (B) 7
(C) 9 (D) 11

20. If $x^4 + \frac{1}{x^4} = 98$ and $x > 1$ then what is the value of $x + \frac{1}{x}$?

यदि $x^4 + \frac{1}{x^4} = 98$ तथा $x > 1$ हो, तो $x + \frac{1}{x}$ का मान क्या है?

(A) 2 (B) $2\sqrt{2}$
(C) $\sqrt{5}$ (D) $2\sqrt{3}$

21. If $(x/y)^{5a-3} = (y/x)^{17-3a}$, then what is the value of a?

जब $(x/y)^{5a-3} = (y/x)^{17-3a}$ है, तो a का मान क्या होगा?

(A) -7 (B) -5
(C) 0 (D) 3

22. What is the value of $\left(\frac{x^2 - x - 6}{x^2 + x - 12} \right) +$

$$\left(\frac{x^2 + 5x + 6}{x^2 + 7x + 12} \right)?$$

$\left(\frac{x^2 - x - 6}{x^2 + x - 12}\right) \div \left(\frac{x^2 + 5x + 6}{x^2 + 7x + 12}\right)$ का मान क्या है ?

- (A) 1
(B) $\frac{(x-3)}{(x+3)}$
(C) $\frac{(x+4)}{(x-3)}$
(D) $\frac{(x-3)}{(x+4)}$

23. If $x^2 + \frac{1}{x^2} = \frac{7}{4}$ for $x > 0$, then what is the value of $x^3 + \frac{1}{x^3}$?

यदि $x > 0$ के लिए $x^2 + \frac{1}{x^2} = \frac{7}{4}$ हो, तो $x^3 + \frac{1}{x^3}$ का मान क्या है ?

- (A) $\frac{3\sqrt{3}}{5}$
(B) $\frac{3\sqrt{15}}{5}$
(C) $\frac{3\sqrt{15}}{8}$
(D) $\frac{3\sqrt{5}}{8}$

24. If $x^2 - 8x + 1 = 0$, then What is the value of $x^2 + \frac{1}{x^2}$?

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

- (A) 18
(B) 34
(C) 40
(D) 62

25. What is the simplified value of

$\left(x^{32} + \frac{1}{x^{32}}\right) \left(x^8 + \frac{1}{x^8}\right) \left(x - \frac{1}{x}\right) \left(x^{16} + \frac{1}{x^{16}}\right)$

$\left(x + \frac{1}{x}\right) \left(x^4 + \frac{1}{x^4}\right) ?$

$\left(x^{32} + \frac{1}{x^{32}}\right) \left(x^8 + \frac{1}{x^8}\right) \left(x - \frac{1}{x}\right) \left(x^{16} + \frac{1}{x^{16}}\right)$

$\left(x + \frac{1}{x}\right) \left(x^1 + \frac{1}{x^1}\right)$ का सरलीकृत मान क्या है ?

(A) $\left(x^{64} + \frac{1}{x^{64}}\right)$
(B) $\frac{\left(x^{64} - \frac{1}{x^{64}}\right)}{\left(x^2 + \frac{1}{x^2}\right)}$

(C) $\frac{\left(x^{64} - \frac{1}{x^{64}}\right)}{\left(x + \frac{1}{x}\right)}$
(D) $\frac{\left(x^{32} - \frac{1}{x^{32}}\right)}{\left(x + \frac{1}{x}\right)}$

26. What is the value of $\left[\frac{1}{1-x^{(p-q)}} + \frac{1}{1-x^{(q-p)}}\right] ?$

$\left[\frac{1}{1-x^{(p-q)}} + \frac{1}{1-x^{(q-p)}}\right]$ का मान क्या है ?

- (A) 0
(B) 1
(C) $(x^q - x^p)/(x^q + x^p)$
(D) $(x^q + x^p)/(x^q - x^p)$

27. If $x^2 - 3x + 1 = 0$, then what is the value of $x + \frac{1}{x}$?

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

- (A) 3
(B) 7
(C) 9
(D) 11

28. If $a + b + c = -11$, then what is the value of $(a + 4)^3 + (b + 5)^3 + (c + 2)^3 - 3(a + 4)(b + 5)(c + 2)$?

यदि $a + b + c = -11$ है, तो $(a + 4)^3 + (b + 5)^3 + (c + 2)^3 - 3(a + 4)(b + 5)(c + 2)$ का मान क्या होगा ?

- (A) -1331
(B) -121
(C) 0
(D) 1331

29. If $\sqrt{7x+12} + \sqrt{7x-12} = 3 + \sqrt{33}$ then what is the value of x ?

यदि $\sqrt{7x+12} + \sqrt{7x-12} = 3 + \sqrt{33}$ है, तो x का मान क्या होगा ?

- (A) 0
(B) 1
(C) 3
(D) 9

30. If $x + (1/x) = 3\sqrt{2}$, then what is the value of $x^5 + (1/x^5)$?

यदि $x + (1/x) = 3\sqrt{2}$ है, तो $x^5 + (1/x^5)$ का मान क्या होगा ?

- (A) $178\sqrt{3}$
(B) $789\sqrt{2}$
(C) $1581\sqrt{2}$
(D) $717\sqrt{2}$

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

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

- (A) 7
(B) 3
(C) 51
(D) 47

32. If $x^2 + 2\sqrt{10}x + 1 = 0$, then What is the value of $x - \frac{1}{x}$?

यदि $x^2 + 2\sqrt{10}x + 1 = 0$ हो, तो $x - \frac{1}{x}$ का मान क्या है ?
 (A) 4 (B) 6
 (C) 3 (D) 5

33. If $\frac{3x-1}{x} + \frac{5y-1}{y} + \frac{7z-1}{z} = 0$, then what is the value of $\frac{1}{x} + \frac{1}{y} + \frac{1}{z}$?

यदि $\frac{3x-1}{x} + \frac{5y-1}{y} + \frac{7z-1}{z} = 0$ हो, तो $\frac{1}{x} + \frac{1}{y} + \frac{1}{z}$ का मान क्या है ?
 (A) -3 (B) 0
 (C) 15 (D) 21

34. If $x^2 - 3x + 1 = 0$, then what is the value of $x^4 + \frac{1}{x^4}$?

यदि $x^2 - 3x + 1 = 0$ हो, तो $x^4 + \frac{1}{x^4}$ का मान क्या है ?
 (A) 11 (B) 18
 (C) 47 (D) 51

35. What is the value of $\frac{(a^2 + b^2)(a-b) - (a-b)^3}{a^3b - ab^3}$?

$\frac{(a^2 + b^2)(a-b) - (a-b)^3}{a^3b - ab^3}$ का मान क्या है ?
 (A) 0 (B) 1
 (C) -1 (D) 2

36. If $x + y = 4$, then what is the value of $x^3 + y^3 + 12xy$?

यदि $x + y = 4$ हो, तो $x^3 + y^3 + 12xy$ का मान क्या होगा ?
 (A) 16 (B) 32
 (C) 64 (D) 256

37. If $x^4 + \frac{1}{x^4} = 198$ and $x > 0$, then what is the value of $x^2 - \frac{1}{x^2}$?

यदि $x^4 + \frac{1}{x^4} = 198$ तथा $x > 0$ हो, तो $x^2 - \frac{1}{x^2}$ का मान क्या है ?
 (A) 14 (B) $2\sqrt{7}$
 (C) $10\sqrt{2}$ (D) 10

38. If $3x - [1/(3x)] = 9$, then what is the value of $x^2 + [1/(81x^2)]$?

यदि $3x - [1/(3x)] = 9$ है, तो $x^2 + [1/(81x^2)]$ का मान क्या होगा ?

(A) 7 (B) $\frac{83}{9}$ (C) 11 (D) $\frac{121}{9}$

39. If $x^3 - y^3 = 112$ and $x - y = 4$, then what is the value of $x^2 + y^2$?

यदि $x^3 - y^3 = 112$ तथा $x - y = 4$ है, तो $x^2 + y^2$ का मान क्या होगा ?

(A) 16 (B) 20
 (C) 24 (D) 28

40. If $x = 5 - \frac{1}{x}$, then what is the value of $x^5 + \frac{1}{x^5}$?

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

(A) 625 (B) 3125
 (C) 2525 (D) 2500

41. If $x - y = 3$, then what is the value of $x^3 - y^3 - 9xy$?

यदि $x - y = 3$ हो, तो $x^3 - y^3 - 9xy$ का मान क्या होगा ?
 (A) 3 (B) 9
 (C) 18 (D) 27

42. If $x^2 - 9x + 1 = 0$, then what is the value of $x^3 + \frac{1}{x^3}$?

यदि $x^2 - 9x + 1 = 0$ हो, तो $x^3 + \frac{1}{x^3}$ का मान क्या है ?

(A) 54 (B) 108
 (C) 702 (D) 810

43. If $a + b + c = 3$ and none of a , b and c is equal to 1, then what is the value of

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

यदि $a + b + c = 3$ तथा a , b तथा c में से कोई भी 1 के बराबर नहीं है तो

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

(A) 0 (B) 1
 (C) 3 (D) 6

44. What is the value of

$$\frac{(a^2 + b^2)(a - b) - (a^3 - b^3)}{a^2b - ab^2} ?$$

$$\frac{(a^2 + b^2)(a - b) - (a^3 - b^3)}{a^2b - ab^2} \text{ का मान क्या है ?}$$

- (A) 0 (B) 1
(C) -1 (D) 3

45. What is the simplified value of $(x^{128} + 1)(x^{32} + 1)(x^{64} + 1)(x^{16} + 1)(x^8 + 1)(x^4 + 1)(x^2 + 1)(x + 1)$
 $(x^{128} + 1)(x^{32} + 1)(x^{64} + 1)(x^{16} + 1)(x^8 + 1)(x^4 + 1)(x^2 + 1)(x + 1)$ का सरलीकृत मान क्या है ?

- (A) $x^{256} - 1$ (B) $\frac{x^{128} - 1}{x - 1}$
(C) $\frac{x^{64} - 1}{x - 1}$ (D) $\frac{x^{256} - 1}{x - 1}$

46. If $(1/x) + (1/y) + (1/z) = 0$ and $x + y + z = 7$, then what is the value of $x^3 + y^3 + z^3 - 3xyz$?

यदि $(1/x) + (1/y) + (1/z) = 0$ तथा $x + y + z = 7$ है, तो $x^3 + y^3 + z^3 - 3xyz$ का मान क्या होगा।

- (A) 49 (B) 343
(C) 1029 (D) 2401

47. If $x + (1/x) = 5$, then what is the value of $x^6 + (1/x^6)$?

यदि $x + (1/x) = 5$ है, तो $x^6 + (1/x^6)$ का मान क्या होगा ?

- (A) 623 (B) 627
(C) 12098 (D) 12102

48. If $x^2 + \frac{1}{x^2} = \frac{7}{4}$ for $x > 0$ then what is the value of

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

यदि $x > 0$ के लिए $x^2 + \frac{1}{x^2} = \frac{7}{4}$ हो, तो $x^4 + \frac{1}{x^4}$ का मान क्या है ?

- (A) 1 (B) 17/16
(C) 15/16 (D) 51/16

49. If $x + \frac{1}{x} = -2$, then what is the value of $1 + x^3 + x^6$?

यदि $x + \frac{1}{x} = -2$ हो, तो $1 + x^3 + x^6$ का मान क्या है ?

- (A) 0 (B) 1
(C) 2 (D) -1

50. What is the simplified value of

$$\left(x + \frac{1}{x}\right)\left(x^2 + \frac{1}{x^2}\right)\left(x^4 + \frac{1}{x^4}\right)\left(x^8 + \frac{1}{x^8}\right)\left(x^{16} + \frac{1}{x^{16}}\right) ?$$

$$\left(x + \frac{1}{x}\right)\left(x^2 + \frac{1}{x^2}\right)\left(x^4 + \frac{1}{x^4}\right)\left(x^8 + \frac{1}{x^8}\right)\left(x^{16} + \frac{1}{x^{16}}\right) \text{ का}$$

मान क्या है ?

(A) $\frac{(x^{64} - 1)}{(x - \frac{1}{x})}$ (B) $\frac{(x^8 - 1)}{(x - \frac{1}{x})}$

(C) $\frac{(x^{16} - 1)}{(x - \frac{1}{x})}$ (D) $\frac{(x^{32} - 1)}{(x - \frac{1}{x})}$

51. If $x = 17 - 4\sqrt{18}$, then find the value of

$$\sqrt{x} + \frac{1}{\sqrt{x}} ?$$

यदि $x = 17 - 4\sqrt{18}$ है, तो $\sqrt{x} + \frac{1}{\sqrt{x}}$ का मान क्या है ?

- (A) $7\sqrt{2}$ (B) 9
(C) 22 (D) 6

52. If $a^2 + b^2 + c^2 + \frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2} = 6$, then what is the value of $a^2 + b^2 + c^2$?

यदि $a^2 + b^2 + c^2 + \frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2} = 6$ है, तो $a^2 + b^2 + c^2$

का मान क्या है ?

- (A) 3 (B) 6
(C) -3 (D) 2

53. If $3x^2 - 9x + 3 = 0$, then what is the value of

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

यदि $3x^2 - 9x + 3 = 0$ है, तो $\left(x + \frac{1}{x}\right)^3$ का मान क्या है ?

- (A) 9 (B) 729
(C) 81 (D) 27

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

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

- (A) 36 (B) 21
(C) 9 (D) 27

55. If $x^2 - 9x - 1 = 0$, then what is the value of $x^2 + \frac{1}{x^2} + 5x - \frac{5}{x}$?

यदि $x^2 - 9x - 1 = 0$ है, तो $x^2 + \frac{1}{x^2} + 5x - \frac{5}{x}$ का मान क्या है ?

- (A) 115 (B) 128
(C) 124 (D) 133

56. If $x^2 + \frac{1}{25x^2} = \frac{8}{5}$ and $x > 0$, then what is the value of $x^3 + \frac{1}{125x^3}$?

यदि $x^2 + \frac{1}{25x^2} = \frac{8}{5}$ तथा $x > 0$ है, तो $x^3 + \frac{1}{125x^3}$ का मान क्या है ?

- (A) $7\sqrt{2}$ (B) $5\sqrt{2}$
(C) $\frac{7\sqrt{2}}{5}$ (D) $7\sqrt{6}$

57. If $ab(a+b)=1$, then what is the value of $\frac{1}{a^3b^3} - a^3 - b^3$?

यदि $ab(a+b)=1$ है, तो $\frac{1}{a^3b^3} - a^3 - b^3$ का मान क्या है ?

- (A) -1 (B) 1
(C) 3 (D) -3

58. If $y^4 + \frac{1}{y^4} = 223$ and $y > 1$, then find the value of $y^2 + \frac{1}{y^2}$?

यदि $y^4 + \frac{1}{y^4} = 223$ तथा $y > 1$ है, तो $y^2 + \frac{1}{y^2}$ का मान क्या है ?

- (A) 15 (B) 14
(C) 14.86 (D) 16

59. If $(c - d) = (c + d)/5 = (cd)/3$ and $c, d \neq 0$ then what is the value of cd ?

यदि $(c - d) = (c + d)/5 = (cd)/3$ तथा $c, d \neq 0$ है तो cd का मान क्या होगा ?

- (A) $1/2$ (B) $3/2$
(C) $5/2$ (D) $5/4$

60. If $x^6 = y^3$, then relation between x and y is:

यदि $x^6 = y^3$ है, तो x तथा y के बीच का संबंध है:

- (A) $x = y^2$ (B) $x = y^4$
(C) $x^4 = y$ (D) $x^3 = y^8$

61. If $\frac{a}{3} = 1 - \frac{3}{a}$, then what is the value of a^5 ?

यदि $\frac{a}{3} = 1 - \frac{3}{a}$, हो तो a^5 का मान क्या है ?

- (A) -81 (B) 148
(C) -243 (D) 227

62. If $a + b = 6x$, then what is the value of

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

यदि $a + b = 6x$, हो तो $\frac{x}{(a-3x)} + \frac{x}{(b-3x)}$ का मान क्या है ?

- (A) 1 (B) 0
(C) 2 (D) -1

63. If $x^3 + 6x^2 + 12x = 19$, then what is the value of x^3 ?

यदि $x^3 + 6x^2 + 12x = 19$ हो, तो x^3 का मान क्या है ?

- (A) 8 (B) 27
(C) -1 (D) 1

64. If $x + \frac{1}{x} = 3$ ($x \neq 0$), then what is the value of

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

यदि $x + \frac{1}{x} = 3$ ($x \neq 0$) हो, तो $\frac{(x^2 - x + 1)}{5x}$ का मान क्या है ?

- (A) $\frac{2}{5}$ (B) $\frac{3}{5}$ (C) $\frac{4}{5}$ (D) $\frac{1}{5}$

Mother's Advance Maths • Algebra [Previous Year Questions]

65. If $x^2 + 16 = -4x$, then what is the value of $x^3 - 64$?
 यदि $x^2 + 16 = -4x$ हो, तो $x^3 - 64$ का मान क्या है?
 (A) 128 (B) 0
 (C) 64 (D) 256
66. If $x + 4$ is a factor of $3x^2 + kx + 8$ then what is the value of k ?
 यदि $(x + 4)$, $3x^2 + Kx + 8$ का गुणनखण्ड है, तो K का मान क्या है?
 (A) 4 (B) -4
 (C) -14 (D) 14
67. If $x + y + z = 0$, then what is the value of $\frac{xy + yz + zx}{x^2 + y^2 + z^2}$?
 यदि $x + y + z = 0$ है, तो $\frac{xy + yz + zx}{x^2 + y^2 + z^2}$ का मान क्या है?
 (A) 1 (B) -1
 (C) $\frac{1}{2}$ (D) $-\frac{1}{2}$
68. If $(a + 4)^3 = a^3 + 12a^2 + ka + 64$, then what is the value of k ?
 यदि $(a + 4)^3 = a^3 + 12a^2 + ka + 64$ है, तो k का मान क्या है?
 (A) $\frac{529}{16}$ (B) $\frac{527}{64}$
 (C) $\frac{4913}{64}$ (D) $\frac{4097}{64}$
69. If $\left(x + \frac{1}{x}\right)^2 = 5$ and $x > 0$, then what is the value of $x^3 + \frac{1}{x^3}$?
 यदि $\left(x + \frac{1}{x}\right)^2 = 5$ तथा $x > 0$ है, तो $x^3 + \frac{1}{x^3}$ का मान क्या है?
 (A) $2\sqrt{5}$ (B) $3\sqrt{5}$
 (C) $4\sqrt{5}$ (D) $5\sqrt{5}$
70. If $\frac{x^2 + 1}{x} = 4\frac{1}{4}$, then what is the value of $x^3 + \frac{1}{x^3}$?
 यदि $\frac{x^2 + 1}{x} = 4\frac{1}{4}$ है, तो $x^3 + \frac{1}{x^3}$ का मान क्या है?
 (A) $\frac{529}{16}$ (B) $\frac{527}{64}$
 (C) $\frac{4913}{64}$ (D) $\frac{4097}{64}$

Solution

1. (B) $\frac{p^2 + q^2}{r^2 + s^2} = \frac{pq}{rs}$
 $\frac{p^2 + q^2}{pq} = \frac{r^2 + s^2}{rs}$
 Divide both side by 2
 $\frac{p^2 + q^2}{2pq} = \frac{r^2 + s^2}{2rs}$
 Component and Dividend rule
 $\frac{p^2 + q^2 + 2pq}{p^2 + q^2 - 2pq} = \frac{r^2 + s^2 + 2rs}{r^2 + s^2 - 2rs}$
 $\frac{(p+q)^2}{(p-q)^2} = \frac{(r+s)^2}{(r-s)^2} \Rightarrow \frac{p+q}{p-q} = \frac{r+s}{r-s}$
 $\frac{p-q}{p+q} = \frac{r-s}{r+s}$

2. (C) $3x^2 - 4x + 1 = 0$
 $3x^2 - 3x - x + 1 = 0$
 $3x(x-1) - 1(x-1) = 0$
 $x = 1, \frac{1}{3}$
 $px^3 - 8x^2 - qx + 1 = 0$
 When $x = 1$
 $p - 8 - q + 1 = 0$
 $p - q = 7 \quad \dots (1)$
 and $x = \frac{1}{3}$
 $\frac{p}{27} - \frac{8}{9} - \frac{q}{3} + 1 = 0$
 $\frac{p - 24 - 9q + 27}{27} = 0$
 $p - 9q = -3 \quad \dots (2)$

Put $p = 7 + q$ in eqn. (2)

$$7 + q - 9q = -3$$

$$-8q = -10$$

$$q = \frac{5}{8}, p = \frac{33}{8}$$

3. (C) $a = 2017, b = 2016, c = 2015$

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

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

$$\frac{a^3 + b^3 + c^3 - 3abc}{a + b + c}$$

Put value

$$\begin{aligned} a^3 + b^3 + c^3 - 3abc &= \frac{1}{2} [(a-b)^2 + (b-c)^2 + (c-a)^2] \\ &= \frac{1}{2} [(2017-2016)^2 + (2016-2015)^2 + (2015-2017)^2] \end{aligned}$$

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

4. (D) $x^2 - 3x + 1 = 0$

Divide by x

$$\left[x + \frac{1}{x}\right]^3 = [3]^3$$

$$x^3 + \frac{1}{x^3} + 9 = 27 \Rightarrow x^3 + \frac{1}{x^3} = 18$$

5. (D) $\frac{6x-1}{x} + \frac{7y-1}{y} + \frac{8z-1}{z} = 0$

$$\frac{6x-1}{x} = 0 \Rightarrow x = \frac{1}{6}$$

$$\frac{7y-1}{y} = 0 \Rightarrow y = \frac{1}{7}$$

$$\frac{8z-1}{z} = 0 \Rightarrow z = \frac{1}{8}$$

$$\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 21$$

6. (B) $x^2 - x\sqrt{68} + 1 = 0$

divided by x

$$x - \sqrt{68} + \frac{1}{x} = 0$$

$$x + \frac{1}{x} = \sqrt{68} \quad (\text{squaring on both side})$$

$$x^2 + \frac{1}{x^2} + 2 = 68$$

$$x^2 + \frac{1}{x^2} = 66$$

Subtracting 2 on both sides

$$x^2 + \frac{1}{x^2} - 2 = 66 - 2$$

$$\left(x - \frac{1}{x}\right)^2 = 64$$

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

7. (A) $x + y = 7 \Rightarrow x^2 + y^2 + 2xy = 49$

$$x^2 + y^2 + 21xy$$

$$(x + y)(x^2 + y^2 - xy) + 21xy$$

$$7(49 - 3xy) + 21xy$$

$$343 - 21xy + 21xy$$

$$= 343$$

8. (C) $2a - \frac{2}{a} + 4 = 0$

$$2\left(a - \frac{1}{a} + 2\right) = 0$$

$$a - \frac{1}{a} + 2 = 0$$

$$a - \frac{1}{a} = -2$$

$$a^3 - \frac{1}{a^3} + 14$$

$$\left(a - \frac{1}{a}\right)^3 + 3\left(a - \frac{1}{a}\right) + 14$$

$$-8 + 3(-2) + 14$$

$$= -14 + 14 = 0$$

9. (A) $x^2 - x + 3 = 0$

$$\alpha + \beta = 1$$

$$\alpha\beta = 3$$

$$\alpha^4 + \beta^4 = ?$$

$$\alpha + \beta = 1$$

$$(\alpha + \beta)^2 = 1^2$$

$$\alpha^2 + \beta^2 + 2\alpha\beta = 1$$

$$\alpha^2 + \beta^2 + 2 \times 3 = 1$$

$$\alpha^2 + \beta^2 = -5$$

$$(\alpha^2 + \beta^2)^2 = (-5)^2$$

$$\alpha^4 + \beta^4 + 2\alpha^2\beta^2 = 25$$

$$\Rightarrow \alpha^4 + \beta^4 = 7$$

10. (C) $x^2 + \frac{1}{x^2} = 2$

Let $x = 1$ is satisfied the equation

$x^6 = (1)^6 = 1$

11. (B) $a^3 + b^3 + c^3 - 3abc$

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

Given as— $a = 61, b = 63, c = 65$

$= \frac{1}{2} (61 + 63 + 65) [(61 - 63)^2 + (63 - 65)^2 + (65 - 61)^2]$

$= \frac{1}{2} \times 189 [4 + 4 + 16]$

$= \frac{1}{2} \times 189 \times 24 = 2268$

12. (D) $x = 3 - 2\sqrt{2}$

$\frac{1}{x} = \frac{1}{3 - 2\sqrt{2}} \times \frac{3 + 2\sqrt{2}}{3 + 2\sqrt{2}} \Rightarrow \frac{3 + 2\sqrt{2}}{9 - 8}$

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

$\sqrt{x} + \left(\frac{1}{\sqrt{x}}\right) = z$

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

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

$z^2 = 8$

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

13. (C) $\frac{1}{x+2} = \frac{3}{y+3} = \frac{1331}{z+1331} = \frac{1}{3}$

$x + 2 = 3 \Rightarrow x = 1$

$y + 3 = 9 \Rightarrow y = 6$

$z + 1331 = 3993 \Rightarrow z = 2662$

$\frac{x}{x+1} + \frac{4}{y+2} + \frac{z}{z+2662} = ?$

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

14. (B) $x^2 + \frac{1}{x^2} = \frac{7}{4}$

Add both side of 2

$x^2 + \frac{1}{x^2} + 2 = \frac{15}{4}$

$\left(x + \frac{1}{x}\right)^2 = \frac{15}{4}$

$x + \frac{1}{x} = \frac{\sqrt{15}}{2}$

15. (D) $x + y + z = 0$

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

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

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

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

Put value $x^3 + y^3 + z^3 = 3xyz$

$\frac{3xyz}{xyz} = 3$

16. (A) $\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 0$

$xy + yz + xz = 0$

$x^3 + y^3 + z^3 - 3xyz = (x + y + z)(x^2 + y^2 + z^2 - xy - yz - xz) \dots (1)$

$(x + y + z)^2 = 121$

$x^2 + y^2 + z^2 = 121 \dots (2)$

from eqn (1) & (2)

$x^3 + y^3 + z^3 - 3xyz = 11 \times 121 = 1331$

17. (C) $\left[\frac{1+x^3}{(x^2-1)}; \frac{(x^2+1-x)}{(x+1)}\right] \times (x-1)$

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

$= (x+1)$

18. (A) $\frac{x + \sqrt{x^2-1}}{x - \sqrt{x^2-1}} + \frac{x - \sqrt{x^2-1}}{x + \sqrt{x^2-1}} = 62$

$\frac{x^2 + x^2 - 1 + 2x\sqrt{x^2-1} + x^2 + x^2 - 1 - 2x\sqrt{x^2-1}}{1}$

$= 62$

$4x^2 = 64$

$x^2 = 16$

$x = \pm 4 \quad [x < 0]$

$x = -4$

19. (B) $x^2 - 3x + 1 = 0$
Divided by x

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

$$x^2 + \frac{1}{x^2} = 3^2 - 2 = 7$$

20. (D) $x^4 + \frac{1}{x^4} = 98$

$$\left(x^2 + \frac{1}{x^2}\right) = \sqrt{100} = 10$$

$$x + \frac{1}{x} = \sqrt{12} = 2\sqrt{3}$$

21. (A) $\left(\frac{x}{y}\right)^{5a-3} = \left(\frac{y}{x}\right)^{17-3a}$

$$\left(\frac{y}{x}\right)^{-5a+3} = \left(\frac{y}{x}\right)^{17-3a}$$

$$-5a + 3 = 17 - 3a$$

$$-2a = 14$$

$$a = -7$$

22. (A) $\left(\frac{x^2 - x - 6}{x^2 + x - 12}\right) + \left(\frac{x^2 + 5x + 6}{x^2 + 7x + 12}\right)$

$$\left(\frac{x^2 - 3x + 2x - 6}{x^2 + 4x - 3x - 12}\right) + \left(\frac{x^2 + 3x + 2x + 6}{x^2 + 4x + 3x + 12}\right)$$

$$\left(\frac{x(x-3) + 2(x-3)}{x(x+4) - 3(x+4)}\right) + \left(\frac{x(x+3) + 2(x+3)}{x(x+4) - 3(x+4)}\right)$$

$$\frac{(x-3)(x+2)}{(x-3)(x+4)} \times \frac{(x+3)(x+4)}{(x+2)(x+3)} = 1$$

23. (C) $x^2 + \frac{1}{x^2} = \frac{7}{4}$

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

$$x + \frac{1}{x} = \frac{\sqrt{15}}{2}$$

$$x^3 + \frac{1}{x^3} + \frac{3\sqrt{15}}{2} = \frac{15\sqrt{15}}{4} + \frac{15\sqrt{15}}{2}$$

$$x^3 + \frac{1}{x^3} = \frac{15\sqrt{15} - 12\sqrt{15}}{8}$$

$$x^3 + \frac{1}{x^3} = \frac{3\sqrt{15}}{8}$$

24. (D) $x^2 - 8x + 1 = 0$ (i)

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

Equation (i) divided by x

$$x - 8 + \frac{1}{x} = 0$$

$$x + \frac{1}{x} = 8 \Rightarrow x^2 + \frac{1}{x^2} = 62$$

25. (B) $\left(x^{32} + \frac{1}{x^{32}}\right)\left(x^{16} + \frac{1}{x^{16}}\right)\left(x^8 + \frac{1}{x^8}\right)$

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

$$= \left(x^{32} + \frac{1}{x^{32}}\right)\left(x^{16} + \frac{1}{x^{16}}\right)\left(x^8 + \frac{1}{x^8}\right)$$

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

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

$$= \frac{1}{x^2 + \frac{1}{x^2}} \left[\left(x^{32} + \frac{1}{x^{32}}\right)\left(x^{16} + \frac{1}{x^{16}}\right)\left(x^8 + \frac{1}{x^8}\right) \right]$$

$$= \frac{1}{x^2 + \frac{1}{x^2}} \left[\left(x^{32} + \frac{1}{x^{32}}\right)\left(x^{16} + \frac{1}{x^{16}}\right) \right]$$

$$= \frac{1}{x^2 + \frac{1}{x^2}} \left[\left(x^{32} + \frac{1}{x^{32}}\right)\left(x^{16} + \frac{1}{x^{16}}\right)\left(x^{16} - \frac{1}{x^{16}}\right) \right]$$

$$= \frac{1}{x^2 + \frac{1}{x^2}} \left[\left(x^{32} + \frac{1}{x^{32}}\right)\left(x^{32} - \frac{1}{x^{32}}\right) \right]$$

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

$$26.(B) \left[\frac{1}{1-x^{(p-q)}} + \frac{1}{1-x^{(q-p)}} \right] = ?$$

$$\frac{x^q}{x^q - x^p} - \frac{x^p}{x^p - x^q} \Rightarrow \frac{x^q}{x^q - x^p} - \frac{x^p}{x^q - x^p}$$

$$\frac{x^q - x^p}{x^q - x^p} = 1$$

$$27. (A) x^2 - 3x + 1 = 0 \text{ --- (i)}$$

eqn (i) divided by x

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

$$28. (C) a + b + c = -11$$

$$(a+4)^3 + (b+5)^3 + (c+2)^3 - 3(a+4)(b+5)(c+2) = ?$$

$$a + b + c + 11 = 0$$

$$(a+4) + (b+5) + (c+2) = 0$$

let $a+4 = x$, $b+5 = y$, $c+2 = z$

So that $x + y + z = 0$

then $x^3 + y^3 + z^3 - 3xyz = 0$

Put the value x, y, z

then $(a+4)^3 + (b+5)^3 + (c+2)^3 - 3(a+4)(b+5)(c+2) = 0$

$$29. (C) (\sqrt{7x+12} + \sqrt{7x-12})^2 = (3 + \sqrt{33})^2$$

$$14x + 2\sqrt{(7x+12)(7x-12)} = 42 + 6\sqrt{33}$$

Comparison for both side real or imaginary part

$$14x = 42$$

$$x = 3$$

$$2\sqrt{(7x+12)(7x-12)} = 6\sqrt{33}$$

$$\sqrt{(49x^2 - 144)} = 3\sqrt{33}$$

$$49x^2 = 441 \Rightarrow 7x = 21 \Rightarrow x = 3$$

$$30. (D) x + \frac{1}{x} = 3\sqrt{2}$$

$$x^2 + \frac{1}{x^2} = 16 \quad \dots (i)$$

$$x^3 + \frac{1}{x^3} + 9\sqrt{2} = 54\sqrt{2}$$

$$x^3 + \frac{1}{x^3} = 45\sqrt{2} \quad \dots (ii)$$

multiply eqn (i) and (ii)

$$x^5 + \frac{1}{x^5} + 3\sqrt{2} = 720\sqrt{2}$$

$$x^5 + \frac{1}{x^5} = 717\sqrt{2}$$

$$31. (A) x^2 - 7x + 1 = 0$$

divide by x

$$x - 7 + \frac{1}{x} = 0$$

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

$$32. (B) x^2 + 2\sqrt{10}x + 1 = 0$$

Divide by x

$$x + 2\sqrt{10} + \frac{1}{x} = 0$$

$$x + \frac{1}{x} = -2\sqrt{10}$$

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

$$x^2 + \frac{1}{x^2} + 2 = 40$$

Square both sides

$$x^2 + \frac{1}{x^2} + 2 = 40$$

Sustract -2 in both sides

$$x^2 + \frac{1}{x^2} = 38$$

$$x^2 + \frac{1}{x^2} - 2 = 36$$

$$\left(x - \frac{1}{x}\right)^2 = (6)^2$$

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

$$33. (C) \frac{3x-1}{x} + \frac{5y-1}{y} + \frac{7z-1}{z} = 0$$

$$3 - \frac{1}{x} + 5 - \frac{1}{y} + 7 - \frac{1}{z} = 0$$

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

$$34. (C) x^2 - 3x + 1 = 0$$

divide by x

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

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

Square in both sides

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

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

Square in both sides

$$\left(x^2 + \frac{1}{x^2}\right)^2 = 7^2 \Rightarrow x^4 + \frac{1}{x^4} + 2 = 49$$

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

35. (D) $\frac{(a^2 + b^2)(a-b) - (a-b)^3}{a^2b - ab^2}$

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

$$\frac{a^2 + b^2 - a^2 - b^2 + 2ab}{ab} = 2$$

36. (C) $x + y = 4$

$$\begin{matrix} \sqrt{2} & \sqrt{2} \\ 2 & 2 \end{matrix}$$

$$(2)^3 + (2)^3 + 12 \times 2 \times 2 = 64$$

37. (A) $x^4 + \frac{1}{x^4} = 198$

Subtract both side of - 2

$$x^4 + \frac{1}{x^4} - 2 = 198 - 2$$

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

38. (B) $3x - \frac{1}{3x} = 9$

Divided by 3

$$\left(x - \frac{1}{9x}\right)^2 = 3^2$$

$$x^2 + \frac{1}{81x} = \frac{83}{2}$$

39. (C) $x^3 - y^3 = 112$ and $x - y = 4$

$$(x - y)^3 = 4^3$$

then $xy = 4$

and $(x - y)^2 = 4^2$

$$x^2 + y^2 - 8 = 16$$

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

40. (C) $x = 5 - \frac{1}{x}$

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

$$x^2 + \frac{1}{x^2} = 23 \text{---(i)} \quad x^3 + \frac{1}{x^3} + 3(5) = 125$$

$$x^3 + \frac{1}{x^3} = 110 \text{---(ii)}$$

multiplie eqn (i) and (ii)

$$x^5 + \frac{1}{x^5} = 2525$$

41. (D) $(x - y) = 3$

A.T.Q

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

$$(3)^3 = x^3 - y^3 - 3xy \times 3$$

$$27 = x^3 - y^3 - 9xy$$

42. (C) $x^2 - 9x + 1 = 0$ Equation Divisible by x

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

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

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

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

43. (A) A.T.Q.

$$= \frac{(1-c) + (1-a) + (1-b)}{(1-a)(1-b)(1-c)} = \frac{3 - (a+b+c)}{(1-a)(1-b)(1-c)}$$

$$\therefore a + b + c = 3$$

$$= \frac{3-3}{(1-a)(1-b)(1-c)} = 0$$

44. (C) $= \frac{a^2 + b^2(a-b) - (a^3 - b^3)}{a^2b - ab^2}$

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

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

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

45. (D)

46. (B) A.T.Q.

$$\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 0 \quad \dots (1)$$

$$\text{and } x + y + z = 7 \quad \dots (2)$$

$$\text{then } x^3 + y^3 + z^3 - 3xyz = ?$$

eqn. (i)

$$xy + yz + zx = 0$$

eqn. (ii)

$$(x + y + z)^3 = 7^3$$

$$x^3 + y^3 + z^3 - 3xyz + 21(xy + yz + zx) = 343$$

$$x^3 + y^3 + z^3 - 3xyz = 343$$

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

$$x^2 + \frac{1}{x^2} = 23 \quad \dots (1)$$

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

$$x^4 + \frac{1}{x^4} = 527 \quad \dots (2)$$

Multiplying eqn. (1) and (2)

$$x^6 + \frac{1}{x^6} + x^2 + \frac{1}{x^2} = 12121$$

$$x^6 + \frac{1}{x^6} = 12098$$

48. (B) $\left(x^2 + \frac{1}{x^3}\right)^2 = \left(\frac{7}{4}\right)^2$

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

$$x^4 + \frac{1}{x^4} + 2 = \frac{49}{16}$$

$$x^4 + \frac{1}{x^4} = \frac{17}{16}$$

49. (B) $x + \frac{1}{x} = -2 \quad 1 + x^3 + x^6 = ?$

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

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

$$(x + 1)(x + 1)$$

$$x = -1$$

$$1 + (-1)^3 + (-1)^6 = 1$$

50. (D)

51. (D) $x = 17 - 4\sqrt{18}$

$$= 17 - 2\sqrt{72}$$

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

$$\sqrt{x} + \frac{1}{\sqrt{x}} = 3 - 2\sqrt{2} + 3 + 2\sqrt{2} = 6$$

52. (A) $a^2 + b^2 + c^2 + \frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2}$

Put the value $a = b = c = 1$

$$a^2 + b^2 + c^2$$

$$1^2 + 1^2 + 1^2 = 3$$

53. (D) $3x^2 - 9x + 3 = 0$

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

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

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

$$\left(x + \frac{1}{x}\right)^3 = (3)^3 \Rightarrow \left(x + \frac{1}{x}\right)^3 = 27$$

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

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

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

$$= 27 + 9 = 36$$

55. (B) $x^2 - 9x - 1 = 0$

$$x - 9 - \frac{1}{x} = 0$$

$$x - \frac{1}{x} = 9$$

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

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

$$9^2 + 2 + 5 \times 9$$

$$81 + 2 + 45$$

$$= 128$$

56. (C) $\left(x + \frac{1}{5x}\right)^2 = x^2 + \frac{1}{25x^2} + 2 \times x \times \frac{1}{5x}$
 $x + \frac{1}{5x} = \sqrt{2}$
 $\left(x + \frac{1}{5x}\right)^3 = (\sqrt{2})^3 = x^3$
 $= x^3 + \frac{1}{125x^3} = 2\sqrt{2} - \frac{3\sqrt{2}}{5} = \frac{7\sqrt{2}}{5}$

57. (C) $(a + b) = \frac{1}{ab}$
 $(a + b)^3 = \left(\frac{1}{ab}\right)^3$
 $a^3 + b^3 + 3ab \left(\frac{1}{ab}\right) = \frac{1}{a^3b^3}$
 $\frac{1}{a^3b^3} - a^3 - b^3 = 3$

58. (A) $\left(y^2 + \frac{1}{y^2}\right)^2 = y^4 + \frac{1}{y^4} + 2y^2 \times \frac{1}{y^2}$
 $\left(y^2 + \frac{1}{y^2}\right)^2 = 225$
 $y^2 + \frac{1}{y^2} = 15$

59. (B) $(c - d) = \frac{c + d}{5} = \frac{cd}{3}$
 $\frac{c - d}{1} = \frac{cd}{3}$
 $= \frac{1}{d} - \frac{1}{c} = \frac{1}{3} \dots\dots (I)$
 $= \frac{1}{d} + \frac{1}{c} = \frac{5}{3} \dots\dots (II)$

After equation solving value

$\frac{1}{d} = 1$; $\frac{1}{c} = \frac{2}{3}$; $CD = \frac{3}{2}$

60. (B) $x^6 = y^3$
 6 is LCM of 6 and 3
 $x^{\frac{1}{6} \times 6} = y^{\frac{2}{3} \times 6}$
 $x = y^4$

61. (C) $\frac{a}{3} = 1 - \frac{3}{a}$
 $\frac{a}{3} + \frac{3}{a} = 1$

Let $\frac{a}{3} = x$ or $x + \frac{1}{x} = 1$
 $x^3 = -1$ (Fictional value)

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

$a^3 = (-3)^3$
 $a^3 = -243$

62. (B) $a + b = 6x$
 $(a - 3x) = (3x - b)$

$= \frac{x}{a - 3x} + \frac{x}{b + 3x}$
 $= \frac{x}{a - 3x} - \frac{x}{a - 3x} = \frac{x - x}{(a - 3x)} = 0$

63. (D) $(x + 2)^3 = x^3 + 8 + 6x(x + 2)$
 $(x + 2)^3 = x^3 + 8 + 6x^2 + 12x$
 $(x + 2)^3 = x^3 + 6x^2 + 12x + 8$
 $(x + 2)^3 = 19 + 8$
 $(x + 2)^3 = 27 \quad \therefore x^3 + 6x^2 + 12x = 19$
 $x + 2 = 3$
 $x = 1$

64. (A) $x + \frac{1}{x} = 3$
 $x^2 + 1 = 3x$

$\therefore x^2 + 1 = 3x$

$\frac{x^2 - x + 1}{5x} = \frac{3x - x}{5x} = \frac{2x}{5x} = \frac{2}{5}$

65. (B) $x^2 + 16 = -4x$
 $x^2 + 4x + 16 = 0$

$\frac{x}{4} + \frac{4}{x} + 1 = 0$

$\frac{x}{4} = a$

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

$a^2 + 1 = -1$

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

$a^3 = 1$

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

$x^3 = 64$

$= x^3 - 64$

$= 64 - 64 = 0$

66. (D) $x + 4 = 0$

$$x = -4$$

$$3x^2 + kx + 8 = 0$$

$$3(-4)^2 - 4k + 8 = 0$$

$$48 + 8 = 4k$$

$$56 = 4k$$

$$k = 14$$

67. (D) $x + y + z = 0$

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

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

A.T.Q.

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

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

68. (D) $(a + 4)^3 = a^3 + 64 + 12a(a + 4)$

$$= a^3 + 64 + 12a^2 + 48a$$

Compare to $a^3 + 12a^2 + ka + 6y$

then $k = 48$

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

$$x + \frac{1}{x} = \sqrt{5} \quad \text{Both side cube}$$

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

$$= x^3 + \frac{1}{x} = 2\sqrt{5}$$

70. (D) $x + \frac{1}{x} = \frac{17}{4} \quad \text{Both side cube}$

$$\left(x + \frac{1}{x}\right)^3 = \left(\frac{17}{4}\right)^3$$

$$x^3 + \frac{1}{x^3} + 3 \times \left(\frac{17}{4}\right) = \frac{4913}{64}$$

$$x^3 + \frac{1}{x^3} = \frac{5113}{64} - \frac{51}{4}$$

$$x^3 + \frac{1}{x^3} = \frac{4097}{64}$$

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

यदि $2x - y = 2$ और $xy = \frac{3}{2}$ है, तो $x^3 - \frac{y^3}{8}$ का मान क्या होगा?

- (A) $\frac{9}{2}$ (B) $-\frac{5}{4}$ (C) $\frac{5}{2}$ (D) $\frac{13}{4}$

2. If $847 \times 385 \times 675 \times 3025 = 3^a \times 5^b \times 7^c \times 11^d$, then the value of $ab - cd$ is:

यदि $847 \times 385 \times 675 \times 3025 = 3^a \times 5^b \times 7^c \times 11^d$ है, तो $ab - cd$ का मान ज्ञात करें।

- (A) 4 (B) 5
(C) 1 (D) 7

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

यदि $a + b + c = 1$, $ab + bc + ca = -22$ और $abc = -40$ है, तो $a^3 + b^3 + c^3$ का मान क्या होगा?

- (A) 67 (B) -53
(C) -51 (D) 27

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

यदि $a + b = 8$, $ab = 10$ है, तो $a^3 + b^3$ का मान ज्ञात करें?

- (A) 312 (B) 215
(C) 272 (D) 111

5. If $x^2 - \sqrt{7}x + 1 = 0$, then what is the value of $x^5 + \frac{1}{x^5}$?

यदि $x^2 - \sqrt{7}x + 1 = 0$ है, तो $x^5 + \frac{1}{x^5}$ का मान क्या होगा?

- (A) $19\sqrt{7}$ (B) $21\sqrt{7}$
(C) $25\sqrt{7}$ (D) $27\sqrt{7}$

6. If $\frac{22\sqrt{2}}{4\sqrt{2} - \sqrt{3} + \sqrt{5}} = a + \sqrt{5}b$, with $a, b > 0$, then what is the value of $(ab) : (a + b)$?

यदि $\frac{22\sqrt{2}}{4\sqrt{2} - \sqrt{3} + \sqrt{5}} = a + \sqrt{5}b$ है, जहाँ $a, b > 0$, है, तो

- $(ab) : (a + b)$ का मान क्या होगा?
(A) 7:8 (B) 7:4
(C) 4:7 (D) 8:7

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

is :

यदि $x^2 - 3x + 1 = 0$ है, तो $\frac{\left(x^4 + \frac{1}{x^2}\right)}{(x^2 + 5x + 1)}$ का मान बताइए।

- (A) $\frac{9}{4}$ (B) $\frac{27}{8}$ (C) $\frac{5}{2}$ (D) 2

8. If $x = 32.5$, $y = 34.6$ and $z = 30.9$, then the value of $x^3 + y^3 + z^3 - 3xyz$ is $0.98k$, where k is equal to:

यदि $x = 32.5$, $y = 34.6$ और $z = 30.9$ है, तो $x^3 + y^3 + z^3 - 3xyz$ का मान $0.98k$ होता है, जहाँ k का _____ मान है।

- (A) 1033 (B) 933
(C) 1026 (D) 921

9. If $27x^3 - 64y^3 = (Ax + By)(Cx^2 - Dy^2 + 12xy)$, then the value of $4A + B + 3C + 2D$ is:

यदि $27x^3 - 64y^3 = (Ax + By)(Cx^2 - Dy^2 + 12xy)$ है, तो $4A + B + 3C + 2D$ का मान कितना होगा?

- (A) 5 (B) 3
(C) -3 (D) -4

10. If $\frac{\sqrt{26 - 7\sqrt{3}}}{\sqrt{14 + 5\sqrt{3}}} = \frac{b + a\sqrt{3}}{11}$, $b > 0$, then what is the

value of $\sqrt{(b - a)}$?

यदि $\frac{\sqrt{26 - 7\sqrt{3}}}{\sqrt{14 + 5\sqrt{3}}} = \frac{b + a\sqrt{3}}{11}$, $b > 0$ हो, तो $\sqrt{(b - a)}$ का

मान कितना होगा?

- (A) 5 (B) 25
(C) 12 (D) 9

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11. If $\frac{\sqrt{38-5\sqrt{3}}}{\sqrt{26+7\sqrt{3}}} = \frac{a+b\sqrt{3}}{23}$, $b > 0$, then the value of $(b-a)$ is:

यदि $\frac{\sqrt{38-5\sqrt{3}}}{\sqrt{26+7\sqrt{3}}} = \frac{a+b\sqrt{3}}{23}$, $b > 0$ हो, तो $(b-a)$ का

मान कितना होगा ?

- (A) 7 (B) 18
(C) 29 (D) 11

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

यदि $x + \frac{1}{x} = 3$, $x \neq 0$ है, तो $x^7 + \frac{1}{x^7}$ का मान बताइए ?

- (A) 749 (B) 843
(C) 746 (D) 849

13. If $x^4 + y^4 + x^2y^2 = 17\frac{1}{16}$ and $x^2 - xy + y^2 = 5\frac{1}{4}$, then one of the values of $(x-y)$ is:

यदि $x^4 + y^4 + x^2y^2 = 17\frac{1}{16}$ और $x^2 - xy + y^2 = 5\frac{1}{4}$ है, तो $(x-y)$ का मान बताइए ?

- (A) $\frac{5}{2}$ (B) $\frac{3}{4}$ (C) $\frac{5}{4}$ (D) $\frac{3}{2}$

Solution

1. (D) $2x-y=2$ $xy = \frac{3}{2}$ $x - \frac{y}{2} = 1$

Cubing both sides

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

$$x^3 - \frac{y^3}{8} = 1 + 3(1)\left(\frac{3}{4}\right) = 1 + \frac{9}{4} = \frac{13}{4}$$

2. (B) $847 \times 385 \times 675 \times 3025 = 3^a \times 5^b \times 7^c \times 11^d$
 $= 7 \times 11^2 \times 5^1 \times 7^1 \times 11^1 \times 5^2 \times 3^3 \times 5^2 \times 11^4$
 $= 3^3 \times 5^5 \times 7^2 \times 11^5$

$a = 3, b = 5, c = 2, d = 5$

$ab - cd = 15 - 10 = 5$

3. (B) $a + b + c = 1$, $ab + bc + ca = -22$, $abc = -40$,
 $a^3 + b^3 + c^3 = ?$

$(a + b + c)^2 = 1$

$a^2 + b^2 + c^2 + 2(ab + bc + ca) = 1$

$a^2 + b^2 + c^2 + 2(-22) = 1$

$a^2 + b^2 + c^2 = 45$

$a^3 + b^3 + c^3 - 3abc = (a + b + c)\{a^2 + b^2 + c^2 - (ab + bc + ca)\}$

$a^3 + b^3 + c^3 + 120 = 1\{45 - (-22)\}$

$a^3 + b^3 + c^3 + 120 = 67$

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

4. (C) $a + b = 8$, $ab = 10$, $a^3 + b^3 = ?$

$(a + b)^2 = 8^2$

$a^2 + b^2 + 2ab = 64$

$a^2 + b^2 + 20 = 64$

$a^2 + b^2 = 44$

$a^2 + b^2 - ab = 44 - ab$

$a^2 + b^2 - ab = 44 - 10$

$a^2 + b^2 - ab = 34$

$a^2 + b^2 - ab = 34$

$a^3 + b^3 = (a + b)(a^2 + b^2 - ab)$
 $= 8(34)$
 $= 272$

5. (A) $x^2 - \sqrt{7x} + 1 = 0$, $x^5 + \frac{1}{x^5} = ?$

divide by x

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

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

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

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

$x^3 + \frac{1}{x^3} + 3\sqrt{7} = 7\sqrt{7}$

$x^3 + \frac{1}{x^3} = 4\sqrt{7}$

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

$= (5)(4\sqrt{7}) - \sqrt{7}$

$= 19\sqrt{7}$

6. (A) $\frac{22\sqrt{2}}{4\sqrt{2} - \sqrt{3} + \sqrt{5}} = a + \sqrt{5}b$

$$= \frac{22\sqrt{2}}{4\sqrt{2} - \sqrt{\frac{2(3+\sqrt{5})}{2}}}$$

$$= \frac{22\sqrt{2}}{4\sqrt{2} - \sqrt{\frac{6+2\sqrt{5}}{2}}}$$

$$= \frac{44}{8 - \sqrt{(\sqrt{5}+1)^2}} = \frac{44}{8 - (\sqrt{5}+1)}$$

$$\Rightarrow \frac{44}{7 - \sqrt{5}} = a + \sqrt{5}b$$

$$= \frac{44 \times (7 + \sqrt{5})}{7^2 - 5}$$

$$\Rightarrow \frac{44}{44} (7 + \sqrt{5}) = a + \sqrt{5}b$$

$$\Rightarrow a = 7, b = 1$$

$$ab : a + b = 7 : 8$$

7. (A) $x^2 - 3x + 1 = 0$

1. (D) $[3(x+y)]^3 - [2(x-y)]^3 = (x+5y)[Ax^2 + By^2 + Cxy]$
 $[3(x+y) - 2(x-y)] \times [9(x+y)^2 + 4(x-y)^2 + 6(x^2 - y^2)]$
 $\Rightarrow [3x + 3y - 2x + 2y] \times [9x^2 + 9y^2 + 18xy + 4x^2 + 4y^2 - 8xy + 6x^2 - 6y^2]$
 $\Rightarrow [x + 5y] \times [19x^2 + 7y^2 + 10xy] = [x + 5y] \times [Ax^2 + By^2 + Cxy]$
 $A = 19, B = 7, C = 10$

$$(A + B - C) = (19 + 7 - 10) = 16$$

2. (B) $a^3 + b^3 + c^3 - 3abc = (a + b + c)[(a + b + c)^2 - 3(ab + bc + ca)]$
 $342 = 6[36 - 3(ab + bc + ca)]$
 $57 = 36 - 3(ab + bc + ca)$
 $\frac{21}{-3} = ab + bc + ca$
 $-7 = ab + bc + ca$

3. (D) $3x + \frac{1}{x} = 5 \Rightarrow x + \frac{1}{3x} = \frac{5}{3}$
 $x^2 + \frac{1}{9x^2} = \frac{25}{9} - \frac{2}{3}$
 $\Rightarrow \frac{25 - 6}{9} = \frac{19}{9} = 2\frac{1}{9}$

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

$$\frac{x^4 + \frac{1}{x^2}}{x^2 + 5x + 1} = \frac{x^3 + \frac{1}{x^3}}{x + \frac{1}{x} + 5} = \frac{27 - 9}{3 + 5} = \frac{18}{8} = \frac{9}{4}$$

8. (A) $x = 32.5, Y = 34.6, Z = 30.9$

$$x^3 + y^3 + z^3 - 3xyz = (x+y+z) \times \frac{1}{2}$$

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

$$= \frac{(32.5 + 34.6 + 30.9)}{2}$$

$$\times [(32.5 - 34.6)^2 + (34.6 - 30.9)^2 + (30.9 - 32.5)^2]$$

$$\frac{98}{2} \times [(2.1)^2 + (3.7)^2 + (1.6)^2]$$

$$= 49 \times [4.41 + 13.69 + 2.56]$$

$$= 49 \times 20.66$$

It is given that

$$49 \times 20.66 = 0.98 K$$

$$\Rightarrow K = \frac{20.66}{0.02} = 1033$$

4. (A) $9x^2 + y^2 = 37 \Rightarrow (3x + y)^2 - 6xy = 37$
 $xy = 2 \quad (3x + y)^2 = 49 = 3x + y = 7$
 $(3x + y)(9x^2 + y^2 - 3xy)$
 $7(37 - 3 \times 2)$
 $7(37 - 6)$
 $7 \times 31 = 217$

5. (A) $x^8 - 34x^4 + 1 = 0$

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

$$x^4 - 34 + \frac{1}{x^4} = 0$$

$$x^4 + \frac{1}{x^4} = 34$$

$$\left(x^2 + \frac{1}{x^2}\right)^2 - 2 = 34$$

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

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

15 November 2020 SSC Mains

1. If $27(x+y)^3 - 8(x-y)^3 = (x+5y)(Ax^2 + By^2 + Cxy)$, then what is the value of $(A+B-C)$?
यदि $27(x+y)^3 - 8(x-y)^3 = (x+5y)(Ax^2 + By^2 + Cxy)$ है, तो $(A+B-C)$ का मान ज्ञात कीजिए।
(A) 11 (B) 18
(C) 13 (D) 16
2. If $a+b+c=6$, $a^2+b^2+c^2-3abc=342$, then what is the value of $ab+bc+ca$?
यदि $a+b+c=6$, $a^2+b^2+c^2-3abc=342$ है, तो $ab+bc+ca$ का मान ज्ञात कीजिए।
(A) 8 (B) -7
(C) -5 (D) 5
3. If $3x^2 - 5x + 1 = 0$, then the value of $\left(x^2 + \frac{1}{9x^2}\right)$ is :
यदि $3x^2 - 5x + 1 = 0$ है, तो $\left(x^2 + \frac{1}{9x^2}\right)$ का मान ज्ञात कीजिए।
(A) $1\frac{2}{3}$ (B) $1\frac{1}{3}$
(C) $2\frac{1}{3}$ (D) $2\frac{1}{9}$
4. If $9x^2 + y^2 = 37$ and $xy = 2$, $x, y > 0$, then the value of $(27x^3 + y^3)$ is :
यदि $9x^2 + y^2 = 37$ और $xy = 2$, $x, y > 0$ है, तो $(27x^3 + y^3)$ का मान ज्ञात कीजिए।
(A) 217 (B) 207
(C) 301 (D) 259
5. Given that $x^3 - 34x^4 + 1 = 0$, $x > 0$. What is the value of $(x^3 + x^3)$?
दिया गया है $x^3 - 34x^4 + 1 = 0$, $x > 0$ तो $(x^3 + x^3)$ का मान ज्ञात कीजिए।
(A) $5\sqrt{8}$ (B) $6\sqrt{6}$
(C) $5\sqrt{6}$ (D) $6\sqrt{8}$

16 November 2020 SSC Mains

6. If $a+b+c=7$ and $a^3+b^3+c^3-3abc=175$, then what is the value of $(ab+bc+ca)$?
यदि $a+b+c=7$ और $a^3+b^3+c^3-3abc=175$ है, तो $(ab+bc+ca)$ का मान ज्ञात कीजिए।
(A) 7 (B) 8
(C) 6 (D) 9
7. If $x^2+4y^2=17$ and $xy=2$, where $x > 0, y > 0$, then what is the value of x^3+8y^3 ?
यदि $x^2+4y^2=17$ और $xy=2$ है, जहाँ $x > 0, y > 0$ है, तो x^3+8y^3 का मान ज्ञात कीजिए।
(A) 85 (B) 76
(C) 65 (D) 95
8. If $(x+y)^3+8(x-y)^3=(3x+Ay)(3x^2+Bxy+Cy^2)$, then the value of $A+B+C$ is :
यदि $(x+y)^3+8(x-y)^3=(3x+Ay)(3x^2+Bxy+Cy^2)$ है, तो $A+B+C$ का मान ज्ञात कीजिए।
(A) 0 (B) 4
(C) 2 (D) 3
9. If $2x^2-7x+5=0$, then what is the value of $x^2+\frac{25}{4x^2}$?
यदि $2x^2-7x+5=0$ है, तो $x^2+\frac{25}{4x^2}$ का मान ज्ञात कीजिए।
(A) $9\frac{1}{2}$ (B) $7\frac{1}{4}$ (C) $9\frac{3}{4}$ (D) $5\frac{1}{2}$
10. If $x - \frac{1}{x} = 5$, $x \neq 0$, then what is the value of $\frac{x^6+3x^3-1}{x^6-8x^3-1}$?
यदि $x - \frac{1}{x} = 5$, $x \neq 0$ है, तो $\frac{x^6+3x^3-1}{x^6-8x^3-1}$ का मान ज्ञात कीजिए।
(A) $\frac{13}{12}$ (B) $\frac{11}{13}$ (C) $\frac{3}{8}$ (D) $\frac{4}{9}$

18 November 2020 SSC Mains

11. If $x + \frac{16}{x} = 8$, then the value of $x^2 + \frac{32}{x^2}$ is :
- यदि $x + \frac{16}{x} = 8$ है, तो $x^2 + \frac{32}{x^2}$ का मान ज्ञात कीजिए।
- (A) 24 (B) 18
(C) 20 (D) 16
12. If $x\left(3 - \frac{2}{x}\right) = \frac{3}{x}$, then the value of $x^3 - \frac{1}{x^3}$ is equal to :
- यदि $x\left(3 - \frac{2}{x}\right) = \frac{3}{x}$ है, तो $x^3 - \frac{1}{x^3}$ का मान ज्ञात कीजिए।
- (A) $\frac{61}{27}$ (B) $\frac{52}{27}$
(C) $\frac{8}{27}$ (D) $\frac{62}{27}$
13. If $x^2 + \frac{1}{x^2} = 7$, then the value of $x^3 + \frac{1}{x^3}$ where $x > 0$ is equal to :

यदि $x^2 + \frac{1}{x^2} = 7$ है, तो $x^3 + \frac{1}{x^3}$ का मान ज्ञात करें, जहाँ $x > 0$ है।

- (A) 15 (B) 16
(C) 12 (D) 18

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

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

- (A) 324 (B) 322
(C) 326 (D) 422

15. If $x - \frac{3}{x} = 6$, $x \neq 0$, then the value of $\frac{x^4 - 27}{x^2 - 3x - 3}$ is :

यदि $x - \frac{3}{x} = 6$, $x \neq 0$ है, तो $\frac{x^4 - 27}{x^2 - 3x - 3}$ का मान ज्ञात कीजिए।

- (A) 90 (B) 270
(C) 80 (D) 54

Solution

1. (D) $[3(x+y)]^3 - [2(x-y)]^3 = (x+5y)[Ax^2 + By^2 + Cxy]$
 $[3(x+y) - 2(x-y)] \times [9(x+y)^2 + 4(x-y)^2 + 6(x^2 - y^2)]$
 $\Rightarrow [3x + 3y - 2x + 2y] \times [9x^2 + 9y^2 + 18xy + 4x^2 + 4y^2 - 8xy + 6x^2 - 6y^2]$
 $\Rightarrow [x + 5y] \times [19x^2 + 7y^2 + 10xy] = [x + 5y] \times [Ax^2 + By^2 + Cxy]$
 $A = 19, B = 7, C = 10$
 $(A + B - C) = (19 + 7 - 10) = 16$
2. (B) $a^3 + b^3 + c^3 - 3abc = (a + b + c)[(a + b + c)^2 - 3(ab + bc + ca)]$
 $342 = 6[36 - 3(ab + bc + ca)]$
 $57 = 36 - 3(ab + bc + ca)$
 $\frac{21}{-3} = ab + bc + ca$
 $-7 = ab + bc + ca$
3. (D) $3x + \frac{1}{x} = 5 \Rightarrow x + \frac{1}{3x} = \frac{5}{3}$
 $x^2 + \frac{1}{9x^2} = \frac{25}{9} - \frac{2}{3}$
 $\Rightarrow \frac{25 - 6}{9} = \frac{19}{9} = 2\frac{1}{9}$

4. (A) $9x^2 + y^2 = 37 \Rightarrow (3x + y)^2 - 6xy = 37$
 $xy = 2 \quad (3x + y)^2 = 49 = 3x + y = 7$
 $(3x + y)(9x^2 + y^2 - 3xy)$
 $7(37 - 3 \times 2)$
 $7(37 - 6)$
 $7 \times 31 = 217$
5. (A) $x^8 - 34x^4 + 1 = 0 \quad x^3 + \frac{1}{x^3} = ?$
 $x^4 - 34 + \frac{1}{x^4} = 0$
 $x^4 + \frac{1}{x^4} = 34 \Rightarrow \left(x^2 + \frac{1}{x^2}\right)^2 - 2 = 34$
 $x^2 + \frac{1}{x^2} = 6 \Rightarrow \left(x + \frac{1}{x}\right)^2 - 2 = 6$
 $x + \frac{1}{x} = \sqrt{8}$
 $x^3 + \frac{1}{x^3} = \left(x + \frac{1}{x}\right)^3 - 3\left(x + \frac{1}{x}\right)$
 $= (\sqrt{8})^3 - 3 \times \sqrt{8} \Rightarrow 8\sqrt{8} - 3\sqrt{8} = 5\sqrt{8}$

6. (B) $a+b+c = 7$
 $a^3 + b^3 + c^3 - 3abc$
 $= (a+b+c)[a^2+b^2+c^2-(ab+bc+ca)]$ or
 $= (a+b+c)[(a+b+c)^2-3(ab+bc+ca)]$
 $175 = 7 [49-3(ab+bc+ca)]$
 $ab+bc+ca = \frac{49-25}{3} = 8$
7. (C) $x^2 + 4y^2 = 17$ $xy = 2$
 add both side $\oplus 4xy$
 $x^2 + 4y^2 + 4xy = 17 + 4xy$
 $(x + 2y)^2 = 17 + 4 \times 2$
 $x + 2y = \sqrt{25}$
 $x + 2y = 5$
 $x^3 + 8y^3 = ?$
 $(x + 2y)^3 = 5^3$
 $x^3 + 8y^3 + 3(x)(2y) \times 5 = 125$
 $x^3 + 8y^3 = 125 - 60 = 65$
8. (A) $(x+y)^3 + 8(x-y)^3 = (3x+Ay)(3x^2+Bxy+cy^2)$
 $(x+y)^3 + [2(x-y)]^3 = (3x-y)[x^2+y^2+2xy+4(x^2+y^2-2xy)-2(x^2-y^2)]$
 $= (3x-y)(3x^2+7y^2-6xy)$
 by comparing
 $A = -1$
 $B = -6$
 $C = 7$
 $A+B+C = -1-6+7 = 0$
9. (B) $2x^2 - 7x + 5 = 0$
 $x + \frac{5}{2x} = \frac{7}{2} \Rightarrow x^2 + \frac{25}{4x^2} = \frac{49}{4} - 5 \frac{1}{2}$
 $x^2 + \frac{25}{4x^2} = 7 \frac{1}{4}$
10. (A) $x - \frac{1}{x} = 5 \Rightarrow x^3 - \frac{1}{x^3} = (5)^3 + 3 \times 5 = 140$
 $\frac{x^6 + 3x^3 - 1}{x^6 - 8x^3 - 1} = \frac{x^3[x^3 - \frac{1}{x^3} + 3]}{x^3[x^3 - \frac{1}{x^3} - 8]}$
 $= \frac{140 + 3}{140 - 8} = \frac{143}{132} = \frac{13}{12}$
11. (B) Put $x = 4$
 $4 + \frac{16}{4} = 8 \Rightarrow x^2 + \frac{32}{x^2} = 16 + \frac{32}{16} = 18$

12. (D) $3x - 2 = \frac{3}{x}$
 $3x - \frac{3}{x} = 2 \Rightarrow x - \frac{1}{x} = \frac{2}{3}$
 $x^3 - \frac{1}{x^3} = \left(x - \frac{1}{x}\right)^3 + 3\left(x - \frac{1}{x}\right)$
 $= \frac{8}{27} + 3 \times \frac{2}{3} \Rightarrow x^3 - \frac{1}{x^3} = \frac{62}{27}$
13. (D) $\left(x + \frac{1}{x}\right)^2 = x^2 + \frac{1}{x^2} + 2 = 7 + 2 = 9$
 $x + \frac{1}{x} = 3$
 $x^3 + \frac{1}{x^3} = \left(x + \frac{1}{x}\right)^3 - 3\left(x + \frac{1}{x}\right)$
 $= 27 - 3 \times 3 = 18$
14. (B) $\sqrt{x} + \frac{1}{\sqrt{x}} = 3$
 $x + \frac{1}{x} = 9 - 2$
 $x + \frac{1}{x} = 7$
 $x^3 + \frac{1}{x^3} = (7)^3 - 3 \times 7$
 $= 343 - 21 = 322$
15. (A) $x - \frac{3}{x} = 6$
 $\frac{x\left(x^3 - \frac{27}{x^3}\right)}{x\left(x - \frac{3}{x} - 3\right)} = \frac{(216+54)}{(6-3)}$
 $= \frac{270}{3} = 90$

1. If $x^8 - 1442x^4 + 1 = 0$, then a possible value of $x - \frac{1}{x}$ is :

यदि $x^8 - 1442x^4 + 1 = 0$ तो $x - \frac{1}{x}$ का संभावित मान है :

(A) 5 (B) 8
(C) 4 (D) 6

2. If $\sqrt{86 - 60\sqrt{2}} = a - b\sqrt{2}$, then what will be the value of $\sqrt{a^2 + b^2}$, correct to one decimal place?

यदि $\sqrt{86 - 60\sqrt{2}} = a - b\sqrt{2}$ है, तो $\sqrt{a^2 + b^2}$ का दशमलव स्थान तक सही मान क्या होगा ?

(A) 8.4 (B) 8.2
(C) 7.8 (D) 7.2

3. 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) $2\sqrt{3}$

4. If $x + y + z = 11$, $x^2 + y^2 + z^2 = 133$ and $x^3 + y^3 + z^3 = 881$, then the value of $\sqrt[3]{xyz}$ is :

यदि $x + y + z = 11$, $x^2 + y^2 + z^2 = 133$ और $x^3 + y^3 + z^3 = 881$ तो $\sqrt[3]{xyz}$ का मान है :

(A) -6 (B) 6
(C) -8 (D) 8

5. Let a, b and c be the fractions such that $a < b < c$. If c is divided by a, the result is $\frac{5}{2}$, which exceeds b by $\frac{7}{4}$. If $a + b + c = 1\frac{11}{12}$ then $(c - a)$ will be equal to :

a, b और c ऐसे भिन्न हैं कि $a < b < c$ हैं। यदि c, a से विभाज्य है, तो परिणाम $\frac{5}{2}$ निकलता है, जो b से $\frac{7}{4}$ अधिक है। यदि $a + b +$

$c = 1\frac{11}{12}$ है, तो $(c - a)$ निम्नलिखित में से किसके बराबर है ?

(A) $\frac{1}{3}$ (B) $\frac{2}{3}$ (C) $\frac{1}{6}$ (D) $\frac{1}{2}$

6. If $(a + b) : (b + c) : (c + a) = 7 : 6 : 5$ and $a + b + c = 27$, then what will be the value of $\frac{1}{a} : \frac{1}{b} : \frac{1}{c}$?

यदि $(a + b) : (b + c) : (c + a) = 7 : 6 : 5$ और $a + b + c = 27$ तो $\frac{1}{a} : \frac{1}{b} : \frac{1}{c}$?

(A) 3 : 6 : 4 (B) 3 : 2 : 4
(C) 4 : 3 : 6 (D) 3 : 4 : 2

7. If $x = \sqrt{1 + \frac{\sqrt{3}}{2}} - \sqrt{1 - \frac{\sqrt{3}}{2}}$, then the value of $\frac{\sqrt{2-x}}{\sqrt{2+x}}$ will be closest to :

यदि $x = \sqrt{1 + \frac{\sqrt{3}}{2}} - \sqrt{1 - \frac{\sqrt{3}}{2}}$ है, तो $\frac{\sqrt{2-x}}{\sqrt{2+x}}$ का मान किसके निकटतम होगा ?

(A) 0.17 (B) 0.12
(C) 1.4 (D) 1.2

8. If $a^3 + b^3 = 218$ and $a + b = 2$, then the value of ab is :

यदि $a^3 + b^3 = 218$ और $a + b = 2$ तो ab का मान है :

(A) 34 (B) -35
(C) -31 (D) 32

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

यदि $2\sqrt{2}x^3 - 3\sqrt{3}y^3 = (\sqrt{2}x - \sqrt{3}y)(Ax^2 + By^2 + Cxy)$ है, तो $A^2 + B^2 - C^2$ का मान है ?

(A) 11 (B) 7
(C) 19 (D) 10

Mother's Advance Maths • Algebra [Previous Year Questions]

10. Three fractions, x , y and z are such that $x > y > z$. When the smallest of them is divided by the greatest, the result is $\frac{9}{16}$, which exceeds y by 0.0625. If $x + y + z = 1\frac{13}{24}$, then the value of $x + z$ is :

तीन भिन्न अंक x , y और z , $x > y > z$ के समान हैं। जब उनमें से सबसे छोटे को सबसे बड़े से विभाजित किया जाता है तो परिणाम $\frac{9}{16}$ निकलता है जो कि y से 0.0625 अधिक है। यदि $x + y + z =$

$1\frac{13}{24}$ तो $x + z$ का मान है :

- (A) $\frac{7}{8}$ (B) 1 (C) $\frac{25}{24}$ (D) $\frac{7}{6}$

11. If $x + \frac{1}{16x} = 3$, then the value of $16x^3 + \frac{1}{256x^3}$ is:

यदि $x + \frac{1}{16x} = 3$ है, तो $16x^3 + \frac{1}{256x^3}$ का मान होगा :

- (A) 423 (B) 441
(C) 432 (D) 414

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

यदि $x + y + z = 2$, $xy + yz + zx = -11$ और $xyz = -12$ है, तो $\sqrt{x^3 + y^3 + z^3 - 2}$ का मान है :

- (A) 6 (B) 12
(C) 9 (D) 8

13. The value of $\frac{(0.545)(0.081)(0.51)(5.2)}{(0.324)^3 + (0.221)^3 - (0.545)^3}$ is :

$\frac{(0.545)(0.081)(0.51)(5.2)}{(0.324)^3 + (0.221)^3 - (0.545)^3}$ का मान है :

- (A) -1 (B) 1
(C) 3 (D) -3

14. If $x^4 - 83x^2 + 1 = 0$, then a value of $x^3 - x^{-3}$ can be:

यदि $x^4 - 83x^2 + 1 = 0$ तो $x^3 - x^{-3}$ का मान हो सकता है :

- (A) 758 (B) 756
(C) 739 (D) 737

15. If $(5x + 1)^3 + (x - 3)^3 + 8(3x - 4)^3 = 6(5x + 1)(x - 3)(3x - 4)$, then x is equal to :

यदि $(5x + 1)^3 + (x - 3)^3 + 8(3x - 4)^3 = 6(5x + 1)(x - 3)(3x - 4)$ है, तो x का मान निम्नलिखित के बराबर होगा :

- (A) $\frac{5}{6}$ (B) $\frac{1}{3}$ (C) $\frac{2}{3}$ (D) $\frac{3}{4}$

16. If $8x^3 - 27y^3 = (Ax + By)(Cx^2 - Dy^2 + 6xy)$, then $(A + B + C - D)$ is equal to :

यदि $8x^3 - 27y^3 = (Ax + By)(Cx^2 - Dy^2 + 6xy)$ है, तो $(A + B + C - D)$ निम्नलिखित में से किसके बराबर है ?

- (A) -12 (B) 12
(C) 15 (D) 9

17. If $x = \frac{\sqrt{5} - \sqrt{3}}{\sqrt{5} + \sqrt{3}}$ and y is the reciprocal of x , then what is the value of $(x^3 + y^3)$?

यदि $x = \frac{\sqrt{5} - \sqrt{3}}{\sqrt{5} + \sqrt{3}}$ है और y , x का व्युत्क्रम है, तो $(x^3 + y^3)$ का

मान है :

- (A) 488 (B) 504
(C) 472 (D) 476

18. If $\sqrt{10 - 2\sqrt{21}} + \sqrt{8 + 2\sqrt{15}} = \sqrt{a} + \sqrt{b}$, where a and b are positive integers, then the value of \sqrt{ab} is closest to :

यदि $\sqrt{10 - 2\sqrt{21}} + \sqrt{8 + 2\sqrt{15}} = \sqrt{a} + \sqrt{b}$ में a और b धनात्मक पूर्णांक हैं, तो \sqrt{ab} का निकटतम मान है :

- (A) 4.6 (B) 5.9
(C) 6.8 (D) 7.2

19. $ab(a - b) + bc(b - c) + ca(c - a)$ is equal to : $ab(a - b) + bc(b - c) + ca(c - a)$ निम्नलिखित में से किसके बराबर है ?

- (A) $(a + b)(b - c)(c - a)$
(B) $(a - b)(b + c)(c - a)$
(C) $(a - b)(b - c)(c - a)$
(D) $(b - a)(b - c)(c - a)$

20. Given that $(5x - 3)^3 + (2x + 5)^3 + 27(4 - 3x)^3 = 9(3 - 5x)(2x + 5)(3x - 4)$, then the value of $(2x + 1)$ is :

यदि $(5x - 3)^3 + (2x + 5)^3 + 27(4 - 3x)^3 = 9(3 - 5x)(2x + 5)(3x - 4)$ है, तो $(2x + 1)$ का मान क्या होगा ?

- (A) -13 (B) 15
(C) -15 (D) 13

21. If $5\sqrt{5}x^3 + 2\sqrt{2}y^3 = (Ax + \sqrt{2}y)(Bx^2 + 2y^2 + Cxy)$, then the value of $(A^2 + B^2 - C^2)$ is :

यदि $5\sqrt{5}x^3 + 2\sqrt{2}y^3 = (Ax + \sqrt{2}y)(Bx^2 + 2y^2 + Cxy)$, है, तो $(A^2 + B^2 - C^2)$ का मान क्या होगा ?
 (A) 15 (B) 20
 (C) 30 (D) 40

22. If $\frac{3(x^2+1)-7x}{3x} = 6$, $x \neq 0$, then the value of $\sqrt{x} + \frac{1}{\sqrt{x}}$ is :

यदि $\frac{3(x^2+1)-7x}{3x} = 6$, $x \neq 0$ है, तो $\sqrt{x} + \frac{1}{\sqrt{x}}$ का मान क्या होगा ?

(A) $\sqrt{\frac{25}{3}}$ (B) $\sqrt{\frac{11}{3}}$ (C) $\sqrt{\frac{35}{3}}$ (D) $\sqrt{\frac{31}{3}}$

23. a, b and c are three fractions such that $a < b < c$. If c is divided by a, the result is $\frac{9}{2}$, which

exceeds b by $\frac{23}{6}$. The sum of a, b and c is $\frac{19}{12}$.

What is the value of $(2a + b - c)$?

a, b और c, $a < b < c$ के रूप में तीन भिन्न हैं। यदि c को a द्वारा विभाजित किया जाता है तो परिणाम $\frac{9}{2}$ आता है, जो b से $\frac{23}{6}$ अधिक

है। a, b और c का योग $\frac{19}{12}$ है। $(2a + b - c)$ का मान क्या है ?

(A) $\frac{1}{2}$ (B) $\frac{1}{3}$

(C) $\frac{1}{12}$ (D) $\frac{1}{4}$

24. Let $x = \sqrt[3]{27} - \sqrt{6\frac{3}{4}}$ and $y = \frac{\sqrt{45} + \sqrt{605} + \sqrt{245}}{\sqrt{80} + \sqrt{125}}$, then the value of $x^2 + y^2$ is :

यदि $x = \sqrt[3]{27} - \sqrt{6\frac{3}{4}}$ और $y = \frac{\sqrt{45} + \sqrt{605} + \sqrt{245}}{\sqrt{80} + \sqrt{125}}$ है, तो

$x^2 + y^2$ का मान क्या होगा ?

(A) $\frac{223}{36}$ (B) $\frac{221}{36}$

(C) $\frac{221}{9}$ (D) $\frac{227}{9}$

25. If $(5x + 2y) : (10x + 3y) = 5 : 9$, then $(2x^2 + 3y^2) : (4x^2 + 9y^2) = ?$

यदि $(5x + 2y) : (10x + 3y) = 5 : 9$ है, तो $(2x^2 + 3y^2) : (4x^2 + 9y^2) =$

(A) 31 : 87 (B) 10 : 27

(C) 16 : 47 (D) 1 : 3

26. If $x + y + z = 6$, $xyz = -10$ and $x^2 + y^2 + z^2 = 30$, then what is the value of $(x^3 + y^3 + z^3)$?

यदि $x + y + z = 6$, $xyz = -10$ तथा $x^2 + y^2 + z^2 = 30$ है, तो $(x^3 + y^3 + z^3)$ का मान क्या होगा ?

(A) 132 (B) 135

(C) 130 (D) 127

Solution

1. (D) $x^3 - 1442x^4 + 1 = 0$
 $\Rightarrow (x^2)^2 + \frac{1}{(x^2)^2} + 2 = 1444 = (38)^2$
 $\Rightarrow \left(x^2 + \frac{1}{x^2}\right) = 38$
 $\Rightarrow \left(x - \frac{1}{x}\right) = 6$

2. (C) $\sqrt{86 - 60\sqrt{2}} = a - b\sqrt{2}$
 $\Rightarrow \sqrt{(6)^2 + (5\sqrt{2})^2} - 2 \times 6 \times 5\sqrt{2}$

$$= a - b\sqrt{2}$$

$$\Rightarrow (6 - 5\sqrt{2})^2 = a - b\sqrt{2}$$

$$\Rightarrow a = 6, b = 5$$

$$\text{So, } \sqrt{(6)^2 + (5)^2} = \sqrt{61} = 7.8$$

3. (C) $a^2 - 8a + 16 + b^2 - 8b + 16 + c^2 + 16c + 64 = 0$
 $\Rightarrow (a - 4)^2 + (b - 4)^2 + (c + 8)^2 = 0$
 $\Rightarrow a = 4, b = 4, c = -8$

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

4. (A) $(xy + yz + xz) = \frac{(x + y + z)^2 - (x^2 + y^2 + z^2)}{2}$
 $= \frac{121 - 133}{2} = -6$

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$$\begin{aligned} x^3 + y^3 + z^3 - 3xyz &= (x+y+z)[x^2+y^2+z^2-(xy+yz+zx)] \\ \Rightarrow 881 - 3xyz &= 11(133+6) \\ \Rightarrow xyz &= \frac{881-1529}{3} \\ &= \frac{-648}{3} = -216, \Rightarrow \sqrt[3]{xyz} = -6 \end{aligned}$$

5. (D) $\frac{c}{a} = \frac{5}{2}$
 $\Rightarrow b = \frac{5}{2} - \frac{7}{4} = \frac{3}{4}$
 $\Rightarrow a+c = \frac{23}{12} - \frac{3}{4} = \frac{7}{6}$

So, $(c-a) = \frac{3}{7} \times \frac{7}{6} = \frac{1}{2}$

6. (C) $(a+b):(b+c):(c+a) = 7:6:5$
 $\Rightarrow (a+b+c) = 27$
 $a = 9$
 $b = 12$
 $c = 6$

So, $\frac{1}{a}:\frac{1}{b}:\frac{1}{c} = \frac{1}{9}:\frac{1}{12}:\frac{1}{6}$
 $= 4:3:6$

7. (A) $x = \sqrt{1+\frac{\sqrt{3}}{2}} - \sqrt{1-\frac{\sqrt{3}}{2}}$
 $\Rightarrow x = \frac{\sqrt{3}+1}{2} - \frac{(\sqrt{3}-1)}{2} = 1$

So, $\frac{\sqrt{2}-x}{\sqrt{2}+x} = \frac{\sqrt{2}-1}{\sqrt{2}+1} = \frac{.414}{2.414} = 0.17$

8. (B) $a^3 + b^3 = 218, a+b=2$
 $(a+b)^3 = a^3 + b^3 + 3ab(a+b)$
 $\Rightarrow (2)^3 = 218 + 3 \times 2 ab$
 $\Rightarrow ab = -35$

9. (B) $2\sqrt{2}x^3 - 3\sqrt{3}y^3 = (\sqrt{2}x - \sqrt{3}y)(Ax^2 + By^2 + Cxy)$
 $\Rightarrow (\sqrt{2}x)^3 - (\sqrt{3}y)^3$
 $= (\sqrt{2}x - \sqrt{3}y)(2x^2 + 3y^2 + \sqrt{6}xy)$
 $\Rightarrow A=2, B=3, C=\sqrt{6}$
 $A^2 + B^2 - C^2 = 4 + 9 - 6 = 7$

10. (C) $x > y > z$
 $\frac{z}{x} = \frac{9}{16}, \frac{9}{16} - y = \frac{625}{10000}$
 $y = \frac{9}{16} - \frac{25}{400}$

$$y = \frac{9}{16} - \frac{1}{16} = \frac{1}{2} \quad \dots(i)$$

$$x+y+z = 1 \frac{13}{24} = \frac{37}{24}$$

$$x+z = \frac{37}{24} - \frac{1}{2}$$

putting value of y from eq. (i)

$$\Rightarrow x+z = \frac{37}{24} - \frac{12}{24}$$

$$\boxed{x+z = \frac{25}{24}}$$

11. (A) $x + \frac{1}{16x} = 3$

$$x^3 + \frac{1}{16^3 x^3} + \frac{3}{16} \times 3 = 27$$

$$x^3 + \frac{1}{16^3 x^3} = 27 - \frac{9}{16}$$

multiplying whole eq. by 16

$$16x^3 + \frac{1}{256x^3} = 27 \times 16 - 9$$

$$= 423$$

12. (A) $x^3 + y^3 + z^3 - 3xyz$
 $= (x+y+z)[(x+y+z)^2 - 3(xy+yz+zx)]$
 $x^3 + y^3 + z^3 - 3xyz = (2)[(4-3(-11))]$
 $= 2 \times 37$
 $\Rightarrow x^3 + y^3 + z^3 = 74 + 3(-12)$
 $= 74 - 36 = 38$

$$\sqrt{x^3 + y^3 + z^3 - 2} = \sqrt{38 - 2} = 6$$

13. (A) $a^3 + b^3 + c^3 = 3abc$
 if $a+b+c = 0$
 Here, $a = 0.324$
 $b = 0.221$
 $c = -0.545$

$$\Rightarrow \frac{0.545 \times 0.081 \times 0.51 \times 5.2}{-3 \times 0.324 \times 0.221 \times 0.545}$$

$$\Rightarrow -1$$

14. (B) $x^2 + \frac{1}{x^2} = 83$

$$x - \frac{1}{x} = 9$$

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

$$= 729 + 27$$

$$= 756$$

15. (A) $a^3 + b^3 + c^3 = 3abc$
 $\Rightarrow a + b + c = 0$
 $(5x + 1) + (x - 3) + 2(3x - 4) = 0$
 $12x - 10 = 0$
 $\Rightarrow x = \frac{5}{6}$
16. (B) Using formula of $A^3 - B^3 = (A - B)(A^2 + B^2 + AB)$
 $(2x - 3y)(4x^2 + 9y^2 + 6xy)$
 $\Rightarrow A = 2 \quad B = -3 \quad C = 4 \quad D = -9$
 $\Rightarrow A + B + C - D = 2 - 3 + 4 + 9 = 12$
17. (A) $x = \frac{1}{y}, x = \frac{\sqrt{5} - \sqrt{3}}{\sqrt{5} + \sqrt{3}} \times \frac{(\sqrt{5} - \sqrt{3})}{(\sqrt{5} - \sqrt{3})}$
 $= \frac{8 - 2\sqrt{15}}{2}$
 $x = 4 - \sqrt{15}$
 $y = 4 + \sqrt{15}$
 $x^3 + y^3 = (x + y)^3 - 3xy(x + y)$
 $= (8)^3 - 3(8)$
 $= 512 - 24 = 488$
18. (B) $\sqrt{(\sqrt{3})^2 + (\sqrt{5})^2} - 2\sqrt{3}\sqrt{7} + \sqrt{(\sqrt{5})^2 + (\sqrt{3})^2} + 2\sqrt{5}\sqrt{3}$
 $= \sqrt{a} + \sqrt{b}$
 $\Rightarrow \sqrt{7} - \sqrt{3} + \sqrt{5} + \sqrt{3} = \sqrt{a} + \sqrt{b}$
 $\sqrt{7} + \sqrt{5} = \sqrt{a} + \sqrt{b}$
 $\Rightarrow a = 7 \quad b = 5 \Rightarrow \sqrt{ab} = 5.9$
19. (D) $ab(a - b) + bc(b - c) + ca(c - a)$
 $a^2b - ab^2 + b^2c - bc^2 + ca(c - a)$
 $b(a^2 - c^2) + b^2(c - a) + ca(c - a)$
 $b(a + c)(a - c) + b^2(c - a) + ca(c - a)$
 $(c - a)[b^2 + ca - ab - bc]$
 $(c - a)[b(b - a) + c(a - b)]$
 $(b - a)(b - c)(c - a)$
20. (B) $a^3 + b^3 + c^3 = 3abc$
 $\Rightarrow a + b + c = 0$
 $5x - 3 + 2x + 5 + 3(4 - 3x) = 0$
 $-2x + 14 = 0$
 $\Rightarrow x = 7$
 $\Rightarrow (2x + 1) = 2(7) + 1 = 15$
21. (B) $(\sqrt{5}x)^3 + (\sqrt{2}y)^3 = (\sqrt{5}x + \sqrt{2}y)(5x^2 + 2y^2 - \sqrt{10}xy)$
 $\Rightarrow A = \sqrt{5} \quad B = 5, C = -\sqrt{10}$
 $\Rightarrow A^2 + B^2 - C^2 = 5 + 25 - 10 = 20$

22. (D) $\frac{3\left(x + \frac{1}{x}\right) - 7}{3} = 6$
 $\Rightarrow x + \frac{1}{x} = \frac{25}{3}, \sqrt{x} + \frac{1}{\sqrt{x}} = k$
 $\Rightarrow x + \frac{1}{x} + 2 = k^2 \Rightarrow \frac{25}{3} + 2 = k^2$
 $\Rightarrow k^2 = \frac{31}{3} \Rightarrow k = \sqrt{\frac{31}{3}}$
23. (D) $\frac{c}{a} = \frac{9}{2} \quad \frac{9}{2} - b = \frac{23}{6}$
 $a + b + c = \frac{19}{12} \Rightarrow b = \frac{4}{6} = \frac{2}{3}$
 $a + c = \frac{11}{12} \Rightarrow a + \frac{9}{2}a = \frac{11}{12}$
 $\frac{11a}{2} = \frac{11}{12} \Rightarrow a = \frac{1}{6}$
 $\Rightarrow c = \frac{9}{6} = \frac{3}{2}$
 $2a + b - c = 2 \times \frac{1}{6} + \frac{2}{3} - \frac{3}{2} = \frac{1}{3} + \frac{2}{3} - \frac{3}{2} = 1 - \frac{3}{2} = \frac{1}{2}$
24. (A) $x = 3^2 - \frac{\sqrt{27}}{2} \quad x = 3^2 - \frac{3^{\frac{3}{2}}}{2}$
 $x^2 = 3 + \frac{27}{4} - 9 \Rightarrow \frac{27}{4} - 6$
 $y = \frac{3\sqrt{5} + 11\sqrt{5} + 7\sqrt{5}}{4\sqrt{5} + 5\sqrt{5}} = \frac{21\sqrt{5}}{9\sqrt{5}} = \frac{7}{3}$
 $y^2 = \frac{49}{9}$
 $x^2 + y^2 = \frac{27}{4} - 6 + \frac{49}{9} = \frac{243 - 216 + 196}{36}$
 $x^2 + y^2 = \frac{223}{36}$
25. (A) $\frac{5x + 2y}{10x + 3y} = \frac{5}{9}$
 $45x + 18y = 50x + 15y$
 $5x = 3y \Rightarrow \frac{x}{y} = \frac{3}{5}$
 $= \frac{2x^2 + 3y^2}{4x^2 + 9y^2} = \frac{18 + 75}{36 + 225} = \frac{93}{261} = \frac{31}{87}$
26. (A) $x^3 + y^3 + z^3 - 3xyz = (x + y + z)(x^2 + y^2 + z^2 - xy - yz - zx)$
 $x^3 + y^3 + z^3 + 30 = (6) \left(30 - \left[\frac{36 - 30}{2} \right] \right)$
 $= 6 \times (30 - 3)$
 $= 27 \times 6 = 162$
 $\Rightarrow x^3 + y^3 + z^3 = 162 - 30 = 132$

ALGEBRA

बीजगणित

(Previous Year Questions)

(SSC MAINS - 2017)

- What is the value of $1006^2 - 1007 \times 1005 + 1008 \times 1004 - 1009 \times 1003$?
 $1006^2 - 1007 \times 1005 + 1008 \times 1004 - 1009 \times 1003$ का मान क्या है?
 (A) 6 (B) 13 (C) 12 (D) 24
- If $a^2 + b^2 = 4b + 6a - 13$, then what is the value of $a + b$?
 यदि $a^2 + b^2 = 4b + 6a - 13$ है, तो $a + b$ का मान क्या है?
 (A) 3 (B) 2 (C) 5 (D) 10
- x and y are positive integers. If $x^2 + y^2 + x^2y^2 = 481$ and $xy = 12$, then what is the value of $x^2 - xy + y^2$?
 x तथा y एक धनात्मक पूर्णांक है। यदि $x^2 + y^2 + x^2y^2 = 481$ तथा $xy = 12$ है, तो $x^2 - xy + y^2$ का मान क्या है?
 (A) 16 (B) 13 (C) 11 (D) 15
- If $A = 1 + 2^p$ and $B = 1 + 2^{-p}$, then what is the value of B ?
 यदि $A = 1 + 2^p$ तथा $B = 1 + 2^{-p}$ है, तो B का मान क्या है?
 (A) $\frac{(A+1)}{(A-1)}$ (B) $\frac{(A+2)}{(A+1)}$ (C) $\frac{A}{A-1}$ (D) $\frac{(A-2)}{(A+1)}$
- If a and b are roots of the equation $ax^2 + bx + c = 0$, then which equation will have roots $(ab + a + b)$ and $(ab - a - b)$?
 यदि a तथा b समीकरण $ax^2 + bx + c = 0$ के मूल हैं, तो किस समीकरण के मूल $(ab + a + b)$ तथा $(ab - a - b)$ होंगे?
 (A) $a^2x^2 + 2acx + c^2 + b^2 = 0$
 (B) $a^2x^2 - 2acx + c^2 - b^2 = 0$
 (C) $a^2x^2 - 2acx + c^2 + b^2 = 0$
 (D) $a^2x^2 + 2acx + c^2 - b^2 = 0$
- If $\sqrt{(1-p^2)(1-q^2)} = \frac{\sqrt{3}}{2}$, then what is the value of $\sqrt{2p^2 + 2q^2 + 2pq} + \sqrt{2p^2 + 2q^2 - 2pq}$?
 यदि $\sqrt{(1-p^2)(1-q^2)} = \frac{\sqrt{3}}{2}$ है, तो $\sqrt{2p^2 + 2q^2 + 2pq} + \sqrt{2p^2 + 2q^2 - 2pq}$ का मान क्या है?
 (A) 2 (B) $\sqrt{2}$
 (C) 1 (D) None of these
- If $(a+b)^2 - 2(a+b) = 80$ and $ab = 16$, then what can be the value of $3a - 19b$?
 यदि $(a+b)^2 - 2(a+b) = 80$ तथा $ab = 16$ हैं, तो $3a - 19b$ का मान क्या हो सकता है?
 (A) -16 (B) -14 (C) -18 (D) -20
- If $x^{y+z} = 1$, $y^{x+z} = 1024$ and $z^{x+y} = 729$ (x, y and z are natural numbers), then what is the value of $(z+1)^{y+x+1}$?
 यदि $x^{y+z} = 1$, $y^{x+z} = 1024$ तथा $z^{x+y} = 729$ (x, y तथा z प्राकृतिक संख्याएँ हैं) तो $(z+1)^{y+x+1}$ का मान क्या है?
 (A) 6561 (B) 10000
 (C) 4096 (D) 14641
- If $a = \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}}$ and $b = \frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}}$, then what is the value of $a^2 + b^2 = ab$?
 यदि $a = \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}}$ तथा $b = \frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}}$ हैं, तो $a^2 + b^2 = ab$ का मान क्या है?
 (A) 97 (B) $(2\sqrt{3}) + 2$
 (C) $(4\sqrt{6}) + 1$ (D) 98
- If the difference between the roots of the equation $Ax^2 - Bx + C = 0$ is 4, then which of the following is TRUE?
 यदि समीकरण $Ax^2 - Bx + C = 0$ के मूलों का अंतर 4 है, तो निम्नलिखित में से कौन-सा सत्य है?
 (A) $B^2 - 16A^2 = 4AC + 4B^2$
 (B) $B^2 - 10A^2 = 4AC + 6A^2$
 (C) $B^2 - 8A^2 = 4AC + 10A^2$
 (D) $B^2 - 16A^2 = 4AC + 8B^2$
- α and β are the roots of quadratic equation. If $\alpha + \beta = 8$ and $\alpha - \beta = 2\sqrt{5}$, then which of the following equation will have roots α^4 and β^4 ?
 α तथा β द्विघात समीकरण के मूल हैं। यदि $\alpha + \beta = 8$ तथा $\alpha - \beta = 2\sqrt{5}$ हैं, तो α^4 तथा β^4 निम्नलिखित में से किस समीकरण के मूल हैं?
 (A) $x^2 - 1522x + 14641 = 0$
 (B) $x^2 + 1921x + 14641 = 0$
 (C) $x^2 - 1764x + 14641 = 0$
 (D) $x^2 + 2520x + 14641 = 0$

12. If a and b are the roots of the equation $Px^2 - Qx + R = 0$, then what is the value of

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

यदि a तथा b समीकरण $Px^2 - Qx + R = 0$ के मूल हैं, तो

$$\left(\frac{1}{a^2}\right) + \left(\frac{1}{b^2}\right) + \left(\frac{a}{b}\right) + \left(\frac{b}{a}\right) \text{ का मान क्या है ?}$$

(A) $\frac{(Q^2 - 2P)(2R + P)}{PR^2}$ (B) $\frac{(Q^2 - 2PR)(R + P)}{PR^2}$

(C) $\frac{(Q^2 - 2R)(2P + R)}{P^2R^2}$ (D) $\frac{(Q^2 - 2PR)(2R + 2P)}{P^2R^2}$

13. If $x^2 + 16x + 59 = 0$, then what is the value of $(x - 6)^2 + \left[\frac{1}{(x - 6)^2}\right] ?$

$$(x - 6)^2 + \left[\frac{1}{(x - 6)^2}\right] ?$$

यदि $x^2 + 16x + 59 = 0$ है, तो $(x - 6)^2 + \left[\frac{1}{(x - 6)^2}\right]$ का मान क्या है ?

- (A) 14 (B) 18
(C) 16 (D) 20

14. If A and B are the roots of the equation $Ax^2 - A^2x + AB = 0$, then what is the value of A and B respectively?

यदि A तथा B समीकरण $Ax^2 - A^2x + AB = 0$ के मूल हैं, तो क्रमशः A तथा B का मान क्या है ?

- (A) 1, 0 (B) 1, 1
(C) 0, 2 (D) 0, 1

15. α and β are the roots of the quadratic equation $x^2 - x - 1 = 0$. What is the value of $\alpha^8 + \beta^8$?

α तथा β द्विघात समीकरण $x^2 - x - 1 = 0$ के मूल हैं। $\alpha^8 + \beta^8$ का मान क्या है ?

- (A) 47 (B) 54 (C) 59 (D) 68

16. If $a + b + c = 9$, $ab + bc + ca = 26$, $a^3 + b^3 = 91$, $b^3 + c^3 = 72$ and $c^3 + a^3 = 35$, then what is the value of abc ?

यदि $a + b + c = 9$, $ab + bc + ca = 26$, $a^3 + b^3 = 91$, $b^3 + c^3 = 72$ तथा $c^3 + a^3 = 35$ हैं, तो abc का मान क्या है ?

- (A) 48 (B) 24
(C) 36 (D) 42

17. If $x^3 - 4x^2 + 19 = 6(x - 1)$, then what is the value

$$\text{of } \left[x^2 + \left(\frac{1}{x - 4}\right)\right] ?$$

यदि $x^3 - 4x^2 + 19 = 6(x - 1)$ है, तो $\left[x^2 + \left(\frac{1}{x - 4}\right)\right]$ का मान क्या है ?

- (A) 3 (B) 5
(C) 6 (D) 8

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

8 पेंसिल, 5 कलम तथा 3 रबड़ का मूल्य 111 रु. है। 9 पेंसिल, 6 कलम तथा 5 रबड़ का मूल्य 130 रु. है। 16 पेंसिल, 11 कलम तथा 3 रबड़ का मूल्य 221 रु. है। 39 पेंसिल, 26 कलम तथा 13 रबड़ का मूल्य (रु. में) क्या है ?

- (A) 316 (B) 546
(C) 624 (D) 482

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

यदि $2x + 3y - 5z = 18$, $3x + 2y + z = 29$ तथा $x + y + 3z = 17$ हैं, तो $xy + yz + zx$ का मान क्या है ?

- (A) 32 (B) 52
(C) 64 (D) 46

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

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

- (A) 793 (B) 681
(C) 758 (D) 715

21. If $\frac{x + y}{z} = 2$, then what is the value of

$$\left[\frac{y}{(y - z)}\right] + \left[\frac{x}{(x - z)}\right] ?$$

यदि $\frac{x + y}{z} = 2$ है, तो $\left[\frac{y}{(y - z)}\right] + \left[\frac{x}{(x - z)}\right]$ का मान क्या है ?

- (A) 0 (B) 1
(C) 2 (D) -1

22. If α and β are the roots of equation $x^2 - 2x + 4 = 0$, then what is the equation whose roots are

$$\frac{\alpha^3}{\beta^2} \text{ and } \frac{\beta^3}{\alpha^2} ?$$

यदि α तथा β समीकरण $x^2 - 2x + 4 = 0$ के मूल हैं, तो वह

समीकरण क्या है जिसके मूल $\frac{\alpha^3}{\beta^2}$ तथा $\frac{\beta^3}{\alpha^2}$ हैं ?

- (A) $x^2 - 4x + 8 = 0$
(B) $x^2 - 32x + 4 = 0$
(C) $x^2 - 2x + 4 = 0$
(D) $x^2 - 16x + 4 = 0$

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- 23.** If one root of the equation $Ax^2 + Bx + C = 0$ is two and a half times the others, then which of the following is TRUE?
 यदि समीकरण $Ax^2 + Bx + C = 0$ का एक मूल दूसरे से ढाई गुणा है तो निम्नलिखित में से कौन-सा सत्य है ?
 (A) $7B^2 = 3 CA$ (B) $7B^2 = 4 CA$
 (C) $7B^2 = 36 CA$ (D) $10B^2 = 49 CA$
- 24.** If $x^2 - 12x + 33 = 0$, then what is the value of $(x - 4)^2 + \left[\frac{1}{(x - 4)^2} \right]$?
 यदि $x^2 - 12x + 33 = 0$ है, तो $(x - 4)^2 + \left[\frac{1}{(x - 4)^2} \right]$ का मान क्या है ?
 (A) 16 (B) 14
 (C) 18 (D) 20
- 25.** If $a^4 + 1 = \frac{a^2}{b^2} (4b^2 - b^4 - 1)$, then what is the value of $a^4 + b^4$?
 यदि $a^4 + 1 = \frac{a^2}{b^2} (4b^2 - b^4 - 1)$ है, तो $a^4 + b^4$ का मान क्या है ?
 (A) 2 (B) 16
 (C) 32 (D) 64
- 26.** If $3\sqrt{\frac{1-a}{a}} + 9 = 19 - 3\sqrt{\frac{a}{1-a}}$, then what is the value of a ?
 यदि $3\sqrt{\frac{1-a}{a}} + 9 = 19 - 3\sqrt{\frac{a}{1-a}}$ है, तो a का मान क्या है ?
 (A) $\frac{3}{10}, \frac{7}{10}$ (B) $\frac{1}{10}, \frac{9}{10}$
 (C) $\frac{2}{5}, \frac{3}{5}$ (D) $\frac{1}{5}, \frac{4}{5}$
- 27.** If $a + b = 10$ and $\sqrt{\frac{a}{b}} - 13 = -\sqrt{\frac{b}{a}} - 11$, then what is the value of $3ab + 4a^2 + 5b^2$?
 यदि $a + b = 10$ तथा $\sqrt{\frac{a}{b}} - 13 = -\sqrt{\frac{b}{a}} - 11$ हैं, तो $3ab + 4a^2 + 5b^2$ का मान क्या है ?
 (A) 450 (B) 300
 (C) 600 (D) 750
- 28.** If $3x + 4y - 2z + 9 = 17$, $7x + 2y + 11z + 8 = 23$ and $5x + 9y + 6z - 4 = 18$, then what is the value of $x + y + z - 34$?
 यदि $3x + 4y - 2z + 9 = 17$, $7x + 2y + 11z + 8 = 23$ तथा $5x + 9y + 6z - 4 = 18$ हैं, तो $x + y + z - 34$ का मान क्या है ?
 (A) -28 (B) -14
 (C) -31 (D) -45
- 29.** If $x + 3y - \frac{2z}{4} = 6$, $x + \frac{2}{3}(2y + 3z) = 33$ and $\frac{1}{7}(x + y + z) + 2z = 9$, then what is the value of $46x + 131y$?
 यदि $x + 3y - \frac{2z}{4} = 6$, $x + \frac{2}{3}(2y + 3z) = 33$ तथा $\frac{1}{7}(x + y + z) + 2z = 9$ हैं, तो $46x + 131y$ का मान क्या है ?
 (A) 414 (B) 364
 (C) 384 (D) 464
- 30.** $p^3 + q^3 + r^3 - 3pqr = 4$. If $a = q + r$, $b = r + p$ and $c = p + q$, then what is the value of $a^3 + b^3 + c^3 - 3abc$?
 $p^3 + q^3 + r^3 - 3pqr = 4$ है। यदि $a = q + r$, $b = r + p$ तथा $c = p + q$ हैं, तो $a^3 + b^3 + c^3 - 3abc$ का मान क्या है ?
 (A) 4 (B) 8
 (C) 2 (D) 12
- 31.** If α and β are the roots of the equation $x^2 + x - 1 = 0$, then what is the equation whose roots are α^5 and β^5 ?
 यदि α तथा β समीकरण $x^2 + x - 1 = 0$ के मूल हैं, तो वह समीकरण क्या है जिसके मूल α^5 तथा β^5 हैं ?
 (A) $x^2 + 7x - 1 = 0$ (B) $x^2 - 7x - 1 = 0$
 (C) $x^2 - 11x - 1 = 0$ (D) $x^2 + 11x - 1 = 0$
- 32.** If x and y are natural numbers such that $x + y = 2017$, then what is the value of $(-1)^x + (-1)^y$?
 यदि x तथा y प्राकृतिक संख्याएं इस प्रकार हैं कि $x + y = 2017$ हैं, तो $(-1)^x + (-1)^y$ का मान क्या है ?
 (A) 2 (B) -2
 (C) 0 (D) 1
- 33.** If $x + \left(\frac{1}{x}\right) = \frac{(\sqrt{3}+1)}{2}$, then what is the value of $x^4 + \left(\frac{1}{x^4}\right)$?
 यदि $x + \left(\frac{1}{x}\right) = \frac{(\sqrt{3}+1)}{2}$ है, तो $x^4 + \left(\frac{1}{x^4}\right)$ का मान क्या है ?
 (A) $\frac{(4\sqrt{3}-1)}{4}$ (B) $\frac{(4\sqrt{3}+1)}{2}$
 (C) $\frac{(-4\sqrt{3}-1)}{4}$ (D) $\frac{(-4\sqrt{3}-1)}{2}$

34. If $a + a^2 + a^3 - 1 = 0$, then what is the value of $a^3 + \left(\frac{1}{a}\right)$?

यदि $a + a^2 + a^3 - 1 = 0$ हो, तो $a^3 + \left(\frac{1}{a}\right)$ का मान क्या है?

- (A) 1 (B) 4
(C) 2 (D) 3

35. If $a - \left(\frac{1}{a}\right) = b$, $b - \left(\frac{1}{b}\right) = c$ and $c - \left(\frac{1}{c}\right) = a$, then

what is the value of $\left(\frac{1}{ab}\right) + \left(\frac{1}{bc}\right) + \left(\frac{1}{ca}\right)$?

यदि $a - \left(\frac{1}{a}\right) = b$, $b - \left(\frac{1}{b}\right) = c$ तथा $c - \left(\frac{1}{c}\right) = a$ हैं, तो

$\left(\frac{1}{ab}\right) + \left(\frac{1}{bc}\right) + \left(\frac{1}{ca}\right)$ का मान क्या है?

- (A) -3 (B) -6
(C) -1 (D) -9

36. If the roots of the equation $a(b-c)x^2 + b(c-a)x + c(a-b) = 0$ are equal, then which of the following is true?

यदि समीकरण $a(b-c)x^2 + b(c-a)x + c(a-b) = 0$ के मूल बराबर हैं, तो निम्नलिखित में से कौन सा सही है?

- (A) $b = \frac{(a+c)}{ac}$ (B) $\frac{2}{b} = \left(\frac{1}{a}\right) + \left(\frac{1}{c}\right)$
(C) $2b = \left(\frac{1}{a}\right) + \left(\frac{1}{c}\right)$ (D) $abc = ab + bc + ca$

37. If $\sqrt{(a^2 + b^2 + ab)} + \sqrt{(a^2 + b^2 - ab)} = 1$, then what is the value of $(1 - a^2)(1 - b^2)$?

यदि $\sqrt{(a^2 + b^2 + ab)} + \sqrt{(a^2 + b^2 - ab)} = 1$ हो, तो $(1 - a^2)(1 - b^2)$ का मान क्या है?

- (A) $\frac{1}{4}$ (B) $\frac{4}{7}$ (C) $\frac{5}{4}$ (D) $\frac{3}{4}$

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

यदि $3x + 4y - 11 = 18$ तथा $8x - 6y + 12 = 6$ हैं, तो $5x - 3y - 9$ का मान क्या है?

- (A) 18 (B) -9
(C) -27 (D) -18

39. If $a + b + c = \frac{7}{12}$, $3a - 4b + 5c = \frac{3}{4}$ and $7a - 11b$

$- 13c = \frac{-7}{12}$, then what is the value of $a + c$?

यदि $a + b + c = \frac{7}{12}$, $3a - 4b + 5c = \frac{3}{4}$ तथा $7a - 11b$

$- 13c = \frac{-7}{12}$ हैं, तो $a + c$ का मान क्या है?

- (A) $\frac{1}{2}$ (B) $\frac{5}{12}$ (C) $\frac{3}{4}$ (D) $\frac{1}{4}$

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

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

- (A) 148 (B) 189
(C) 194 (D) 204

41. If $x = (\sqrt{5}) + 1$ and $y = (\sqrt{5}) - 1$, then what is the value of $\left(\frac{x^2}{y^2}\right) + \left(\frac{y^2}{x^2}\right) + 4\left[\left(\frac{x}{y}\right) + \left(\frac{y}{x}\right)\right] + 6$?

यदि $x = (\sqrt{5}) + 1$ तथा $y = (\sqrt{5}) - 1$ हैं, तो

$\left(\frac{x^2}{y^2}\right) + \left(\frac{y^2}{x^2}\right) + 4\left[\left(\frac{x}{y}\right) + \left(\frac{y}{x}\right)\right] + 6$ का मान क्या है?

- (A) 31 (B) $23\sqrt{5}$
(C) $27\sqrt{5}$ (D) 25

42. If $x = 2 + \sqrt{3}$, $y = 2 - \sqrt{3}$ and $z = 1$, then what is the value of $\left(\frac{x}{yz}\right) + \left(\frac{y}{xz}\right) + \left(\frac{z}{xy}\right) + 2\left[\left(\frac{1}{x}\right) + \left(\frac{1}{y}\right) + \left(\frac{1}{z}\right)\right]$?

यदि $x = 2 + \sqrt{3}$, $y = 2 - \sqrt{3}$ तथा $z = 1$ हैं, तो

$\left(\frac{x}{yz}\right) + \left(\frac{y}{xz}\right) + \left(\frac{z}{xy}\right) + 2\left[\left(\frac{1}{x}\right) + \left(\frac{1}{y}\right) + \left(\frac{1}{z}\right)\right]$ का मान क्या है?

- (A) 25 (B) 22
(C) 17 (D) 43

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43. A root of equation $ax^2 + bx + c = 0$ (where a, b and c are rational numbers) is $5 + 3\sqrt{3}$. What is the value of $(a^2 + b^2 + c^2)/(a + b + c)$?
समीकरण $ax^2 + bx + c = 0$ (जहाँ a, b तथा c परिमेय संख्याएँ हैं) का मूल $5 + 3\sqrt{3}$ है। $(a^2 + b^2 + c^2)/(a + b + c)$ का मान क्या है ?
(A) $\frac{35}{3}$ (B) $\frac{37}{3}$ (C) $\frac{-105}{11}$ (D) $\frac{-105}{13}$
44. If $x = \left(\frac{a}{b}\right) + \left(\frac{b}{a}\right)$, $y = \left(\frac{b}{c}\right) + \left(\frac{c}{b}\right)$ and $z = \left(\frac{c}{a}\right) + \left(\frac{a}{c}\right)$, then what is the value of $xyz - x^2 - y^2 - z^2$?
यदि $x = \left(\frac{a}{b}\right) + \left(\frac{b}{a}\right)$, $y = \left(\frac{b}{c}\right) + \left(\frac{c}{b}\right)$ तथा $z = \left(\frac{c}{a}\right) + \left(\frac{a}{c}\right)$ है, तो $xyz - x^2 - y^2 - z^2$ का मान क्या है ?
(A) -4 (B) 2
(C) -1 (D) -6
45. If/यदि $\left[\left(a + \frac{1}{a}\right)^2 - 2\left(a - \frac{1}{a}\right)\right] = 12$, then/हो, तो which of the following is a value of 'a'?
निम्नलिखित में से कौन-सा 'a' का एक मान है ?
(A) $-8 + \sqrt{3}$ (B) $-8 - \sqrt{3}$
(C) $-8 + \sqrt{5}$ (D) None of these
46. If $x^2 - 4x + 1 = 0$, then what is the value of $x^9 + x^7 - 194x^5 - 194x^3$?
यदि $x^2 - 4x + 1 = 0$ हो, तो $x^9 + x^7 - 194x^5 - 194x^3$ का मान क्या है ?
(A) 4 (B) -4 (C) 1 (D) -1
47. If $x + y = 3$, then what is the value of $x^3 + y^3 + 9xy$?
यदि $x + y = 3$ हो, तो $x^3 + y^3 + 9xy$ का मान क्या है ?
(A) 15 (B) 81 (C) 27 (D) 9
48. $A = (x^3 - 1)/(x^2 + 1)$ and $B = (y^3 - 1)/(y^2 + 1)$. If $x = 2$ and $y = 9$, then what is the value of $A^2 + 2AB + AB^2$?
 $A = (x^3 - 1)/(x^2 + 1)$ तथा $B = (y^3 - 1)/(y^2 + 1)$ है। यदि $x = 2$ तथा $y = 9$ हैं, तो $A^2 + 2AB + AB^2$ का मान क्या है ?
(A) 96475 (B) 98625
(C) 92425 (D) 89125
49. If $x - 4y = 0$ and $x + 2y = 24$, then what is the value of $(2x + 3y)/(2x - 3y)$?
यदि $x - 4y = 0$ तथा $x + 2y = 24$ है, तो $(2x + 3y)/(2x - 3y)$ का मान क्या है ?
(A) $\frac{9}{5}$ (B) $\frac{11}{5}$
(C) $\frac{13}{7}$ (D) $\frac{9}{7}$
50. If $\left(\frac{x}{a}\right) + \left(\frac{y}{b}\right) = 3$ and $\left(\frac{x}{b}\right) - \left(\frac{y}{a}\right) = 9$, then what is the value of $\frac{x}{y}$?
यदि $\left(\frac{x}{a}\right) + \left(\frac{y}{b}\right) = 3$ तथा $\left(\frac{x}{b}\right) - \left(\frac{y}{a}\right) = 9$ है, तो $\frac{x}{y}$ का मान क्या है ?
(A) $\frac{(b + 3a)}{(a - 3b)}$ (B) $\frac{(a + 3b)}{(b - 3a)}$
(C) $\frac{(1 + 3a)}{(a - 3b)}$ (D) $\frac{(a + 3b^2)}{(b - 3a^2)}$
51. If $x + y + z = 0$, then what is the value of $\frac{(3y^2 + x^2 + z^2)}{(2y^2 - xz)}$?
यदि $x + y + z = 0$ हो, तो $\frac{(3y^2 + x^2 + z^2)}{(2y^2 - xz)}$ का मान क्या है ?
(A) 2 (B) 1
(C) $\frac{3}{2}$ (D) $\frac{5}{3}$
52. If $P = 7 + 4\sqrt{3}$ and $PQ = 1$, then what is the value of $\frac{1}{P^2} + \frac{1}{Q^2}$?
यदि $P = 7 + 4\sqrt{3}$ तथा $PQ = 1$ है, तो $\frac{1}{P^2} + \frac{1}{Q^2}$ का मान क्या है ?
(A) 196 (B) 194
(C) 206 (D) 182
53. If $a^3 + 3a^2 + 9a = 1$, then what is the value of $a^3 + \left(\frac{3}{a}\right)$?
यदि $a^3 + 3a^2 + 9a = 1$ हो, तो $a^3 + \left(\frac{3}{a}\right)$ का मान क्या है ?
(A) 31 (B) 26
(C) 28 (D) 24

54. x, y and z are real numbers. If $x^3 + y^3 + z^3 = 13$, $x + y + z = 1$ and $xyz = 1$, then what is the value of $xy + yz + zx$?

x, y तथा z वास्तविक संख्याएँ हैं। यदि $x^3 + y^3 + z^3 = 13$, $x + y + z = 1$ तथा $xyz = 1$ हैं, तो $xy + yz + zx$ का मान क्या है ?
(A) -1 (B) 1
(C) 3 (D) -3

55. If $\frac{(a+b)}{c} = \frac{6}{5}$ and $\frac{(b+c)}{a} = \frac{9}{2}$, then what is the value of $\frac{(a+c)}{b}$?

यदि $\frac{(a+b)}{c} = \frac{6}{5}$ तथा $\frac{(b+c)}{a} = \frac{9}{2}$ हैं, तो $\frac{(a+c)}{b}$ का मान क्या है ?
(A) $\frac{9}{5}$ (B) $\frac{11}{7}$
(C) $\frac{7}{11}$ (D) $\frac{7}{4}$

56. If $x^3 + y^3 + z^3 = 3(1 + xyz)$, $P = y + z - x$, $Q = z + x - y$ and $R = x + y - z$, then what is the value of $P^3 + Q^3 + R^3 - 3PQR$?

यदि $x^3 + y^3 + z^3 = 3(1 + xyz)$, $P = y + z - x$, $Q = z + x - y$ तथा $R = x + y - z$ हैं, तो $P^3 + Q^3 + R^3 - 3PQR$ का मान क्या है ?

(A) 9 (B) 8
(C) 12 (D) 6

57. If $x_1, x_2, x_3 = 4(4 + x_1 + x_2 + x_3)$, then 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 $x_1, x_2, x_3 = 4(4 + x_1 + x_2 + x_3)$ हों, तो $\left[\frac{1}{(2+x_1)}\right] + \left[\frac{1}{(2+x_2)}\right] + \left[\frac{1}{(2+x_3)}\right]$ का मान क्या है ?

(A) 1 (B) $\frac{1}{2}$
(C) 2 (D) $\frac{1}{3}$

58. If α and β are the roots of equation $x^2 - x + 1 = 0$, then which equation will have roots α^3 and β^3 ? यदि α तथा β समीकरण $x^2 - x + 1 = 0$ के मूल हैं, तो किस समीकरण के मूल α^3 तथा β^3 होंगे ?

(A) $x^2 + 2x + 1 = 0$ (B) $x^2 - 2x - 1 = 0$
(C) $x^2 + 3x - 1 = 0$ (D) $x^2 - 3x + 1 = 0$

Solution

1. (A) Assume $1006 = x$
 $= x^2 - (x+1)(x-1) + (x+2)(x-2) - (x+3)(x-3)$
 $x^2 - x^2 + 1 + x^2 - 4 - x^2 + 9 = 6$

2. (C) $(b^2 - 4b + 4)(a^2 - 6a + 9) = 0$
 $(b-2)^2 + (a-3)^2 = 0$
 $a = 3, b = 2$
 $a + b = 5$

3. (B) $x^1 + y^1 + x^2y^2 = 481$
 $(x^2 + y^2)^2 - x^2y^2 = 481$
Here $x^2 + y^2 = K$
 $K^2 - 144 = 481$
 $K^2 = 625$
 $K = 25$
 $x^2 + y^2 - xy = 25 - 12 = 13$

4. (C) $A = 1 + 2^P$
 $A - 1 = 2^P, B = 1 + \frac{1}{2^P} = 1 + \frac{1}{A-1}$
 $B = \frac{A-1+1}{A-1} = \frac{A}{A-1} \Rightarrow B = \frac{A}{A-1}$

5. (B) $\alpha + \beta = 2ab$
 $\alpha\beta = (ab)^2 - (a+b)^2$
required equation
 $= x^2 - (\alpha + \beta)x + \alpha\beta = 0 \dots (i)$

Given

$$a + b = \frac{-b}{a} \text{ and } ab = \frac{c}{a}$$

Put in equation (i)

$$x^2 - 2x \frac{c}{a} + \left(\frac{c}{a}\right)^2 - \left(\frac{b}{a}\right)^2 = 0$$

$$a^2x^2 - 2acx - b^2 + c^2 = 0$$

6. (B) $\sqrt{(1-p^2)(1-q^2)} = \frac{\sqrt{3}}{2}$

Put $q = 0$

$$1 - p^2 = \frac{3}{4} = p = \frac{1}{2}$$

Put value

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

and $q = 0$ in given equation

$$\sqrt{2 \times \frac{1}{4}} + \sqrt{2 \times \frac{1}{4}} = \sqrt{2}$$

Mother's Advance Maths • Algebra [Previous Year Questions]

7. (B) Assume $a + b = x$
 $x^2 - 2x - 80 = 0$
 $x = 10$
 $a + b = 10$
 $ab = 16$
 $a = 8, b = 2$

8. (B) $x^{y+z} = 1$
 $y^{x+z} = 1024$
 $z^{x+y} = 729$
 If look that in equations
 $z = 9, y = 2, x = 1$
 $(z + 1)^{x+y+1} = (10)^4$
 $= 10000$

9. (A) $a = \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}} \times \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} + \sqrt{2}} = 5 + 2\sqrt{6}$
 $b = 5 - 2\sqrt{6}, ab = 1$
 $a^2 + b^2 - ab$
 $= 98 - 1 = 97$

10. (B) Let roots are α, β

$$\begin{aligned} \alpha + \beta &= \frac{B}{A} \\ \alpha - \beta &= 4 \\ \alpha\beta &= \frac{C}{A} \\ \alpha^2 + \beta^2 + 2\alpha\beta &= \frac{B^2}{A^2} \\ \alpha^2 + \beta^2 - 2\alpha\beta &= 16 \\ \hline - & - & + \\ 4\alpha\beta &= \frac{B^2}{A^2} - 16 \\ 4 \frac{C}{A} &= \frac{B^2 - 16A^2}{A^2} \\ 4CA &= B^2 - 16A^2 \\ B^2 - 10A^2 &= 4CA + 6A^2 \end{aligned}$$

11. (A) $\alpha + \beta = 8, \alpha - \beta = 2\sqrt{5}$ after square
 $\alpha^2 + \beta^2 + 2\alpha\beta = 64$
 $\alpha^2 + \beta^2 - 2\alpha\beta = 20$
 $\hline - & - & + \\ 4\alpha\beta &= 44 \\ \alpha^2 + \beta^2 &= 64 - 22 = 42$

Again square
 $\alpha^4 + \beta^4 = 1764 - 2 \times 121 = 1522$
 Quadratic eq. for root α^4 and β^4
 $x^2 - (\alpha^4 + \beta^4) + (\alpha^4\beta^4) = 0$
 $x^2 - 1522x + 14641 = 0$

12. (B) $a + b = \frac{Q}{P}$ $a \cdot b = \frac{R}{P}$
 $a^2 + b^2 + 2ab$
 $= \frac{Q^2}{P^2} = \frac{a^2 + b^2}{ab} + \frac{2ab}{ab} = \frac{q^2}{p^2(ab)}$

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

$$\frac{a^2 + b^2}{ab} \left[\frac{1}{ab} + 1 \right] = \frac{a^2 + b^2}{ab} \left\{ \frac{1 + ab}{ab} \right\}$$

Put value

$$= \left(\frac{Q^2}{P^2(ab)} - 2 \right) \left[\frac{1 + ab}{ab} \right] = \left(\frac{Q^2}{P^2 \times \frac{R}{P}} - 2 \right) \left[\frac{1 + \frac{R}{P}}{\frac{R}{P}} \right]$$

$$\frac{(R + P)(Q^2 - 2RP)}{PR^2}$$

13. (A) $x^2 + 16x + 59 = 0$

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

Let $x - 6 = a$
 $x = a + 6$

Put in equation

$$a^2 + 36 + 12a - 96 - 16a - 59 = 0$$

$$a^2 - 4a - 1 = 0$$

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

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

$$= 18$$

14. (A) $A + B = \frac{A^2}{A} = A$

$$A \cdot B = \frac{AB}{A} = B$$

$$A + B = A$$

$$A \cdot B = B$$

So

$$B = 0$$

$$A = 1 \quad (1, 0)$$

15. (A) $x^2 - x - 1 = 0$

$$\alpha + \beta = 1$$

$$\alpha\beta = -1$$

$$\alpha^2 + \beta^2 + 2(-1) = 1$$

$$\alpha^2 + \beta^2 = 3$$

$$\alpha^4 + \beta^4 = 7$$

$$\alpha^8 + \beta^8 + 2(-1)^8 = 49$$

$$\alpha^8 + \beta^8 = 47$$

- 16. (B)** $a + b + c = 9$, $a^2 + b^2 + c^2 = 9^2$
 $= 9^2 - 2 \times 26 = 29$
 $2(a^3 + b^3 + c^3) = 91 + 72 + 35 = 198$
 $a^3 + b^3 + c^3 - 3abc$
 $= (a + b + c) [a^2 + b^2 + c^2 - (ab + bc + ca)]$
 $99 - 3abc = 9 [29 - 26]$
 $= 27$
 $abc = 24$
- 17. (C)** $x^3 - 4x^2 - 6x + 25 = 0$
 $x^2 + \frac{1}{x-4} = \frac{x^3 - 4x^2 + 1}{x-4}$
 [Put the above value]
 $= \frac{6x - 24}{x-4} = 6 \frac{(x-4)}{x-4} = 6$
- 18. (B)**
 $8P + 5K + 3R = 111$
 $9P + 6K + 5R = 130$
 $16P + 11K + 3R = 221$
 Adding all $33P + 22K + 11R = 462$
 $3P + 2K + R = 42$
 Multiply by 13
 $39P + 26K + 13R = 546$
- 19. (B)** $2x + 3y - 5z = 18 \dots$ (i)
 $3x + 2y + z = 29 \dots$ (ii)
 $x + y + 3z = 17 \dots$ (iii)
 (iii) $\times 2$ $2x + 2y + 6z = 34$
 (i) $2x + 3y - 5z = 18$
 $\underline{\quad - \quad + \quad - \quad}$
 $-y + 11z = 16 \dots$ (iv)
 (iii) $\times 3$ $3x + 3y + 9z = 51$
 (ii) $3x + 2y - z = 29$
 $\underline{\quad - \quad + \quad - \quad}$
 $y + 8z = 22 \dots$ (v)
 (iii) \times (iv) $y + 8y = 22$
 (ii) $-y + 11z = 16$
 $\underline{\quad + \quad + \quad + \quad}$
 $19z = 38$
 $z = \frac{38}{19} = 2$
 Put in (iv) $y = 6$
 Put in (iii) $x = 5$
 $xy + yz + 2z = 5 \times 6 + 2 \times 6 + 5 \times 2$
 $= 52$
- 20. (C)** $x + y + z = 22$ and $xy + yz + zx = 35$
 We know
 $(x + y + z)^2 = x^2 + y^2 + z^2 + 2(xy + yz + zx)$
 $(22)^2 = x^2 + y^2 + z^2 + 2 \times 35$
 $x^2 + y^2 + z^2 = 484 - 70 = 414$
 $(x - y)^2 + (y - z)^2 + (z - x)^2 = 2(x^2 + y^2 + z^2 - (xy + yz + zx))$
 $= 2(414 - 35) = 2 \times 379 = 758$

- 21. (A)** If $\frac{x+y}{z} = 2$
 Let $x = 2$
 $y = 0$
 $z = 1$
 then
 $\Rightarrow \frac{y}{y-z} + \frac{x}{x-z}$ putting value
 $\Rightarrow 0 + \frac{2}{2-1} = 2$
- 22. (C)** $x^2 - 2x + 4 = 0$
 $\alpha + \beta = 2$
 $\alpha\beta = 4$
 Now, $\frac{\alpha^3}{\beta^2} + \frac{\beta^2}{\alpha^2} = \frac{\alpha^5 + \beta^5}{(\alpha\beta)^2}$
 $= \frac{(\alpha^3 + \beta^3)(\alpha^2 + \beta^2) - \alpha^2\beta^2(\alpha + \beta)}{(\alpha\beta)^2}$
 $= \frac{64 - 16 \times 2}{16} = 4 - 2 = 2$
 Product $\alpha\beta = 4$
 Equation $x^2 - (\text{sum})x + \text{Product} = 0$
 $x^2 - 2x + 4 = 0$
- 23. (D)** $Ax^2 + Bx + c = 0$
 (given)
 $\alpha = \frac{5}{2} \beta \Rightarrow \frac{\alpha}{\beta} = \frac{5x}{2x}$
 Now, $\alpha + \beta = \frac{-\beta}{A} = 7x \Rightarrow 49x^2 = \frac{B^2}{A^2} \dots$ (i)
 $\alpha\beta = \frac{C}{A} = 10x^2 \Rightarrow 10x^2 = \frac{C}{A} \dots$ (ii)
 Divide (i) by (ii)
 $\frac{49}{10} \frac{B^2}{A^2} \times \frac{A}{C} = \frac{B}{CA} = 10B^2 = 49CA$
- 24. (B)** $x^2 - 12x + 33 = 0$
 $(x-4)^2 + \frac{1}{(x+4)^2} = a^2 + \frac{1}{a^2}$ (Let $x-4 = a$)
 $x = a + 4$
 Now putting this value in equation
 $x^2 - 12x + 33 = 0$
 $\Rightarrow (a+4)^2 - 12(a+4) + 33 = 0$
 $\Rightarrow a^2 + 8a + 16 - 12a - 48 + 33 = 0$
 $\Rightarrow a^2 - 4a + 1 = 0$
 $\Rightarrow a + \frac{1}{a} = 4$
 $\therefore a^2 + \frac{1}{a^2} = 4^2 - 2$
 $= 16 - 2 = 14$

25. (A) If $a^4 + 1 = \frac{a^2}{b^2} [4b^2 - b^4 - 1]$

Let $a = b = 1$
 $1 + 1 = \frac{1}{4} [4 - 1 - 1]$
 $2 = 2$

So, $a^4 + b^4 = 1 + 1 = 2$

26. (B) If $3\sqrt{\frac{1-a}{a}} + 9 = 19 - 3\sqrt{\frac{a}{1-a}}$

Then $\Rightarrow 3\sqrt{\frac{1-a}{a}} + 3\sqrt{\frac{a}{1-a}} = 10$

$\Rightarrow 3 \left[\frac{(1-a)^2 + (\sqrt{a})^2}{\sqrt{a}\sqrt{1-a}} \right] = 10$

$\Rightarrow 3 \left[\frac{1}{\sqrt{a}\sqrt{1-a}} \right] = 10$

$\Rightarrow a - a^2 = \frac{9}{100}$

$\Rightarrow 100a - 100a^2 = 9$

By solving quadratic equation

$a = \frac{1}{10}, \frac{9}{10}$

27. (B) $a + b = 10$ and $\sqrt{\frac{a}{b}} - 13 = -\sqrt{\frac{b}{a}} - 11$

$\Rightarrow \sqrt{\frac{a}{b}} + \sqrt{\frac{b}{a}} = 2$

$\Rightarrow \frac{a+b}{\sqrt{ab}} = 2$

$\Rightarrow \frac{10}{\sqrt{ab}} = 2$
 $ab = 25$
 $a + b = 10$
 $a = b = 5$

From question $3ab + 4a^2 + 5b^2$

$\Rightarrow 3 \times 5 \times 5 + 4 \times 5 \times 5 + 5 \times 5 \times 5 = 300$

28. (C) $3x + 4y - 2z + 9 = 17$... (i)

$7x + 2y + 11z + 8 = 23$... (ii)

and $5x + 9y + 6z - 4 = 18$... (iii)

sum of eqn. (i) + (ii) + (iii)

$\Rightarrow 15x + 15y + 15z + 13 = 58$

$\Rightarrow 15(x + y + z) = 45$

$\Rightarrow x + y + z = 3$

then from question

$x + y + z - 34$

$\Rightarrow 3 - 34 = -31$

29. (A) $x + 3y - \frac{2z}{4} = 6$
 $4x + 12y - 2z = 24$... (1)

$x + \frac{2}{3}(2y + 3z) = 33$
 $3x + 4y + 6z = 99$... (2)

$\frac{1}{7}(x + y + z) + 2z = 9$
 $x + y + 15z = 63$... (3)

eq. (1) $\times 21$ + eq. (2) $\times 2$ + eq. (3) $\times 2$
 then

$92x + 262y = 828$

$6x + 131y = 414$

30. (B) $p^3 + q^3 + r^3 - 3pqr = 4$
 $a = q + r$ $b = r + p$ $c = p + q$

Let $q \& r = 0$
 then $p^3 = 4$... (i)

then $a = 0$ $b = p$ $c = p$

on putting in

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

$= 0 + p^3 + p^3 - 0$

from eq. (i)

$= 4 + 4 = 8$

31. (D) $x^2 + x - 1 = 0$ root = α & β

$\Rightarrow \alpha\beta = -1 \Rightarrow \beta = \frac{-1}{\alpha}$

$\alpha^5\beta^5 = -1$

$\alpha + \beta = -1$

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

$\alpha^3 - \frac{1}{\alpha^3} = -4$

$\alpha^2 + \frac{1}{\alpha^2} = 3$

$\left(\alpha^2 + \frac{1}{\alpha^2}\right)\left(\alpha^3 - \frac{1}{\alpha^3}\right) = -12$

$\alpha^5 - \frac{1}{\alpha^5} = -11$

$\alpha^5 + \beta^5 = -11$

So eqⁿ. = $x^2 - (\alpha^5 + \beta^5)x + \alpha^2\beta^5 = 0$

$x^2 + 11x - 1 = 0$

32. (C) $x + y = 2017$

$(-1)^x + (-1)^y$

If addition of two no is odd then one no should always be odd

then let x is odd

y is even

$(-1)^{\text{odd}} + (-1)^{\text{even}}$

$-1 + 1 = 0$

33. (C) $x + \frac{1}{x} = \frac{\sqrt{3}+1}{2}$

On squaring

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

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

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

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

on squaring again

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

$$= x^4 + \frac{1}{x^4} = \frac{7-4\sqrt{3}}{4} - 2$$

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

34. (C) $a + a^2 + a^3 - 1 = 0$... (i)

On multiplying with a

$$a^2 + a^3 + a^4 - a = 0$$
 ... (ii)

On subtracting eq. (i) - eq. (ii)

$$\Rightarrow 2a - 1 - a^4 = 0$$

$$\Rightarrow 2a = a^4 + 1$$

$$\Rightarrow \frac{a^4+1}{a} = 2 \Rightarrow a^3 + \frac{1}{a} = 2$$

35. (A) $a - \frac{1}{a} = b; b - \frac{1}{b} = c; c - \frac{1}{c} = a$

$$\frac{1}{ab} + \frac{1}{bc} + \frac{1}{ca} = -3$$

36. (B) $a(b-c)x^2 + b(c-a)x + c(a-b) = 0$

If roots are equal then $b^2 = 4ac$

$$\Rightarrow b^2(c-a)^2 = 4a(b-c) \times c(a-b)$$

$$\Rightarrow b^2(c-a)^2 = 4ac(b-c)(a-b)$$

On solving this

$$\Rightarrow 2ac = ab + bc$$

$$\Rightarrow \frac{2}{b} = \frac{1}{a} + \frac{1}{c}$$

37. (D) $\sqrt{a^2+b^2+ab} + \sqrt{a^2+b^2-ab} = 1$... (1)

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

Put $b = 0$ then

$$\Rightarrow \sqrt{a^2+0+0} + \sqrt{a^2+0-0} = 1$$

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

Put in eqn. (2)

$$\Rightarrow \left(1 - \frac{1}{4}\right)(1-0) = \frac{3}{4}$$

38. (B) $3x + 4y - 11 = 18$

$$\Rightarrow 3x + 4y = 29$$

$$8x - 6y + 12 = 6$$

$$\Rightarrow 8x - 6y = -6$$

$$\Rightarrow \frac{x}{+24-(6 \times 29)} = \frac{-y}{29 \times 8 + 18} = \frac{1}{-18-32}$$

$$\frac{x}{-150} = \frac{y}{-250} = \frac{1}{-50}$$

$$x = 3; \quad y = 5$$

On putting this in eq. $5x - 3y - 9$

$$= 5(3) - 3(5) - 9$$

$$= -9$$

39. (B) $a + b + c = \frac{7}{12}$

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

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

After solving = $A + C = \frac{5}{12}$

40. (C)

$$P = 7 + 4\sqrt{3}$$

and $PQ = 1$

then $Q = 7 - 4\sqrt{3}$

$$\Rightarrow \frac{1}{P^2} + \frac{1}{Q^2} = \frac{Q^2 + P^2}{P^2Q^2} \quad \therefore PQ = 1$$

$$\Rightarrow \frac{P^2 + Q^2}{1} \quad \therefore P^2Q^2 = 1$$

$$\Rightarrow (7 + 4\sqrt{3})^2 + (7 - 4\sqrt{3})^2$$

$$\Rightarrow 49 + 48 + 56\sqrt{3} + 49 + 48 - 56\sqrt{3}$$

$$\Rightarrow 194$$

41. (D) $x = \sqrt{5} + 1$ & $y = \sqrt{5} - 1$ (Given)

To find $\left[\frac{x^2}{y^2} + \frac{y^2}{x^2} + 4\left[\left(\frac{x}{y}\right) + \left(\frac{y}{x}\right)\right]\right] + 6$

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

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

Since $x^2 + y^2 = 12$ and $xy = 4$

$$\therefore \left(\frac{x}{y} + \frac{y}{x}\right) = \frac{12}{4} = 3$$

Now putting values $[(3)^2 - 2] + 4 \times 3 + 6$
 $= 7 + 12 + 6 = 25$

42. (A) $x = 2 + \sqrt{3}$
 $y = 2 - \sqrt{3} \Rightarrow xyz = 1$
 $z = 1$
- then $\frac{x}{yz} + \frac{y}{xz} + \frac{z}{xy} + 2\left[\frac{1}{x} + \frac{1}{y} + \frac{1}{z}\right]$
 $\Rightarrow \frac{x^2 + y^2 + z^2}{xyz} + 2\left[\frac{xy + yz + zx}{xyz}\right]$
 $\Rightarrow x^2 + y^2 + z^2 + 2(xy + yz + zx)$
 $\Rightarrow (x + y + z)^2 = (2 + \sqrt{3} + 2 - \sqrt{3} + 1)^2$
 $= (5)^2 = 25$
43. (C) $ax^2 + bx + c = 0$
 $\alpha = 5 + 3\sqrt{3}$ (given) $\beta = 5 - 3\sqrt{3}$
 Here α & β are roots of quadratic equation
 Equation with root α & β
 $x^2 - (\alpha + \beta)x + \alpha\beta = 0$
 $x^2 - 10x - 2 = 0 / ax^2 + bx + c = 0$
 $\Rightarrow a = 1, b = -10, c = -2$
- Finding $= \frac{a^2 + b^2 + c^2}{a + b + c} = \frac{1 + 100 + 4}{1 - 10 - 2}$
 $= \frac{-105}{11}$
44. (A) $x = \frac{a}{b} + \frac{b}{a}; y = \frac{b}{c} + \frac{c}{a}; z = \frac{c}{a} + \frac{a}{c}$
 Let $a = b = c = 1$ then $x = y = z = 2$
 $\Rightarrow x \times y \times z = 8$
 then, $xyz - x^2 - y^2 - z^2$
 $= 8 - 4 - 4 - 4 = -4$ ans.
45. (D) $\left(a + \frac{1}{a}\right)^2 - 2\left(a - \frac{1}{a}\right) = 12$ (given)
- Since $\left(a + \frac{1}{a}\right)^2 = \left(a - \frac{1}{a}\right)^2 + 4$
 $\therefore \left(a - \frac{1}{a}\right)^2 + 4 - 2\left(a - \frac{1}{a}\right) = 12$
- Let $a - \frac{1}{a} = x$
 $\Rightarrow x^2 + 4 - 2x = 12 \Rightarrow x^2 - 2x - 8 = 0$
 $x = 4, -2$
- Now, $a - \frac{1}{a} = 4 \Rightarrow a^2 - 4a - 1 = 0$
 $\Rightarrow a = \frac{4 \pm \sqrt{16 + 4}}{2} = 2 \pm \sqrt{5}$

$$a - \frac{1}{a} = -2 \Rightarrow a^2 + 2a - 1 = 0$$

$$\Rightarrow a = \frac{2 \pm \sqrt{4 + 4}}{2} = -1 \pm \sqrt{2}$$

46. (B) If $x^2 - 4x + 1 = 0$... (i)
 $x^2 + 1 = 4x$
 $x^4 + 1 = 14x^2$
 $x^8 + 1 = 194x^4$... (ii)

$$x^9 + x^7 - 194x^5 - 194x^3$$

$$= x^7(x^2 + 1) - 194x^3(x^2 + 1)$$

$$= (x^2 + 1) \times (x^7 - 194x^3)$$

$$= 4(x^8 - 194x^4)$$

$$4 \times -1 = -4$$

$$x + y = 3$$

47. (C)

Let $x = 1$
 and $y = 2$
 then $x^3 + y^3 + 9xy$
 $1 + 8 + 9 \times 2 \times 1 = 27$

48. (B) $A = \frac{x^8 - 1}{x^4 + 1} = \frac{(x^4 - 1)(x^4 + 1)}{(x^4 + 1)}$
 $= x^4 - 1 = 15$
 $B = \frac{y^4 - 1}{y^2 + 1} = \frac{(y^2 + 1)(y^2 - 1)}{(y^2 + 1)} = y^2 - 1 = 80$

$$\Rightarrow A^2 + 2AB + AB^2$$

$$\Rightarrow A^2 + AB(2 + B)$$

$$= 225 + 1200 \times 82 = 98625$$

49. (B)

$x - 4y = 0$ then $x = 4y$
 and $x + 2y = 24$
 Putting the value of x

$$6y = 24$$

$$y = 4$$

then $x = 16$

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

50. (A)

$$\frac{x}{a} + \frac{y}{b} = 3$$

$$bx + ay = 3ab$$

$$bx + ay - 3ab = 0$$

$$\frac{x}{b} - \frac{y}{a} = 9$$

$$xa - yb = 9ab$$

$$xa - yb - 9ab = 0$$

Solving these two equation by cross multiplications

$$\frac{x}{\begin{pmatrix} a & -3ab \\ -b & -9ab \end{pmatrix}} = \frac{-y}{\begin{pmatrix} b & -3ab \\ a & -9ab \end{pmatrix}}$$

$$\frac{x}{-9a^2b - 3ab^2} = \frac{-y}{-9ab^2 + 3a^2b}$$

$$= \frac{x}{y} = \frac{-3ab(b+3a)}{-3ab(-3b+a)} = \frac{b+3a}{a-3b}$$

51. (A) Let's Value of x, y, z
z = 0, x = 1, y = -1

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

Second Method :

$$\begin{aligned} x + y + z &= 0 \\ x + z &= -y \\ x^2 + z^2 + 2xz &= y^2 \\ x^2 + z^2 &= y^2 - 2xz \end{aligned}$$

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

$$= 2 \left(\frac{2y^2 - xz}{2y^2 - xz} \right) = 2$$

52. (B) P = 7 + 4√3
pq = 1

$$\frac{1}{p^2} + \frac{1}{q^2} = ?$$

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

$$q = 7 - 4\sqrt{3}$$

$$\frac{1}{(7+4\sqrt{3})^2} + \frac{1}{(7-4\sqrt{3})^2} = (7+4\sqrt{3})^2 + (7-4\sqrt{3})^2$$

$$= 49 + 48 + 2 \times 28\sqrt{3} + 49 + 48 - 2 \times 28\sqrt{3}$$

$$= 194$$

53. (C) a³ + 3a² + 9a = 1

$$a^3 + \frac{3}{a} = ?$$

$$a^3 + 3a^2 + 9a$$

We multiple by a

$$a(a^3 + 3a^2 + 9a = 1)$$

$$a^4 + 3a^3 + 9a^2 = a \quad \dots (i)$$

$$3(a^3 + 3a^2 + 9a = 1) \quad \text{Multiple by 3 (ii) eq.}$$

Subtract eq. (i) - eq (ii)

$$a^4 - 27a = a - 3$$

$$a^4 + 3 = 28a$$

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

54. (D) x³ + y³ + z³ = 13

$$x + y + z = 1, \quad xyz = 1$$

$$xy + yz + zx = ?$$

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

$$1 = x^2 + y^2 + z^2 + 2(xy + yz + zx)$$

$$1 - 3(xy + yz + zx) = x^2 + y^2 + z^2 - xy - yz - zx$$

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

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

$$13 - 3 = (1)(1 - 3(xy + yz + zx))$$

$$10 = 1 - 3(xy + yz + zx)$$

$$10 = 1 - 3(xy + yz + zx)$$

$$\frac{9}{-3} = xy + yz + zx$$

$$xy + yz + zx = -3$$

55. (D) $\frac{a+b}{c} = \frac{6}{5}, \frac{b+c}{a} = \frac{9}{2}; \frac{a+c}{b} = ?$

We can say — a = 2, b = 4, c = 5

It satisfy the given equation

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

56. (C) x³ + y³ + z³ = 3(1 + xyz)

$$p = y + z - x, \quad a = z + x - y, \quad z = x + y - z$$

$$\text{Find} = p^3 + a^3 + r^3 - 3pqr$$

We put value in equation

$$y = z = 0$$

We find value of x³ = 3

$$p = -x, \quad q = x, \quad r = x$$

$$p^3 + a^3 + r^3 - 3pqr$$

$$-x^3 + x^3 + x^3 - 3x(-x)x$$

$$x^3 + 3x^3$$

$$\begin{array}{cc} \downarrow & \downarrow \\ 3 & 3 \end{array}$$

$$3 + 3 \times 3 = 12$$

57. (B) x₁, x₂, x₃ = 4(4 + x₁ + x₂ + x₃) find

$$\frac{1}{(2+x_1)} + \frac{1}{(2+x_2)} + \frac{1}{(2+x_3)}$$

We assume value = x₁ = x₂ = x₃ = 4

$$\frac{1}{2+x_1} + \frac{1}{2+x_2} + \frac{1}{2+x_3} = \frac{1}{6} + \frac{1}{6} + \frac{1}{6} = \frac{1}{2}$$

58. (A) α & β are roots of equation = x² - x + 1 = 0

$$\alpha + \beta = 1$$

$$\alpha\beta = 1$$

$$(\alpha + \beta)^3 = (1)^3$$

$$\alpha^3 + \beta^3 = 1 - 3\alpha\beta$$

$$\alpha^3 + \beta^3 = -2$$

$$x^2 - (\alpha^3 + \beta^3)x + \alpha^3\beta^3 = 0$$

$$x^2 + 2x + 1$$

1. If $a + b = p$, $ab = q$, then $a^4 + b^4 = ?$
 यदि $a + b = p$, $ab = q$ हो, तो $a^4 + b^4 = ?$
 (A) $p^4 - 2p^2q^2 + q^2$ (B) $p^4 - 4p^2q + 2q^2$
 (C) $p^4 - 4p^2q + q^2$ (D) $p^4 - 4p^2q^2 + 2q^2$
2. By using the algebraic identities simplify the following expression.
 बीजीय सर्वसमिकाओं का प्रयोग करके निम्नलिखित व्यंज को सरल कीजिए-
- $$\frac{(x^4 + x^2 + 1)}{(x^2 + x + 1)}$$
- (A) $x^2 - 2x + 1$ (B) $x^2 + x + 1$
 (C) $x^2 + 2x + 1$ (D) $x^2 - x + 1$
3. If $\left(x + \frac{1}{x}\right)^3 = 27$, what would be the value of $\left(x^2 + \frac{1}{x^2}\right)$ if x is a real number?
 यदि $\left(x + \frac{1}{x}\right)^3 = 27$, तो $\left(x^2 + \frac{1}{x^2}\right)$ का मान क्या होगा यदि x एक वास्तविक संख्या है ?
 (A) 7 (B) 9
 (C) 25 (D) 11
4. If/यदि $\left(x - \frac{2}{x}\right) = 4$, then/तो $\left(x^2 + \frac{4}{x^2}\right) = ?$
 (A) 8 (B) 20
 (C) 18 (D) 12
5. If/यदि $\sqrt{x} + \frac{1}{\sqrt{x}} = \sqrt{6}$, then/तो $\left(x^6 + \frac{1}{x^6}\right) = ?$
 (A) 2712 (B) 2270
 (C) 2502 (D) 2702
6. If $x^2 + 1 - 2x = 0$, $x > 0$, then $x^2(x^2 - 2) = ?$
 यदि $x^2 + 1 - 2x = 0$, $x > 0$, तो $x^2(x^2 - 2) = ?$
 (A) 0 (B) $\sqrt{2}$
 (C) -1 (D) 1
7. If/यदि $x^2 - 3\sqrt{2}x + 1 = 0$, then/तो $\left(x^3 + \frac{1}{x^3}\right) = ?$
 (A) $30\sqrt{6}$ (B) $30\sqrt{2}$
 (C) $45\sqrt{2}$ (D) $15\sqrt{6}$
8. If $a + b + c = 7$, $a^3 + b^3 + c^3 - 3abc = 301$, then $ab + bc + ac = ?$
 यदि $a + b + c = 7$, $a^3 + b^3 + c^3 - 3abc = 301$, तो $ab + bc + ac = ?$
 (A) 3 (B) 2
 (C) -4 (D) -2
9. Find the coefficient of x^3y in $(x - 2y)(5x + y)^3$.
 $(x - 2y)(5x + y)^3$ में x^3y का गुणांक ज्ञात कीजिए-
- (A) 75 (B) -150
 (C) -175 (D) 250
10. If $x + y + z = 13$, $x^2 + y^2 + z^2 = 91$ & $xz = y^2$, then $z - x = ?$
 यदि $x + y + z = 13$, $x^2 + y^2 + z^2 = 91$ और $xz = y^2$, तो $z - x = ?$
 (A) 9 (B) 8
 (C) 3 (D) 5
11. If/यदि $x^2 + 4y^2 + 3z^2 + \frac{19}{4} = 2\sqrt{3}(x + y + z)$, then /तो $(x - 4y) + 3z = ?$
 (A) $\frac{\sqrt{3}}{2}$ (B) $2\sqrt{3}$
 (C) $\frac{\sqrt{3}}{3}$ (D) $\sqrt{3}$
12. If $9a^2 + 4b^2 + 49c^2 + 18 = 2(2b + 28c - 3a)$, then $(a + 2b - c) = ?$
 यदि $9a^2 + 4b^2 + 49c^2 + 18 = 2(2b + 28c - 3a)$, तो $(a + 2b - c) = ?$
 (A) $\frac{26}{21}$ (B) $\frac{5}{21}$
 (C) $\frac{11}{21}$ (D) $\frac{2}{21}$

13. If $9x^2 - 6x + 1 = 0$, then $27x^3 + (27x^3)^{-1} = ?$
 यदि $9x^2 - 6x + 1 = 0$, तो $27x^3 + (27x^3)^{-1} = ?$
 (A) 8 (B) 2
 (C) 1 (D) 4
14. If/यदि $(4x-5)^3 + (x-2)^3 + 27(2x-5)^3 = 9(4x-5)(x-2)(2x-5)$, then/तो $\left(x + \frac{3}{2}\right) = ?$
 (A) $\frac{1}{2}$ (B) $\frac{3}{2}$
 (C) $\frac{7}{2}$ (D) $\frac{5}{2}$
15. If $a + b = 24$, $a^2 + b^2 = 306$ ($a > b$), then $4a - 5b = ?$
 यदि $a + b = 24$, $a^2 + b^2 = 306$ ($a > b$), तो $4a - 5b = ?$
 (A) 15 (B) 20
 (C) 18 (D) 12
16. Find the coefficient of y^2 in the expansion of $(\sqrt{2}y^2 - 5\sqrt{3})^3$.
 $(\sqrt{2}y^2 - 5\sqrt{3})^3$ के विस्तार में y^2 का गुणांक ज्ञात कीजिए-
 (A) $225\sqrt{2}$ (B) $-225\sqrt{2}$
 (C) $-30\sqrt{3}$ (D) $30\sqrt{3}$
17. If $x - y = 4$, $x^3 - y^3 = 316$, then $x^4 + y^4 = ?$
 यदि $x - y = 4$, $x^3 - y^3 = 316$, तो $x^4 + y^4 = ?$
 (A) 2284 (B) 2428
 (C) 2248 (D) 2482
18. If $x - y = 4$, $xy = 3$, then $x^3 - y^3 = ?$
 यदि $x - y = 4$, $xy = 3$, तो $x^3 - y^3 = ?$
 (A) 88 (B) 100
 (C) 64 (D) 28
19. $(2a - b - 3c)(4a^2 + b^2 + 9c^2 + 2ab + 6ac - 3bc) = ?$
 (A) $8a^3 + b^3 + 27c^3$
 (B) $-8a^3 + b^3 + 27c^3$
 (C) $8a^3 - b^3 - 27c^3 - 18abc$
 (D) $8a^3 - b^3 - 27c^3 + 18abc$
20. If $a + b + c = 4$, $ab + bc + ac = -14$ & $abc = -18$, then $\sqrt{4a^3 + 4b^3 + 4c^3 - 36} = ?$
 यदि $a + b + c = 4$, $ab + bc + ac = -14$ और $abc = -18$ तो $\sqrt{4a^3 + 4b^3 + 4c^3 - 36} = ?$
 (A) 24 (B) 25
 (C) 18 (D) 26
21. If $a + b + c = 2$, $ab + bc + ac = -1$ then $a^3 + b^3 + c^3 - 3abc = ?$
 यदि $a + b + c = 2$, $ab + bc + ac = -1$ तो $a^3 + b^3 + c^3 - 3abc = ?$
 (A) 5 (B) 10
 (C) 2 (D) 14
22. If/यदि $\left(x^2 + \frac{1}{49x^2}\right) = 15\frac{5}{7}$, then/तो $\left(x + \frac{1}{7x}\right) = ?$
 (A) 4 (B) ± 7
 (C) ± 4 (D) 7
23. If $(2a + 3b)(2c - 3d) = (2a - 3b)(2c + 3d)$, then :
 यदि $(2a + 3b)(2c - 3d) = (2a - 3b)(2c + 3d)$, तो :
 (A) $\frac{a}{b} = \frac{c}{d}$ (B) $\frac{a}{b} = \frac{d}{c}$
 (C) $\frac{b}{a} = \frac{c}{d}$ (D) $\frac{a}{b} = \frac{c}{d}$
24. If/यदि $x - \frac{1}{x} = 2\sqrt{2}$, then/तो $x^3 - \frac{1}{x^3} = ?$
 (A) $12\sqrt{2}$ (B) $10\sqrt{2}$
 (C) $20\sqrt{2}$ (D) $22\sqrt{2}$
25. If/यदि $x + \frac{81}{x} = 18$ ($x > 0$), then/तो $x^2 + \frac{162}{x^2} = ?$
 (A) 81 (B) 78
 (C) 85 (D) 83
26. If/यदि $x^4 - 12x^2 + 1 = 0$, then/तो $x^4 + \frac{1}{x^4} = ?$
 (A) 146 (B) 142
 (C) 10 (D) 144
27. If/यदि $x + 2y = 19$, $x^3 + 8y^3 = 361$, then/तो $xy = ?$
 (A) 58 (B) 57
 (C) 56 (D) 55
28. If/यदि $(3x + 2y)^3 + (3x - 2y)^3 = 3kx(3x^2 + 4y^2)$, then/तो $k = ?$
 (A) 3 (B) 18
 (C) 6 (D) 19
29. If/यदि $(27x^3 - 64y^3) = (Ax + By)(Cx^2 + Dy^2 - Exy)$, then/तो $(A - B + C - D + E) = ?$
 (A) 15 (B) 18
 (C) -12 (D) -20

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30. If $x^4 + \frac{1}{x^4} = 1154$ ($x > 0$), then $x + \frac{1}{x} = ?$

यदि $x^4 + \frac{1}{x^4} = 1154$ ($x > 0$), तो $x + \frac{1}{x} = ?$

- (A) 6 (B) $\sqrt{34}$
(C) $\sqrt{32}$ (D) 18

31. If $(40\sqrt{5}x^3 - 2\sqrt{2}y^3) + (2\sqrt{5}x - \sqrt{2}y) = Ax^2 + By^2 - Cxy$, then $A + 3B - \sqrt{10}C = ?$

- (A) 34 (B) 28
(C) 46 (D) 6

32. If $x + y = 27$, $x^2 + y^2 = 425$, then $(x - y)^2 = ?$

यदि $x + y = 27$, $x^2 + y^2 = 425$ तो $(x - y)^2 = ?$

- (A) 169 (B) 225
(C) 144 (D) 121

33. If $a^2 + b^2 + c^2 = 576$, $ab + bc + ca = 50$, then $a + b + c = ?$

यदि $a^2 + b^2 + c^2 = 576$, $ab + bc + ca = 50$, तो $a + b + c = ?$

- (A) ± 24 (B) ± 26
(C) -24 (D) -26

34. If $3x + y = 12$, $xy = 9$, then $(3x - y) = ?$

यदि $3x + y = 12$, $xy = 9$, तो $(3x - y) = ?$

- (A) 4 (B) 6
(C) 6 (D) 5

35. If $\left(2x + \frac{1}{2x}\right) = 5$, then $\left(8x^3 + \frac{1}{8x^3}\right) = ?$

यदि $\left(2x + \frac{1}{2x}\right) = 5$ तो $\left(8x^3 + \frac{1}{8x^3}\right) = ?$

- (A) 100 (B) 120
(C) 125 (D) 110

36. Simplify that $\left(x - \frac{2}{x}\right)^3 - \left(x + \frac{2}{x}\right)^3 = ?$

(A) $-4\left(x + \frac{4}{x^3}\right)$ (B) $-4\left(3x + \frac{4}{x^3}\right)$

(C) $2\left(x - \frac{4}{x^3}\right)$ (D) $4\left(3x - \frac{4}{x^3}\right)$

37. If $(x^6 - 6\sqrt{6}y^6) = (x^2 + Ay^2)(x^4 + Ax^2y^2 + Cy^4)$, then $(A^2 - B^2 + C^2) = ?$

यदि $(x^6 - 6\sqrt{6}y^6) = (x^2 + Ay^2)(x^4 + Ax^2y^2 + Cy^4)$ तो $(A^2 - B^2 + C^2) = ?$

- (A) 36 (B) 18
(C) 42 (D) 27

38. If $\left(x + \frac{1}{15x}\right) = 3$, then $\left(9x^3 + \frac{1}{375x^3}\right) = ?$

यदि $\left(x + \frac{1}{15x}\right) = 3$ तो $\left(9x^3 + \frac{1}{375x^3}\right) = ?$

- (A) 367.2 (B) 237.6
(C) 376.2 (D) 273.6

39. If $\left(x + \frac{1}{3x}\right) = 5$, then $\left(27x^3 + \frac{1}{x^3}\right) = ?$

यदि $\left(x + \frac{1}{3x}\right) = 5$ तो $\left(27x^3 + \frac{1}{x^3}\right) = ?$

- (A) 3024 (B) 3420
(C) 3042 (D) 3240

40. If $1 + 4x^2 + 16x^4 = 512$, $1 - 2x + 4x^2 = 64$, then $(1 + 2x + 4x^2) = ?$

यदि $1 + 4x^2 + 16x^4 = 512$, $1 - 2x + 4x^2 = 64$ तो $(1 + 2x + 4x^2) = ?$

- (A) 8 (B) 10
(C) 6 (D) 12

41. If $2x + 3y + 4z = 11$, $8x^3 + 27y^3 + 64z^3 = 105$ & $xyz = 1$, then $4x^2 + 9y^2 + 16z^2 - 6xy - 12yz - 8xz = ?$

यदि $2x + 3y + 4z = 11$, $8x^3 + 27y^3 + 64z^3 = 105$ और $xyz = 1$ तो $4x^2 + 9y^2 + 16z^2 - 6xy - 12yz - 8xz = ?$

- (A) 6 (B) 4
(C) 5 (D) 3

42. If $a + b + c = 11$, $ab + bc + ac = 15$, then $a^3 + b^3 + c^3 - 3abc = ?$

यदि $a + b + c = 11$, $ab + bc + ac = 15$ तो $a^3 + b^3 + c^3 - 3abc = ?$

- (A) 386 (B) 836
(C) 368 (D) 638

43. If $a + b + c = 5$, $a^2 + b^2 + c^2$ & $a^3 + b^3 + c^3 = 12$, then $\frac{abc}{5} = ?$

यदि $a + b + c = 5$, $a^2 + b^2 + c^2$ और $a^3 + b^3 + c^3 = 12$ तो $\frac{abc}{5} = ?$

- (A) -5 (B) -1
(C) 5 (D) 1

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44. If $(x - 1.5)^3 + (x - 4)^3 + (x - 3.5)^3 = 3(x - 1.5)(x - 4)(x - 3.5)$, then $x = ?$
 यदि $(x - 1.5)^3 + (x - 4)^3 + (x - 3.5)^3 = 3(x - 1.5)(x - 4)(x - 3.5)$ तो $x = ?$
 (A) 6 (B) 3
 (C) 9 (D) 1
45. If $a^2 + b^2 + c^2 + 48 = 8(a + b + c)$, then $\sqrt[3]{a^3 - b^3 + c^3} = ?$
 यदि $a^2 + b^2 + c^2 + 48 = 8(a + b + c)$ तो $\sqrt[3]{a^3 - b^3 + c^3} = ?$
 (A) 3 (B) 6
 (C) 4 (D) 2
46. If $3x + 5y = 14$, $xy = 6$, then $9x + 25y^2 = ?$
 यदि $3x + 5y = 14$, $xy = 6$ तो $9x + 25y^2 = ?$
 (A) 182 (B) 16
 (C) 14 (D) 20
47. If $x^4 - y^4 = 47$, $x > 0$, then $(2x - 3)^2 = ?$
 यदि $x^4 - y^4 = 47$, $x > 0$ तो $(2x - 3)^2 = ?$
 (A) 9 (B) 5
 (C) 3 (D) 7
48. If $x - y = 7$, $x^2 + y^2 = 169$ ($x, y > 0$), then $3x + y = ?$
 यदि $x - y = 7$, $x^2 + y^2 = 169$ ($x, y > 0$) तो $3x + y = ?$
 (A) 41 (B) 46
 (C) 38 (D) 44
49. If $a - \frac{24}{a} = 5$ ($a > 0$), then $a^2 + \frac{64}{a^2} = ?$
 यदि $a - \frac{24}{a} = 5$ ($a > 0$) तो $a^2 + \frac{64}{a^2} = ?$
 (A) 45 (B) 60
 (C) 65 (D) 56
50. x, y are two such positive numbers such that $x > y$. If $x^4 + y^4 = 706$ & $xy = 15$, then $2x + 3y = ?$
 x, y दो ऐसी धनात्मक संख्याएँ हैं जैसे कि $x > y$, अगर $x^4 + y^4 = 706$ और $xy = 15$ तो $2x + 3y = ?$
 (A) 19 (B) 18
 (C) 20 (D) 15
51. If $3a - b = 1$, $ab = 4$, then the value of $(9a^2 - b^2) = ?$
 यदि $3a - b = 1$, $ab = 4$ तो $(9a^2 - b^2) = ?$
 (A) 8 (B) 5
 (C) 7 (D) 6
52. If $x = 555$, $y = 556$ & $z = 557$, then the value of $x^3 + y^3 + z^3 - 3xyz = ?$
 यदि $x = 555$, $y = 556$ और $z = 557$ तो $x^3 + y^3 + z^3 - 3xyz = ?$
 (A) 5002 (B) 5008
 (C) 5006 (D) 5004
53. If $a + 5b = 25$, $ab = 20$, then the value of $(a - 5b) = ?$
 यदि $a + 5b = 25$, $ab = 20$ तो $(a - 5b) = ?$
 (A) 16 (B) 15
 (C) 13 (D) 14
54. If $x^4 + y^4 + x^2y^2 = 117$, $x^2 + y^2 - xy = 3(4 + \sqrt{3})$, then the value of $(x^2 + y^2) = ?$
 यदि $x^4 + y^4 + x^2y^2 = 117$, $x^2 + y^2 - xy = 3(4 + \sqrt{3})$ तो $(x^2 + y^2) = ?$
 (A) $6\sqrt{3}$ (B) 12
 (C) 9 (D) $13\sqrt{3}$
55. If $x^2 - 6\sqrt{3}x + 1 = 0$, then the value of $x^3 + \frac{1}{x^3} = ?$
 यदि $x^2 - 6\sqrt{3}x + 1 = 0$ तो $x^3 + \frac{1}{x^3} = ?$
 (A) $630\sqrt{3}$ (B) $216\sqrt{3}$
 (C) $666\sqrt{3}$ (D) $234\sqrt{3}$
56. $(2x - 3y)^3 - 18xy(2x - 3y) = ?$
 (A) $8x^3 - 72x^2y + 18xy^2 - 27y^3$
 (B) $8x^3 - 72y^3 - 36x^2y - 54xy^2$
 (C) $8x^3 - 72x^2y + 108xy^2$
 (D) $8x^3 - 27y^3$
57. If $a + b + c = 0$, $abc = 12$, then the value of $(a^3 + b^3 + c^3) = ?$
 यदि $a + b + c = 0$, $abc = 12$ तो $(a^3 + b^3 + c^3) = ?$
 (A) 6 (B) 36
 (C) 72 (D) 12
58. If $x^4 + \frac{1}{x^4} = 6887$, find the positive value of $x - \frac{1}{x}$.
 यदि $x^4 + \frac{1}{x^4} = 6887$ तो $x - \frac{1}{x}$ का धनात्मक मान:
 (A) 15 (B) 12
 (C) 8 (D) 9

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59. If $x^2 - 3x + 1 = 0$, then the value of $2\left(x^8 + \frac{1}{x^8}\right) - 5\left(x^2 + \frac{1}{x^2}\right) = ?$
 यदि $x^2 - 3x + 1 = 0$ तो $2\left(x^8 + \frac{1}{x^8}\right) - 5\left(x^2 + \frac{1}{x^2}\right) = ?$
 (A) 3479 (B) 4370
 (C) 4379 (D) 4279
60. If $x - y - z = 0$, then the value of $(x^2 + y^2 + z^2) + (y^2 + xz) = ?$
 यदि $x - y - z = 0$ तो $(x^2 + y^2 + z^2) + (y^2 + xz) = ?$
 (A) -1 (B) 1
 (C) 2 (D) -2
61. If $3x - 2y + 3 = 0$, then the value of $27x^3 + 54xy + 30 - 8y^3 = ?$
 यदि $3x - 2y + 3 = 0$ तो $27x^3 + 54xy + 30 - 8y^3 = ?$
 (A) 57 (B) -57
 (C) -27 (D) 3
62. If $(3\sqrt{3}x^3 - 8y^3) = (\sqrt{3}x + Ay)(3x^2 + Cxy + By^2)$, then the value of $(A^2 + B^2 - C^2) = ?$
 यदि $(3\sqrt{3}x^3 - 8y^3) = (\sqrt{3}x + Ay)(3x^2 + Cxy + By^2)$ तो $(A^2 + B^2 - C^2) = ?$
 (A) 0 (B) 4
 (C) 12 (D) 8
63. If $\sqrt{x} + \frac{1}{\sqrt{x}} = 2\sqrt{3}$, then the value of $x^4 + \frac{1}{x^4} = ?$
 यदि $\sqrt{x} + \frac{1}{\sqrt{x}} = 2\sqrt{3}$ तो $x^4 + \frac{1}{x^4} = ?$
 (A) 10406 (B) 10402
 (C) 9602 (D) 9606
64. If $a = \frac{\sqrt{5} + 2}{\sqrt{5} - 2}$, $b = \frac{\sqrt{5} - 2}{\sqrt{5} + 2}$, then the value of $2a^2 + 2b^2 - 5ab = ?$
 यदि $a = \frac{\sqrt{5} + 2}{\sqrt{5} - 2}$, $b = \frac{\sqrt{5} - 2}{\sqrt{5} + 2}$ तो $2a^2 + 2b^2 - 5ab = ?$
 (A) 649 (B) 635
 (C) 693 (D) 639
65. If $a = 125$, $b = 127$, $c = 129$, then the value of $(a^3 + b^3 + c^3 - 3abc) = ?$
 यदि $a = 125$, $b = 127$, $c = 129$ तो $(a^3 + b^3 + c^3 - 3abc) = ?$
 (A) 4752 (B) 4572
 (C) 4725 (D) 3752
66. If $7x - 10y = 8$, $xy = 5$, then the value of $49x^2 + 100y^2 = ?$
 यदि $7x - 10y = 8$, $xy = 5$ तो $49x^2 + 100y^2 = ?$
 (A) 632 (B) 623
 (C) 746 (D) 764
67. If $x^2 + (4 - \sqrt{3})x - 1 = 0$, then the value of $x^2 + \frac{1}{x^2} = ?$
 यदि $x^2 + (4 - \sqrt{3})x - 1 = 0$ तो $x^2 + \frac{1}{x^2} = ?$
 (A) $21 - 8\sqrt{3}$ (B) $17 - 8\sqrt{3}$
 (C) $9 - 8\sqrt{3}$ (D) $21 - 12\sqrt{3}$
68. If $x^2 + \frac{1}{x^2} = 83$, $x > 0$, then the value of $x^3 - \frac{1}{x^3} = ?$
 यदि $x^2 + \frac{1}{x^2} = 83$, $x > 0$ तो $x^3 - \frac{1}{x^3} = ?$
 (A) 675 (B) 756
 (C) 746 (D) 576
69. If $x + \frac{1}{x} = \sqrt{13}$, then the value of $x^3 - \frac{1}{x^3} = ?$
 यदि $x + \frac{1}{x} = \sqrt{13}$ तो $x^3 - \frac{1}{x^3} = ?$
 (A) 36 (B) 32
 (C) $4\sqrt{13}$ (D) $4\sqrt{11}$
70. If $a + b + c = 5$, $a^3 + b^3 + c^3 - 3abc = 185$, then the value of $ab + bc + ac$ will be between:
 यदि $a + b + c = 5$, $a^3 + b^3 + c^3 - 3abc = 185$ तो $ab + bc + ac$ का मान किसके बीच होगा?
 (A) -7 & -3 (B) 1 & 5
 (C) -3 & 1 (D) 5 & 9
71. If $2x^2 - 6x = 1$, then the value of $x^2 + \frac{1}{4x^2} = ?$
 यदि $2x^2 - 6x = 1$ तो $x^2 + \frac{1}{4x^2} = ?$
 (A) 12 (B) 10
 (C) 8 (D) 9
72. If $3u + 2v = 7$, $uv = 2$, then the value of $(3u - 2v) = ?$
 यदि $3u + 2v = 7$, $uv = 2$ तो $(3u - 2v) = ?$
 (A) 1 (B) 5
 (C) 2 (D) 0

73. If $(2x + y)^3 - (x + 2y)^3 = (x - y)[A(x^2 + y^2) + Bxy]$, then the value of $(2A - B) = ?$

यदि $(2x + y)^3 - (x + 2y)^3 = (x - y)[A(x^2 + y^2) + Bxy]$ तो $(2A - B) = ?$

- (A) 6 (B) 7
(C) 1 (D) 0

74. If $x^4 - 142x^2 + 1 = 0$, then the value of $x^3 + \frac{1}{x^3} = ?$

यदि $x^4 - 142x^2 + 1 = 0$ तो $x^3 + \frac{1}{x^3} = ?$

- (A) 1592 (B) 1952
(C) 1692 (D) 1962

75. If $a^2 + b^2 = 25$, $x^2 + y^2 = 17$ & $ax + by = 8$, then the value of $(ay - bx) = ?$

यदि $a^2 + b^2 = 25$, $x^2 + y^2 = 17$ और $ax + by = 8$ तो $(ay - bx) = ?$

- (A) 33 (B) 19
(C) 25 (D) 21

76. If $a^2 + b^2 + c^2 + 170 = 2(8a + 5b - 9c)$, then the value of $\sqrt{4a + 8b - c} = ?$

यदि $a^2 + b^2 + c^2 + 170 = 2(8a + 5b - 9c)$ तो $\sqrt{4a + 8b - c} = ?$

- (A) 12 (B) 9
(C) 8 (D) 15

77. If $k - \frac{3}{k} = 5$, then the value of $k^2 + \frac{9}{k^2} = ?$

यदि $k - \frac{3}{k} = 5$, $abc = 12$ तो $k^2 + \frac{9}{k^2} = ?$

- (A) 25 (B) 11
(C) 19 (D) 31

78. If $x^3 + y^3 = 468$, $x + y = 12$, then the value of $x^4 + y^4 = ?$

यदि $x^3 + y^3 = 468$, $x + y = 12$ तो $x^4 + y^4 = ?$

- (A) 3026 (B) 3620
(C) 3025 (D) 2036

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

यदि $49a^2 + 25b^2 = 30$, $ab = 1$ ($a, b > 0$) तो $(7a + 5b) = ?$

- (A) 10 (B) 14
(C) 12 (D) 8

80. If $x + y = 5$, $\frac{1}{x} + \frac{1}{y} = \frac{20}{9}$, then the value of $(x^3 + y^3) = ?$

यदि $x + y = 5$, $\frac{1}{x} + \frac{1}{y} = \frac{20}{9}$ तो $(x^3 + y^3) = ?$

- (A) $\frac{635}{4}$ (B) $\frac{365}{4}$
(C) $\frac{635}{8}$ (D) $\frac{205}{4}$

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

यदि $x + y + z = 5$, $\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 0$, $xyz = 12$ और $x^3 + y^3 + z^3 = 151$ तो $(x^2 + y^2 + z^2) = ?$

- (A) 21 (B) 24
(C) 22 (D) 23

82. If $(3p - 5m) = 5$, $pm = 6$, then the value of $(9p^2 - 25m^2) = ?$

यदि $(3p - 5m) = 5$, $pm = 6$ तो $(9p^2 - 25m^2) = ?$

- (A) $\pm 5\sqrt{385}$ (B) $\pm 30\sqrt{10}$
(C) $5\sqrt{385}$ (D) $30\sqrt{10}$

83. If $(7x + 3)^3 + (x - 2)^3 + 27(2x - 5)^3 = 9(7x + 3)(x - 2)(2x - 5)$, then the value of $5x + 3 = ?$

यदि $(7x + 3)^3 + (x - 2)^3 + 27(2x - 5)^3 = 9(7x + 3)(x - 2)(2x - 5)$ तो $5x + 3 = ?$

- (A) 10 (B) 6
(C) 8 (D) 2

84. If $x + y = 5$, $(x^2 + y^2) = 17$, then the value of $(x - y)^2 = ?$

यदि $x + y = 5$, $(x^2 + y^2) = 17$ तो $(x - y)^2 = ?$

- (A) 25 (B) 16
(C) 9 (D) 4

85. If $x - \frac{1}{2x} = 4$, then the value of $8x^3 - \frac{1}{x^3} = ?$

यदि $x - \frac{1}{2x} = 4$ तो $8x^3 - \frac{1}{x^3} = ?$

- (A) 520 (B) 560
(C) 480 (D) 540

Mother's Advance Maths • Algebra [Previous Year Questions]

- 86.** If $2a + b = 4$, $(8a^3 + b^3)$, then the value of $(16a^4 + b^4) = ?$
 (A) 36 (B) 38
 (C) 28 (D) 32
- 87.** If $\left(x + \frac{2}{x}\right) = 7$, then the value of $\left(2x^2 + \frac{8}{2x^2}\right) = ?$
 यदि $\left(x + \frac{2}{x}\right) = 7$ तो $\left(2x^2 + \frac{8}{2x^2}\right) = ?$
 (A) 90 (B) 50
 (C) 44 (D) 94
- 88.** If $\left(\frac{x}{y} + 1\right) = 4$, then the value of $\left(\frac{x^2 + y^2}{y^2}\right) = ?$
 यदि $\left(\frac{x}{y} + 1\right) = 4$ तो $\left(\frac{x^2 + y^2}{y^2}\right) = ?$
 (A) 22 (B) 10
 (C) 14 (D) 12
- 89.** If $x - 3 = \frac{1}{2x}$, then the value of $\left(x^4 + \frac{1}{16x^4}\right) = ?$
 यदि $x - 3 = \frac{1}{2x}$ तो $\left(x^4 + \frac{1}{16x^4}\right) = ?$
 (A) 11 (B) 10
 (C) $99\frac{1}{2}$ (D) 98
- 90.** If $a^2 + 4b^2 + 25c^2 + 18 = 2(a - 2b + 20c)$, then the value of $(a + 2b + 5c) = ?$
 यदि $a^2 + 4b^2 + 25c^2 + 18 = 2(a - 2b + 20c)$ तो $(a + 2b + 5c) = ?$
 (A) 6 (B) 5
 (C) 4 (D) 3
- 91.** If $x + \frac{1}{x} = 7$, then the value of $\left(x^3 + \frac{1}{x^3}\right) = ?$
 यदि $x + \frac{1}{x} = 7$ तो $\left(x^3 + \frac{1}{x^3}\right) = ?$
 (A) 343 (B) 340
 (C) 322 (D) 161
- 92.** If $x + y + z = 4$, $xy + yz + zx = 1$ & $x^3 + y^3 + z^3 = 34$, then the value of $2xyz = ?$
 यदि $x + y + z = 4$, $xy + yz + zx = 1$ और $x^3 + y^3 + z^3 = 34$ तो $2xyz = ?$
 (A) 8 (B) 18
 (C) -12 (D) -6
- 93.** If $x + y + z = 10$, $x^3 + y^3 + z^3 - 3xyz = 250$, then the value of $\frac{1}{3}(xy + yz + zx) = ?$
 यदि $x + y + z = 10$, $x^3 + y^3 + z^3 - 3xyz = 250$ तो $\frac{1}{3}(xy + yz + zx) = ?$
 (A) 25 (B) 10
 (C) 5 (D) 15
- 94.** If $x^2 + y^2 = 45$, $x - y = 5$, then the value of $(x^3 - y^3) = ?$
 यदि $x^2 + y^2 = 45$, $x - y = 5$ तो $(x^3 - y^3) = ?$
 (A) 150 (B) 275
 (C) -25 (D) 250
- 95.** If $x + y + z = 3$, $x^2 + y^2 + z^2 = 45$ & $x^3 + y^3 + z^3 = 69$, then the value of $xyz = ?$
 यदि $x + y + z = 3$, $x^2 + y^2 + z^2 = 45$ और $x^3 + y^3 + z^3 = 69$ तो $xyz = ?$
 (A) 30 (B) -30
 (C) 40 (D) -40
- 96.** If $x + \frac{1}{x} = \sqrt{7}$, then the value of $(x^2 + 1) + \left[x^4 + \frac{1}{x^2}\right] = ?$
 यदि $x + \frac{1}{x} = \sqrt{7}$ तो $(x^2 + 1) + \left[x^4 + \frac{1}{x^2}\right] = ?$
 (A) $2\sqrt{7}$ (B) $\frac{1}{4}$
 (C) $3\sqrt{7}$ (D) $\frac{1}{2}$
- 97.** If $4\sqrt{3}x^2 + 5x - 2\sqrt{3} = (Ax + 2)(Bx + C)$, $(A > 0)$, then the value of $(A + B + C) = ?$
 यदि $4\sqrt{3}x^2 + 5x - 2\sqrt{3} = (Ax + 2)(Bx + C)$, $(A > 0)$ तो $(A + B + C) = ?$
 (A) 4 (B) $4 - \sqrt{3}$
 (C) $2\sqrt{3}$ (D) $4 + \sqrt{3}$
- 98.** If $x^2 - 5\sqrt{2}x - 1 = 0$, then the value of $x^3 - \frac{1}{x^3} = ?$
 यदि $x^2 - 5\sqrt{2}x - 1 = 0$ तो $x^3 - \frac{1}{x^3} = ?$
 (A) $265\sqrt{2}$ (B) $485\sqrt{2}$
 (C) $250\sqrt{2}$ (D) $255\sqrt{2}$

99. If $x - y = \frac{7}{4}$, $\frac{1}{x} - \frac{1}{y} = \frac{14}{3}$, then the value of $x^3 - y^3 = ?$

यदि $x - y = \frac{7}{4}$, $\frac{1}{x} - \frac{1}{y} = \frac{14}{3}$ तो $x^3 - y^3 = ?$

- (A) $\frac{433}{64}$ (B) $\frac{433}{32}$
(C) $\frac{217}{64}$ (D) $\frac{217}{32}$

100. If $a^4 + b^4 + a^2b^2 = 133$, $a^2 + b^2 - ab = 19$, then the value of $ab = ?$

यदि $a^4 + b^4 + a^2b^2 = 133$, $a^2 + b^2 - ab = 19$ तो $ab = ?$
(A) 12 (B) -9
(C) 15 (D) -6

101. If $x^8 - 2599x^4 + 1 = 0$, then the positive value of

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

यदि $x^8 - 2599x^4 + 1 = 0$ तो $x - \frac{1}{x}$ का धनात्मक मान क्या होगा ?

- (A) 12 (B) 7
(C) 8 (D) 6

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

यदि $a^2 + 49b^2 + c^2 + 18 = 2(28b - c - a)$ तो $(a + 7b - c) = ?$

- (A) 6 (B) -1
(C) 2 (D) 4

Solution

1. (B) $a + b = p$,

$$ab = q,$$

$$a^4 + b^4$$

$$\Rightarrow (a + b)^2 = p^2$$

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

$$\Rightarrow (a^2 + b^2)^2 = (p^2 - 2q)^2$$

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

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

2. (D) $\frac{(x^1 + x^2 + 1)}{(x^2 + x + 1)} = \frac{1 + 1 + 1}{1 + 1 + 1} = q$

put $x = 1$

By options

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

3. (A) $\left(x + \frac{1}{x}\right)^3 = 27 \Rightarrow x + \frac{1}{x} = 3$

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

4. (B) $x - \frac{2}{x} = 4 \Rightarrow \left(x - \frac{2}{x}\right)^2 = 4^2$

$$\Rightarrow x^2 + \frac{4}{x^2} - 2 \times x \times \frac{2}{x} = 16$$

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

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

5. (D) $\sqrt{x} + \frac{1}{\sqrt{x}} = \sqrt{6}$

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

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

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

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

$$\Rightarrow \left(x^2 + \frac{1}{x^2}\right)^3 = 14^3$$

$$\Rightarrow x^6 + \frac{1}{x^6} + 3\left(x^2 + \frac{1}{x^2}\right) = 14^3$$

$$\Rightarrow x^6 + \frac{1}{x^6} + 3 \times 14 = 14^3$$

$$\Rightarrow x^6 + \frac{1}{x^6} = 2702$$

6. (C) $x^2 + 1 - 2x = 0$

$$(x - 1)^2 = 0$$

$$x = 1$$

Then,

$$x^2(x^2 - 2) \Rightarrow 1(1 - 2) = -1$$

7. (C) $x + \frac{1}{x} = 3\sqrt{2}$

$$x^3 + \frac{1}{x^3} = 27 \times 2 \times \sqrt{2} - 3 \times 3\sqrt{2}$$

$$= 54\sqrt{2} - 9\sqrt{2} = 45\sqrt{2}$$

8. (C) $a^3 + b^3 + c^3 - 3abc = (a + b + c)[(a + b + c)^2 - 3(ab + bc + ca)]$
 $301 = 7[49 - 3(ab + bc + ca)]$
 $43 = 49 - 3(ab + bc + ca)$
 $ab + bc + ca = 2$

9. (C) $(x - 2y)(5x + y)^3$
 $\Rightarrow (x - 2y)[125x^3 + y^3 + 35xy(5x + y)]$
 $\Rightarrow (x - 2y)[125x^3 + y^3 + 75x^2y + 15xy^2]$
 $\Rightarrow 125x^4 + xy^3 + 75x^3y + 15x^2y^2 - 250x^3y - 2y^4 - 150x^2y^2 - 30xy^3$
 \Rightarrow Coefficient of $x^3y = -250 + 75 = -175$

10.(B) $x + y + z = 13$
 $x^2 + y^2 + z^2 = 91$
 $xz = y^2$
 $x^2 + y^2 + z^2 + 2(xy + yz + zx) = 13^2$
 $\Rightarrow 91 + 2(y^2 + xy + yz) = 169$
 $\Rightarrow 2[y^2 + y(x + z)] = 169 - 91$
 $\Rightarrow 2[y^2 + y(13 - y)] = 78$
 $\Rightarrow y^2 + 13y - y^2 = 39$
 $\Rightarrow 13y = 39$
 $\Rightarrow y = 3$
 $\Rightarrow x + z = 10 \Rightarrow x^2 + z^2 + 2xz = 100$
 $\Rightarrow xz = 9 \Rightarrow (x - z)^2 + 4xz = 100$
 $\Rightarrow x^2 + z^2 = 82 \Rightarrow (x - z)^2 + 36 = 100$
 $(x - z) = 8$
 $(x + z) = 10$

$$2x = 18$$

$$x = 9$$

$$z = 1$$

\Rightarrow Difference = $9 - 1 = 8$

11.(D)

12.(D) $9a^2 + 4b^2 + 4ac^2 + 18 = 2(2b + 28c - 3a)$
 $\Rightarrow 9a^2 + 4b^2 + 4ac^2 + 18 - 4b - 56c + 6a$
 $\Rightarrow (3a + 1)^2 + (2b - 1)^2 + (7c - 4)^2 = 0$

$\Rightarrow a = -\frac{1}{3} \Rightarrow b = \frac{1}{2} \Rightarrow c = \frac{4}{7}$

$\Rightarrow a + 2b - c$

$\Rightarrow -\frac{1}{3} + 2 \times \frac{1}{2} - \frac{4}{7}$

$\Rightarrow -\frac{1}{3} + 1 - \frac{4}{7} = -\frac{19}{21} + 1 = \frac{2}{21}$

13.(B) $9x^2 - 6x + 1 = 0 \Rightarrow 9x - 6 + \frac{1}{x} = 0$
 $\Rightarrow 9x + \frac{1}{x} = 6$
 $\Rightarrow 27x^3 + \frac{1}{27x^3}$

$\Rightarrow \frac{1}{27} \left[(9x)^3 + \frac{1}{(x)^3} \right]$

$\Rightarrow \frac{1}{27} \left[\left(9x + \frac{1}{x} \right)^3 - 3 \left(9x + \frac{1}{x} \right) \right] 9x \times \frac{1}{x}$

$\Rightarrow \frac{1}{27} |6^3 - 3 \times 6 \times 9| \Rightarrow \frac{1}{27} |216 - 162| = 2$

14.(C) $(4x - 5)^3 + (x - 2)^3 + 27(2x - 5)^3 = 9(4x - 5)(x - 2)(2x - 5)$
 $a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$
 $a^3 + b^3 + c^3 - 3abc = 0 \quad (a + b + c = 0)$
 $4x - 5 + x - 2 + 3(2x - 5) = 0$
 $4x - 5 + x - 2 + 6x - 15 = 0$
 $11x = 22$
 $x = 2$
 $\Rightarrow x + \frac{3}{2} = 2 + \frac{3}{2} = \frac{7}{2}$

15.(A) $a + b = 24$
 $a^2 + b^2 = 306$
 $a^2 + b^2 + 2ab = 24^2$
 $306 + 2ab = 24^2$
 $2ab = 576 - 306$
 $2ab = 270$
 $(a - b)^2 = a^2 + b^2 - 2ab$
 $= 306 - 270$
 $(a - b)^2 = 36$
 $\Rightarrow a - b = 6$
 $\Rightarrow a + b = 24$
 $\Rightarrow 2a = 30 \Rightarrow a = 15$
 $\Rightarrow b = 9$
 $\Rightarrow 4a - 5b = 4 \times 15 - 5 \times 9$
 $= 60 - 45 = 15$

16.(C) $(\sqrt{2}y^3 - 5\sqrt{3})^3$
 $\Rightarrow (a - b)^3 = [a^3 - b^3 - 3ab(a + b)]$
 $\Rightarrow (\sqrt{2}y^3)^3 + (5\sqrt{3})^3 - 3\sqrt{2}y \times 5\sqrt{3}(\sqrt{2}y - 5\sqrt{3})$
 $\Rightarrow 2\sqrt{2}y^9 - 375\sqrt{3} - 15\sqrt{6}(\sqrt{2}y - 5\sqrt{3})$
 $\Rightarrow 2\sqrt{2}y^9 - 375\sqrt{3} - 15 \times 2\sqrt{3}y^2 + 75 \times 3\sqrt{2}$
 $\Rightarrow 2\sqrt{2}y^9 - 375\sqrt{3} - 30\sqrt{3}y^2 + 225\sqrt{2}$
 $\Rightarrow y^9 - \text{coefficient} = -30\sqrt{3}$

17.(D) $x - y = 4 \Rightarrow x^2 + y^2 - 2xy = 16$

$\Rightarrow x^2 - y^2 = 316$

$\Rightarrow (x - y)(x^2 + y^2 + xy) = 316$

$\Rightarrow 4(16 + 3xy) = 316$

$\Rightarrow 16 + 3xy = 79$

$\Rightarrow 3xy = 63$

$\Rightarrow xy = 21$

$\Rightarrow x^1 + y^1 = (x^2 + y^2)^2 - 2x^2y^2$

$= (16 + 2xy)^2 - 2x^2y^2$

$= (16 + 2 \times 21)^2 - 2 \times 21$

$= (58)^2 - 2 \times 21 \times 21$

$= 3364 - 882$

$= 2482$

18.(B) $x - y = 4, \quad xy = 3$

$x^2 + y^2 = 16 + 6 = 22$

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

$= 4[22 + 3]$

$= 100$

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

$8a^3 - b^3 - 27c^3 - 18abc$

$(2a - b - 3c)(4a^2 + b^2 + 9c^2 + 2ab + 6ac - 3bc)$

20.(D) $a + b + c = 4$

$ab + bc + ac = -14$

$abc = -18$

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

$\Rightarrow a^3 + b^3 + c^3 + 54 = 4(16 + 42)$
 $= 178$

$\Rightarrow \sqrt{4(a^3 + b^3 + c^3) - 36} = \sqrt{(178 - 54)4 - 36}$

$= \sqrt{676} = 26$

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

$= 2[4 - 3 \times -1]$

$= 2 \times 7 = 14$

22.(C) $x^2 + \frac{1}{49x^2} = \frac{110}{7}$

$x^2 + \frac{1}{49x^2} + \frac{2 \times 1}{7} = \frac{110}{7} + \frac{2}{7}$

$\left(x + \frac{1}{7x}\right)^2 = \frac{112}{7} = 16 \Rightarrow x + \frac{1}{7x} = \pm 4$

23.(D) $\frac{2a + 3b}{2a - 3b} = \frac{2c + 3d}{2c - 3d}$

by C & D

$\frac{4a}{6b} = \frac{4c}{6d}$

$\Rightarrow \frac{a}{c} = \frac{c}{d}$

24.(D) $x - \frac{1}{x} = 2\sqrt{2}$

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

$= 16\sqrt{2} + 6\sqrt{2} = 22\sqrt{2}$

25.(D) $x^2 - 18x + 81 = 0$

$x^2 - 9x - 9x + 81 = 0$

$x(x - 9) - 9(x - 9) = 0$

$x = 9$

$x^2 + \frac{162}{x^2} = 81 + \frac{162}{81} = 81 + 2 = 83$

26.(B) $x^2 + \frac{1}{x^2} = 12$

$x^4 + \frac{1}{x^4} = 144 - 2 = 142$

27.(B) $x + 2y = 19 \Rightarrow x^2 + 4y^2 + 4xy = 19^2$

$x^3 + 8y^3 = 361$

$(x + 2y)(x^2 + 7y^2 - 2xy) = 361$

$19(x^2 + 4y^2 - 2xy) = 361$

$19(19^2 - 4xy - 2xy) = 361$

$19^2 - 6xy = 19$

$19^2 - 19 = 6xy$

$6xy = 342$

$\Rightarrow xy = 57$

28.(C) $(3x + 2y)^3 + (3x - 2y)^3 = 3kx(3x^2 + 4y^2)$

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

$\Rightarrow (3x + 2y + 3x - 2y)[(3x + 2y)^2 + (3x - 2y)^2 - (9x^2 - 4y^2)]$

$\Rightarrow 6x[9x^2 + 4y^2 + 12xy + 9x^2 + 4y^2 - 12xy - 9x^2 + 4y^2]$

$\Rightarrow 6x[9x^2 + 12y^2]$

$\Rightarrow 18x[3x^2 + 4y^2]$

$\Rightarrow 3kx[3x^2 + 4y^2]$

$\Rightarrow k = 6$

29.(C) $27x^3 - 64y^3 = (Ax + By)(Cx^2 + 9y^2 - Exy)$

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

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

$\Rightarrow A - B + C - D + E$

$\Rightarrow 3 + 4 + 9 - 16 - 12$

$\Rightarrow 16 - 16 - 12 = -12$

30.(A) $x^4 + \frac{1}{x^4} = 1154$

$\left(x^2 + \frac{1}{x^2}\right)^2 - 2 = 1154$

$\left(x^2 + \frac{1}{x^2}\right)^2 = 1156$

$$x^2 + \frac{1}{x^2} = 34$$

$$\left(x + \frac{1}{x}\right)^2 - 2 = 34 \Rightarrow \left(x + \frac{1}{x}\right)^2 = 36$$

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

31.(B) $(40\sqrt{5}x^3 - 2\sqrt{2}y^3) + (2\sqrt{5}x - \sqrt{2}y) = Ax^2 + By^2 - Cxy$

$$\Rightarrow \frac{(2\sqrt{5}x)^3 - (\sqrt{2}y)^3}{2\sqrt{5}x - \sqrt{2}y}$$

$$\Rightarrow [(2\sqrt{5}x)^2 + (\sqrt{2}y)^2 + 2\sqrt{5}x \times \sqrt{2}y]$$

$$\Rightarrow x^2 + 2y^2 + 2\sqrt{10}xy$$

$$\Rightarrow A + 3B - \sqrt{10}C$$

$$\Rightarrow A = 20$$

$$B = 02$$

$$C = \sqrt{10}$$

$$A + 3B - \sqrt{10}C$$

$$\Rightarrow 20 + 3 \times 2 + \sqrt{10} \times \sqrt{10}$$

$$\Rightarrow 20 + 6 + 10 = 36$$

32.(D) $x + y = 27$

$$x^2 + y^2 = 425$$

$$x^2 + y^2 + 2xy = 27^2$$

$$425 + 2xy = 729$$

$$2xy = 304$$

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

$$= 425 - 304$$

$$= 121$$

33.(D) $a^2 + b^2 + c^2 = 576$

$$ab + bc + ca = 50$$

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

$$= 576 + 2 \times 50 = 576 + 100$$

$$(a + b + c)^2 = 676$$

$$a + b + c < 0 = -26$$

34.(B) $3x + y = 12$

$$xy = 9$$

$$(3x + y)^2 = 12^2$$

$$9x^2 + y^2 + 6xy = 12^2$$

$$(3x - y)^2 + 12xy = 12^2$$

$$(3x - y)^2 + 12 \times 9 = 144$$

$$(3x - y)^2 + 108 = 144$$

$$(3x - y)^2 = 36$$

$$3x - y = 6$$

35.(D) $\left[2x + \frac{1}{2x}\right]^3 = 5^3$

$$8x^3 + \frac{1}{8x^3} + 3\left(2x + \frac{1}{2x}\right) = 125$$

$$8x^3 + \frac{1}{8x^3} + 3 \times 5 = 125$$

$$8x^3 + \frac{1}{8x^3} = 110$$

36.(B) $\left(x - \frac{2}{x}\right)^3 - \left(x + \frac{2}{x}\right)^3$

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

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

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

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

$$\Rightarrow -\frac{4}{x}\left(3x^2 - \frac{4}{x^2}\right)$$

$$\Rightarrow -4\sqrt{225}$$

37.(A) $(x^6 - 6\sqrt{6}y^6) = (x^2 + Ay^2)(x^4 + Ax^2y^2 + Cy^4)$

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

$$= (x^2 - \sqrt{6}y^2)(x^4 + 6y^4 + x^2\sqrt{6}y)$$

$$A = -\sqrt{6}; B = \sqrt{6}; C = 6$$

$$A^2 - B^2 + C^2$$

$$6 - 6 + 36 = 36$$

38.(B) $x + \frac{1}{15x} = 3 \Rightarrow 3x + \frac{1}{5x} = 9$

$$9x^3 + \frac{1}{375x^3} \Rightarrow 3\left(3x^3 + \frac{1}{125x^3}\right)$$

$$\left(3x + \frac{1}{5x}\right)^3 = 9^3$$

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

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

$$27x^3 + \frac{1}{125x^3} = 729 - \frac{81}{5}$$

$$27x^3 + \frac{1}{125x^3} = \frac{3564}{5}$$

$$3\left(9x^3 + \frac{1}{375x^3}\right) = \frac{3564}{5}$$

$$9x^3 + \frac{1}{375x^3} = \frac{3564}{15}$$

$$= 237.6$$

39.(D) $x + \frac{1}{3x} = 5 \Rightarrow x^2 + \frac{9}{x^2} + \frac{2}{3} = 25$

$$\Rightarrow 27x^3 + \frac{1}{x^3} \Rightarrow 27\left(x^3 + \frac{1}{27x^3}\right)$$

$$\Rightarrow 27\left(x^3 + \frac{1}{(3x)^3}\right)$$

$$\Rightarrow 27\left[\left(x + \frac{1}{3x}\right)\left(x^2 + \frac{1}{9x^2} + \frac{1}{3}\right)\right]$$

$$\Rightarrow 27\left[5\left(25 - \frac{2}{3} + \frac{1}{3}\right)\right]$$

$$\Rightarrow 27\left[5\left(25 - \frac{1}{3}\right)\right] \Rightarrow 27\left(5 \times \frac{74}{3}\right)$$

$$\Rightarrow 45 \times 74 = 3330$$

40.(A) $1 + 4x^2 + 16x^4 = 512$

$$1 - 2x^2 + 4x^2 = 64$$

$$(1 - 2x + 4x^2)(1 + 2x + 4x^2) = 5$$

$$= 1 + 2x + 4x^2 - 2x - 4x^2 - 8x^3 + 4x^2 + 8x^3 + 16x^4$$

$$= 1 + 4x^2 + 16x^4$$

$$= (1 - 2x + 4x^2)(1 + 2x + 4x^2) = 512$$

$$\Rightarrow 64(1 + 2x + 4x^2) = 512$$

$$\Rightarrow 1 + 2x + 4x^2 = 8$$

41.(D) $2x + 3y + 4z = 11$

$$8x^3 + 27y^3 + 64z^3 = 105$$

$$xyz = 1$$

$$(2x)^3 + (3y)^3 + (4z)^3 = 105$$

$$(2x + 3y + 4z)(4x^2 + 9y^2 + 16z^2 - 6xy - 12yz - 8xz) + 3 \times zx \times 3y \times 4z = 105$$

$$11(4x^2 + 9y^2 + 16z^2 - 6xy - 12yz - 8xz) + 3 \times 24 \times 1 = 105$$

$$\times 1 = 105$$

$$(4x^2 + 9y^2 + 16z^2 - 6xy - 12yz - 8xz) = 3$$

42.(B) $a + b + c = 11$

$$ab + bc + ca = 15$$

$$a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ac - bc - ca)$$

$$- bc - ca)$$

$$a^2 + b^2 + c^2 + 2(cb + bc + ca) = 11^2$$

$$= 11[11^2 - 3(ab + bc + ca)]$$

$$= 11[121 - 3 \times 15]$$

$$= 11[121 - 45]$$

$$= 11 \times 76 = 836$$

43.(B) $a + b + c = 5$

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

$$a^2 + b^2 + c^2 = 27 \quad ab + bc + ca = -1$$

$$a^3 + b^3 + c^3 = 125$$

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

$$125 - 3abc = 5[25 - 3(ab + bc + ca)]$$

$$= 5[25 - 3(-1)]$$

$$125 - 3abc = 5 \times 28$$

$$3abc = 125 - 140$$

$$3abc = -15$$

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

44.(B) $(x - 1.5)^2 + (x - 4)^3 + (x - 3.5)^3 = 3(x - 1.5)(x - 4)(x - 3.5)$

By options

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

$$x - 1.5 + x - 4 + x - 3.5 = 0$$

$$3x = 9$$

$$x = 3$$

45. (C) $a^2 + b^2 + c^2 + 48 = 8(a + b + c)$

$$\Rightarrow a^2 + b^2 + c^2 = 2(4a + 4b + 4c) - 48$$

$$\therefore a = 4, b = 4, c = 4$$

$$\Rightarrow \sqrt{4^3 - 4^3 + 4^3} = 4$$

46.(B) $3x + 5y = 14$

$$xy = 16$$

$$9x + 5y^2 = (3x + 5y)^2 - 30xy$$

$$= 196 - 180$$

$$= 16$$

47. (B) $x^1 + \frac{1}{x^4} = 47$

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

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

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

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

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

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

48. (A) $a - b = 7, a^2 + b^2 = 169$

$$49 = 169 + 2ab$$

$$2ab = 120$$

$$ab = 60$$

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$$\begin{aligned}(a+b)^2 &= a^2 + b^2 + 2ab \\ &= 169 + 120 \\ &= 289 \\ a+b &= 17 \\ a-b &= 7 \\ a &= 12, b = 5 \\ 3a+b &= 36 + 5 = 41\end{aligned}$$

49. (C) $a - \frac{24}{a} = 5$

$$\begin{aligned}a^2 - 5a - 24 &= 0 \\ a^2 - 8a + 3a - 24 &= 0 \\ a(a-8) + 3(a-8) &= 0 \\ a &= 8, -3 \\ a &= 8\end{aligned}$$

50. (A) Let $x = 5$
 $y = 3$

$$2x + 3y = 10 + 9 = 19$$

51. (C) $3a - b = 1, ab = 4$

$$\begin{aligned}(3a-b)^2 &= 9a^2 + b^2 - 2 \times 3 \times ab \\ 1 &= 9a^2 + b^2 - 24 \\ 9a^2 + b^2 &= 25 \\ (3a+b)^2 &= 9a^2 + b^2 + 6ab \\ (3a+b)(3a-b) &= (9a^2 - b^2) \\ (9a^2 - b^2) &= 7\end{aligned}$$

52. (D) $x^3 + y^3 + z^3 - 3xyz = \frac{(x+y+z)}{2} [(x-y)^2 + (y-z)^2 + (z-x)^2]$
 $= \frac{1668}{2} [1 + 1 + 4]$
 $= 834 \times 6 = 5004$

53. (B) $a + 5b = 25, ab = 20$
 $(a+5b)^2 = a^2 + 25b^2 + 10ab$
 $625 - 200 = a^2 + 25b^2$
 $425 = a^2 + 25b^2$
 $(a-5b)^2 = a^2 + 25b^2 - 10ab$
 $= 425 - 200$
 $(a-5b) = \sqrt{225} = 15$

54. (B) $x^1 + y^1 + x^2y^2 = 117$

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

$$\begin{aligned}\therefore 2(x^2 + y^2) &= 3(4 + \sqrt{3}) + 3(4 - \sqrt{3}) \\ &= 12 + 3\sqrt{3} + 12 - 3\sqrt{3} \\ x^2 + y^2 &= 12\end{aligned}$$

55. (A) $x^2 - 6\sqrt{3}x + 1 = 0$

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

$$\begin{aligned}x^3 + \frac{1}{x^3} &= (6\sqrt{3})^3 - 3(6\sqrt{3}) \\ &= 648\sqrt{3} - 18\sqrt{3} = 630\sqrt{3}\end{aligned}$$

56. (A) $= 8x^3 - 27y^3 - 36x^2y + 54xy^2 - 36x^2y + 54xy^2$
 $= 8x^3 - 72x^2y + 108xy^2 - 27y^3$

57. (B) $a + b + c = 0$

$$\begin{aligned}abc &= 12 \\ a^3 + b^3 + c^3 - 3abc &= 0 \\ a^3 + b^3 + c^3 &= 36\end{aligned}$$

58. (D) $x^4 + \frac{1}{x^4} + 2 = 6887 + 2$

$$x^2 + \frac{1}{x^2} = 83$$

$$x - \frac{1}{x} = 9$$

59. (C) $x^2 - 3x + 1 = 0$

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

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

$$\begin{aligned}x^8 + \frac{1}{x^8} &= 2209 - 2 \\ &= 2207\end{aligned}$$

$$\begin{aligned}2\left(x^8 + \frac{1}{x^8}\right) - 5\left(x^2 + \frac{1}{x^2}\right) &= 2 \times 2207 - 5 \times 7 \\ &= 4414 - 35 = 4379\end{aligned}$$

60. (B) 61. (*) 62. (D) 63. (C)

64. (D) $a = \frac{\sqrt{5} + 2}{\sqrt{5} - 2}, b = \frac{\sqrt{5} - 2}{\sqrt{5} + 2}, ab = 1$

$$\begin{aligned}a^2 + b^2 &= \frac{9 + 4\sqrt{5}}{9 - 4\sqrt{5}} + \frac{9 - 4\sqrt{5}}{9 + 4\sqrt{5}} \\ &= \frac{81 + 80 + 72\sqrt{5} + 81 + 80 - 72\sqrt{5}}{81 - 80}\end{aligned}$$

$$= \frac{2(161)}{1}$$

$$\therefore 2(a^2 + b^2) - 5ab = 2(322) - 5 = 639$$

65.(B) $a^3 + b^3 + c^3 - 3abc$
 $= \frac{1}{2} (a + b + c)[(a - b)^2 + (b - c)^2 + (c - a)^2]$
 $= \frac{1}{2} (125 + 127 + 129)[(2)^2 + (-2)^2 + (4)^2]$
 $= \frac{381}{2} \times 24 = 4572$

66.(D) $7x - 10y = 8$
 $xy = 5$
 $49x^2 + 100y^2 - 140xy = 64$
 $49x^2 + 100y^2 = 764$

67.(A) $x - \frac{1}{x} = -4 + \sqrt{3}$
 $x^2 + \frac{1}{x^2} = 16 + 3 - 8\sqrt{3} + 2$
 $= 21 - 8\sqrt{3}$

70. (A)

71. (B) 72. (A) 73. (C) 74. (C) 75. (B)

76. (B) 77. (D) 78. (A)

79.(A) Given
 $\Rightarrow 49a^2 + 25b^2 = 30$
 $\Rightarrow ab = 1$
 $\Rightarrow (7a^2) + (5b)^2 = 30$
 $\Rightarrow (7a + 5b)^2 - 70ab = 30$
 $\Rightarrow (7a + 5b)^2 = 100$
 $\Rightarrow (7a + 5b) = 10$

80.(B) $x + y = 5$ and $\frac{x+y}{xy} = \frac{20}{9}$
 $\Rightarrow xy = \frac{9}{4}$
 $(x^3 + y^3) = (x + y)[(x + y)^2 - 3xy]$
 $= 5 \left[25 - 3 \times \frac{9}{4} \right]$
 $= 5 \times \frac{73}{4} = \frac{365}{4}$

81.(D) Given

$x + y + z = 5, \frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 0, xyz = 12$

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

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

$\Rightarrow \frac{151 - 36}{5} = x^2 + y^2 + z^2$

$\Rightarrow x^2 + y^2 + z^2 = 23$

82.(A) Given,
 $(3p - 5m) = 5$ (i)
 $pm = 6$
 $9p^2 - 25m^2 = (3p - 5m)(3p + 5m)$ (ii)
 from eq. (i)
 $9p^2 + 25m^2 - 30 \times 6 = 25$
 $9p^2 + 25m^2 = 205$
 $9p^2 + 25m^2 + 30 \times 6 = 205 + 30 \times 6$
 $(3p + 5m)^2 = 385$ (iii)
 eq.(i) & (iii) put in (ii)

$9p^2 - 25m^2 = 5 \times (\pm\sqrt{385})$
 $= \pm 5\sqrt{385}$

83.(C) Let $a = (7x + 3)$
 $b = x - 2$
 $c = 3(2x - 5)$
 $\therefore a^3 + b^3 + c^3 - 3abc = 0$
 $\Rightarrow (a + b + c) = 0$
 $\Rightarrow 14x - 14 = 0$
 $\Rightarrow x = 1$
 $\therefore 5x + 3 = 8$

84.(C) I $x + y = 5$
 $x^2 + y^2 = 17$
 Put $x = 4, y = 1$
 $\therefore (x - y)^2 = (4 - 1)^2 = 9$
 II $\Rightarrow x^2 + y^2 + 2xy = 25$
 $\Rightarrow 2xy = 25 - 17 = 8$
 $- 2xy = 8$
 $\therefore x^2 + y^2 - 2xy = 17 - 8 = 9$
 $\Rightarrow (x - y)^2 = 9$

85.(B) $x - \frac{1}{2x} = 4$

$\frac{1}{2} \left[2x - \frac{1}{x} \right] = 4$

$2x - \frac{1}{x} = 8$

$8x^3 - \frac{1}{x^3} = 8^3 + 3 \times 2(8)$
 $= 512 + 48 = 560$

86.(B) Given
 $(2a)^3 + (b)^3 = 16$
 $2a + b = 4$
 Put $a = 1, b = 2$
 $\Rightarrow 16a^1 + b^1$
 $\Rightarrow 16(1) + (2)4 = 32$

87.(A) $x + \frac{2}{x} = 7$

$\Rightarrow 2x + \frac{4}{x} = 14$

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$$\Rightarrow 4x^2 + \frac{16}{x^2} = 196 - 2(2 \times 4)$$

$$\Rightarrow 2\left(2x^2 + \frac{8}{x^2}\right) = 180$$

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

88.(B) $\frac{x}{y} + 1 = 4 \Rightarrow \frac{x}{y} = 3 \Rightarrow \frac{x^2}{y^2} = 9$

and $\frac{x^2 + y^2}{y^2} = \frac{x^2}{y^2} + \frac{y^2}{y^2}$
 $= 9 + 1 = 10$

89.(C) Given

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

$$\Rightarrow x^2 + \frac{1}{4x^2} = 9 + 2\left(x \times \frac{1}{2x}\right) = 10$$

and $x^4 + \frac{1}{16x^4} = 100 - 2\left(x^4 \times \frac{1}{4x^4}\right)$

$$\Rightarrow 100 - \frac{1}{2} = 99\frac{1}{2}$$

90.(C) Given

$$a^2 + 4b^2 + 25c^2 + 18 = 2(a - 2b + 2ac)$$

$$a^2 - 2a + 4b^2 + 4b + 25c^2 - 40c + 18 = 0$$

$$(a - 1)^2 + (2b + 1)^2 + (5c - 4)^2 = 0$$

$$\therefore a = 1, b = -\frac{1}{2} \text{ and } c = \frac{4}{5}$$

$$\Rightarrow a + 2b + 5c$$

$$\Rightarrow 1 - 1 + 5 \times \frac{4}{5} = 4$$

91.(C) $x + \frac{1}{x} = 7$

$$x^3 + \frac{1}{x^3} = 343 - 21 = 322$$

92.(C) Given

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

$$\text{and } x^3 + y^3 + z^3 = 34$$

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

$$\therefore 34 - 3xyz = 4(16 - 3)$$

$$\Rightarrow -3xyz = 52 - 34$$

$$\Rightarrow xyz = -\frac{18}{3} = -6$$

$$\therefore 2xyz = -12$$

93.(C) Given

$$a^3 + b^3 + c^3 - 3abc = 250$$

$$\text{and } a + b + c = 10$$

$$250 = 10[100 - 3(ab + bc + ca)]$$

$$ab + bc + ca = 25$$

$$\frac{1}{5}(ab + bc + ca) = 5$$

94.(B) $x^2 + y^2 = 45$

$$x - y = 5 \Rightarrow (x - y)^2 = x^2 + y^2 - 2xy$$

$$\Rightarrow xy = 10$$

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

$$= 5(45 + 10)$$

$$= 275$$

95.(D) Given,

$$x + y + z = 3$$

$$x^2 + y^2 + z^2 = 45$$

$$\text{and } x^3 + y^3 + z^3 = 69$$

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

$$\Rightarrow x^2 + y^2 + z^2 + 2(xy + yz + zx) = 9$$

$$\Rightarrow (xy + yz + zx) = \frac{9 - 45}{2} = -18$$

$$\Rightarrow 69 - 3xyz = 3[9 - 3(-18)]$$

$$\Rightarrow -xyz = \frac{3 \times 63 - 69}{3}$$

$$\Rightarrow xyz = -63 + 23 = -40$$

96.(B) $x + \frac{1}{x} = \sqrt{7}$

$$\Rightarrow x^2 + 1 = \sqrt{7}x$$

$$\text{and } x^3 + \frac{1}{x^3} = 7\sqrt{7} - 3\sqrt{7}$$

$$= 4\sqrt{7}$$

$$\therefore (x^2 + 1) \div \left[x^4 + \frac{1}{x^2}\right]$$

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

97.(A) $4\sqrt{3}x^2 + 5x - 2\sqrt{3} = (Ax + 2)(Bx + c)$ [Given]

$$\Rightarrow 4\sqrt{3}x^2 + 8x - 3x - 2\sqrt{3} = (Ax + 2)(Bx + c)$$

$$\Rightarrow 4x(\sqrt{3}x + 2) - \sqrt{3}(\sqrt{3}x + 2) = (Ax + 2)(Bx + c)$$

$$\Rightarrow (4x - \sqrt{3})(\sqrt{3}x + 2) = (Ax + 2)(Bx + c)$$

By comparison

$$\Rightarrow (4x - \sqrt{3}) = (Bx + c) \Rightarrow B = 4, C = -\sqrt{3}$$

$$\Rightarrow (\sqrt{3}x + 2) = (Ax + 2) \Rightarrow A = \sqrt{3}$$

$$\therefore A + B + C = \sqrt{3} + 4 - \sqrt{3} = 4$$

98.(A) Given : $x^2 - 5\sqrt{2}x - 1 = 0$
divide by x

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

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

$$= 250\sqrt{2} + 15\sqrt{2}$$

$$\therefore x^3 - \frac{1}{x^3} = 265\sqrt{2}$$

99.(C) Given, $x - y = \frac{7}{4}$, $\frac{1}{x} - \frac{1}{y} = \frac{14}{3}$, $x^3 - y^3 = ?$

$$\frac{y - x}{xy} = \frac{14}{7}$$

$$\Rightarrow \frac{-7}{xy} = \frac{14}{7} \Rightarrow xy = -\frac{3}{8}$$

$$\Rightarrow x^2 + y^2 - 2 \left(-\frac{3}{8} \right) = \frac{40}{16}$$

9. (B) $27x^3 - 64y^3 = (Ax + By)(Cx^2 - Dy^2 + 12xy)$
 $4A + B + 3C + 2D = ?$
 $27x^3 - 64y^3 = (3x - 4y)(9x^2 + 16y^2 + 12xy)$
 $A = 3, B = -4, C = 9, D = -16$
 $4A + B + 3C + 2D = ?$
 $4 \times 3 - 4 + 27 - 32$
 $12 - 4 + 27 - 32 = 3$

10. (A) $\frac{\sqrt{26-7\sqrt{3}}}{\sqrt{14+5\sqrt{3}}} = \frac{b+a\sqrt{3}}{11}$

$$\Rightarrow \frac{\sqrt{52-14\sqrt{3}}}{\sqrt{28+10\sqrt{3}}} = \frac{b+a\sqrt{3}}{11}$$

$$\Rightarrow \frac{\sqrt{49+3-2 \times 7 \times \sqrt{3}}}{\sqrt{25+3+2 \times 5 \times \sqrt{3}}} = \frac{b+a\sqrt{3}}{11}$$

$$\Rightarrow \frac{\sqrt{(7-\sqrt{3})^2}}{\sqrt{(5+\sqrt{3})^2}} = \frac{b+a\sqrt{3}}{11}$$

$$\Rightarrow \frac{7-\sqrt{3}}{5+\sqrt{3}} = \frac{b+a\sqrt{3}}{11}$$

$$x^2 + y^2 = \frac{37}{16}$$

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

$$= \frac{7}{4} \left[\frac{37}{16} - \frac{3}{8} \right]$$

$$= \frac{7}{4} \left[\frac{31}{16} \right] = \frac{217}{64}$$

100. (D) Given $a^4 + b^4 + a^2b^2 = 133$, $a^2 + b^2 - ab = 19$

$$\therefore (a^2 + b^2 + ab)(a^2 + b^2 - ab) = a^4 + b^4 + a^2b^2$$

$$a^2 + b^2 + ab = \frac{133}{9} = 7$$

$$a^2 + b^2 - ab = 19$$

$$a^2 + b^2 + ab = 7$$

$$\hline -2ab = 12$$

$$ab = -6$$

101. (B)

102. (D)

$$\Rightarrow \frac{(7-\sqrt{3})(5-\sqrt{3})}{22} = \frac{b+a\sqrt{3}}{11}$$

$$\Rightarrow b+a\sqrt{3} = \frac{35+3-12\sqrt{3}}{2} = 19 - 6\sqrt{3}$$

$$\Rightarrow b = 19, a = -6$$

$$\sqrt{b-a} = \sqrt{19-(-6)} = 5$$

11. (C) $\frac{\sqrt{38-5\sqrt{3}}}{\sqrt{26+7\sqrt{3}}} = \frac{a+b\sqrt{3}}{23}$

$$\Rightarrow \frac{\sqrt{76-2 \times 1 \times \sqrt{75}}}{\sqrt{52+2 \times 7 \times \sqrt{3}}} = \frac{a+b\sqrt{3}}{23}$$

$$\Rightarrow \frac{\sqrt{(\sqrt{75}-1)^2}}{\sqrt{(7+\sqrt{3})^2}} = \frac{a+b\sqrt{3}}{23}$$

$$\Rightarrow \frac{5\sqrt{3}-1}{7+\sqrt{3}} = \frac{a+b\sqrt{3}}{23}$$

$$\Rightarrow \frac{(5\sqrt{3}-1)(7-\sqrt{3})}{46} = \frac{a+b\sqrt{3}}{23}$$

1. If $a^3 + b^3 = 20$ and $a + b = 5$, then find the value of $a^1 + b^1$.
यदि $a^3 + b^3 = 20$ और $a + b = 5$ तो $a^1 + b^1$ का मान ज्ञात करें।
(A) 25 (B) 26
(C) 24 (D) 23
2. If $x + y = 4$, $xy = 2$, $y + z = 5$, $yz = 3$, $z + x = 6$ and $zx = 4$, then find the value of $x^3 + y^3 + z^3 - 3xyz$.
यदि $x + y = 4$, $xy = 2$, $y + z = 5$, $yz = 3$, $z + x = 6$ और $zx = 4$ है, तो $x^3 + y^3 + z^3 - 3xyz$ का मान ज्ञात करें।
(A) 150.75 (B) 152.75
(C) 157.75 (D) 153.75
3. If $x = 1 + \sqrt{2}$, then find the value of $\sqrt{x} + \left(\frac{1}{\sqrt{x}}\right)$.
यदि $x = 1 + \sqrt{2}$ है, तो $\sqrt{x} + \left(\frac{1}{\sqrt{x}}\right)$ का मान ज्ञात करें।
(A) 2.1014 (B) 2.1973
(C) 1.9876 (D) 1.9996
4. If the value of $\frac{3x\sqrt{y} + 2y\sqrt{x}}{3x\sqrt{y} - 2y\sqrt{x}} - \frac{3x\sqrt{y} - 2y\sqrt{x}}{3x\sqrt{y} + 2y\sqrt{x}}$ is same as that of \sqrt{xy} , then which of the following relations between x and y is correct?
यदि $\frac{3x\sqrt{y} + 2y\sqrt{x}}{3x\sqrt{y} - 2y\sqrt{x}} - \frac{3x\sqrt{y} - 2y\sqrt{x}}{3x\sqrt{y} + 2y\sqrt{x}}$ का मान \sqrt{xy} के मान बराबर है, तो x और y के बीच निम्न में से कौन सा संबंध सही है?
(A) $9x - 4y = 36$ (B) $9x + 4y = 24$
(C) $9x + 4y = 36$ (D) $9x - 4y = 24$
5. If $a + b + c + d = 2$, then the maximum value of $(1 + a)(1 + b)(1 + c)(1 + d)$ is _____.
यदि $a + b + c + d = 2$ है, तो $(1 + a)(1 + b)(1 + c)(1 + d)$ का अधिकतम मान है।
(A) $\frac{91}{9}$ (B) $\frac{81}{16}$
(C) $\frac{62}{22}$ (D) $\frac{54}{13}$
6. If $x^3 + y^3 = 16$ and $x + y = 4$, then find the value of $x^1 + y^1$.
यदि $x^3 + y^3 = 16$ और $x + y = 4$ है, तो $x^1 + y^1$ का मान ज्ञात करें।
(A) 32 (B) 28
(C) 36 (D) 26
7. The value of $[(a^2 - b^2)^3 + (b^2 - c^2)^3 + (c^2 - a^2)^3] + [(a - b)^3 + (b - c)^3 + (c - a)^3]$ is equal to : (Given $a \neq b \neq c$)
 $[(a^2 - b^2)^3 + (b^2 - c^2)^3 + (c^2 - a^2)^3] + [(a - b)^3 + (b - c)^3 + (c - a)^3]$ का मान किसके बराबर है? (दिया हुआ है $a \neq b \neq c$)
(A) $(a + b)(b + c)(c + a)$
(B) $(a^2 - b^2)(b^2 - c^2)(c^2 - a^2)$
(C) $(a^2 + b^2)(b^2 + c^2)(c^2 + a^2)$
(D) $(a - b)(b - c)(c - a)$
8. If $x^4 + \frac{1}{x^4} = 14159$, then the value of $x + \frac{1}{x}$ is:
यदि $x^4 + \frac{1}{x^4} = 14159$ है, तो $x + \frac{1}{x}$ का मान ज्ञात करें।
(A) 9 (B) 12
(C) 10 (D) 11
9. If $a - b = 18$ and $a^3 - b^3 = 324$, then find ab .
यदि $a - b = 18$ और $a^3 - b^3 = 324$ है, तो ab का मान ज्ञात करें।
(A) -102 (B) 103
(C) 105 (D) -104
10. If $x - \frac{1}{x} = 13$, then the value of $x^2 + \frac{1}{x^2}$ is:
यदि $x - \frac{1}{x} = 13$ है, तो $x^2 + \frac{1}{x^2}$ का मान ज्ञात करें।
(A) 171 (B) 169
(C) 167 (D) 165
11. If $a + b + c = 2$, $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 0$, $ac = \frac{4}{b}$ and $a^3 + b^3 + c^3 = 28$, find the value of $a^2 + b^2 + c^2$.

Mother's एण्डवांस • बीजगणित

- यदि $a + b + c = 2$, $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 0$, $ac = \frac{4}{b}$ और $a^3 + b^3 + c^3 = 28$ है, तो $a^2 + b^2 + c^2$ का मान ज्ञात करें।
 (A) 6 (B) 12
 (C) 10 (D) 8
12. If $x + y + z = 10$, $x^3 + y^3 + z^3 = 75$ and $xyz = 15$, then find the value of $x^2 + y^2 + z^2 - xy - yz - zx$.
 यदि $x + y + z = 10$, $x^3 + y^3 + z^3 = 75$ और $xyz = 15$ है, तो $x^2 + y^2 + z^2 - xy - yz - zx$ का मान बताइए।
 (A) 6 (B) 3
 (C) 5 (D) 4
13. If $2x + y = 6$ and $xy = 4$, then find the value of $8x^3 + y^3$ is :
 यदि $2x + y = 6$ और $xy = 4$ है, तो $8x^3 + y^3$ का मान है :
 (A) 64 (B) 72
 (C) 48 (D) 16
14. If, $2^{x+1} \cdot 2^z = 8^{3z-5} \cdot 5$; $5^{4y-6z} = 25^{y+z}$; $3^{4x-3z} = 9^{x+z}$ then the value of $2x + 3y + 5z$ is :
 यदि $2^{x+1} \cdot 2^z = 8^{3z-5} \cdot 5$; $5^{4y-6z} = 25^{y+z}$; $3^{4x-3z} = 9^{x+z}$ है तो $2x + 3y + 5z$ का मान बताइए।
 (A) 56 (B) 44
 (C) 32 (D) 28
15. If $x^4 + \frac{1}{x^4} = \frac{257}{16}$ then find $\frac{8}{13} \left(x^3 + \frac{1}{x^3} \right)$, where $x > 0$.
 यदि $x^4 + \frac{1}{x^4} = \frac{257}{16}$ है, तो $\frac{8}{13} \left(x^3 + \frac{1}{x^3} \right)$ का मान ज्ञात करें, जहाँ $x > 0$ है।
 (A) 5 (B) 4
 (C) 6 (D) 8
16. If $xy = 16$ and $x^2 + y^2 = 32$, then the value of $(x + y)$ is :
 यदि $xy = 16$ और $x^2 + y^2 = 32$ है, तो $(x + y)$ का मान ज्ञात कीजिए।
 (A) ± 4 (B) ± 10
 (C) ± 6 (D) ± 8
17. $(a + 2b)^2 - (a - 2b)^2$ is equal to :
 $(a + 2b)^2 - (a - 2b)^2$ का मान ज्ञात कीजिए।
 (A) 10ab (B) 6ab
 (C) 8ab (D) 4ab
18. If $x + y = 14$; $x^3 + y^3 = 1064$, then the value of $(x - y)^2$ is :
 यदि $x + y = 14$; $x^3 + y^3 = 1064$ है, तो $(x - y)^2$ का मान ज्ञात कीजिए।
 (A) 100 (B) 36
 (C) 81 (D) 64
19. If $x = 255$, $y = 256$, $z = 257$, then find the value of $x^3 + y^3 + z^3 - 3xyz$.
 यदि $x = 255$, $y = 256$, $z = 257$ है, तो $x^3 + y^3 + z^3 - 3xyz$ का मान ज्ञात करें।
 (A) 1984 (B) 2304
 (C) 1876 (D) 1378
20. If $x + \frac{1}{x} = 8$, then find the value of $\frac{5x}{x^2 + 1 - 6x}$.
 यदि $x + \frac{1}{x} = 8$ तो $\frac{5x}{x^2 + 1 - 6x}$ का मान ज्ञात करें।
 (A) 2.5 (B) 6
 (C) 5 (D) 6.5
21. The factors of the expression $2x^2 - 5x - 12$ are: व्यंजक $2x^2 - 5x - 12$ के गुणखंड क्या होंगे ?
 (A) $(x - 4)$ and $(2x - 3)$ (B) $(x + 4)$ and $(2x + 3)$
 (C) $(x - 4)$ and $(2x + 3)$ (D) $(x + 4)$ and $(2x - 3)$
22. If $x = 2 + \sqrt{3}$, then find the value of $x^4 - 8x^3 + 16x^2$.
 यदि $x = 2 + \sqrt{3}$ है, तो $x^4 - 8x^3 + 16x^2$ का मान ज्ञात करें।
 (A) -1 (B) 1
 (C) 0 (D) 2
23. If $2a + 3b = 8$ and $ab = 5$, then find the value of $4a^2 + 9b^2$.
 यदि $2a + 3b = 8$ और $ab = 5$ है, तो $4a^2 + 9b^2$ का मान ज्ञात कीजिए।
 (A) 2 (B) 4
 (C) 8 (D) 6
24. If $x + y = 15$ and $xy = 14$, then the value of $x - y$ is :
 यदि $x + y = 15$ और $xy = 14$ है, तो $x - y$ का मान ज्ञात कीजिए।
 (A) 11 (B) 12
 (C) 14 (D) 13
25. If $a = 355$, $b = 356$, $c = 357$, then find the value of $a^3 + b^3 + c^3 - 3abc$.
 यदि $a = 355$, $b = 356$, $c = 357$ है, तो $a^3 + b^3 + c^3 - 3abc$ का मान ज्ञात कीजिए।
 (A) 3208 (B) 3202
 (C) 3206 (D) 3204
26. If $x + \frac{1}{x} = 4$, then the value of $x^4 + \left(\frac{1}{x}\right)^4$ is :
 यदि $x + \frac{1}{x} = 4$ है, तो $x^4 + \left(\frac{1}{x}\right)^4$ का मान बताइए।
 (A) 14 (B) 196
 (C) 16 (D) 194

Mother's Advance Maths • Algebra [Previous Year Questions]

27. If $a + b = 8$ and $ab = 12$, then the value of $a^3 + b^3$ is :
 यदि $a + b = 8$ और $ab = 12$ है, तो $a^3 + b^3$ का मान बताइए।
 (A) 224 (B) 96
 (C) 288 (D) 512
28. $2x - 3y$ is a factors of :
 $2x - 3y$ इनमें से किसका गुणखंड है ?
 (A) $4x^2 + 2x - 3y + 9y^2 - 12xy$
 (B) $8x^3 + 27y^3$
 (C) $4x^2 + 9y^2 + 12xy$
 (D) $4x^2 + 2x - 3y + 36y^2 + 12xy$
29. $(ax + by)$ is a factor of :
 $(ax + by)$ इनमें से किसका गुणखंड है ?
 (A) $a^2x^2 + 2ab - b^2y^2$ (B) $a^2x^2 + 2abxy + b^2y^2$
 (C) $a^2x^3 + 2abx - b^2y^2x$ (D) $a^2x^2 + 2ab + b^2y^2$
30. If $x + y = 4$ and $x^3 + y^3 = 12$, then the value of $x^4 + y^4 = ?$
 यदि $x + y = 4$ और $x^3 + y^3 = 12$ है, तो $x^4 + y^4$ का मान क्या होगा ?
 (A) $\frac{146}{9}$ (B) $\frac{146}{3}$
 (C) $\frac{146}{7}$ (D) $\frac{146}{5}$
31. If $x - y = 13$ and $xy = 25$, then the value of $x^2 - y^2 = ?$
 यदि $x - y = 13$ और $xy = 25$ है, तो $x^2 - y^2$ का मान क्या होगा ?
 (A) $13\sqrt{269}$ (B) $13\sqrt{210}$
 (C) $13\sqrt{229}$ (D) $13\sqrt{240}$
32. If $x - \frac{1}{x} = 8$, find the value of $x^4 + \frac{1}{x^4}$
 यदि $x - \frac{1}{x} = 8$ है, तो $x^4 + \frac{1}{x^4}$ का मान ज्ञात करें।
 (A) 4355 (B) 4352
 (C) 4356 (D) 4354
33. If $a + 3b = 12$ and $ab = 9$, then the value of $(a - 3b)$ is :
 यदि $a + 3b = 12$ और $ab = 9$ है, तो $(a - 3b)$ का मान ज्ञात करें।
 (A) 4 (B) 8
 (C) 6 (D) 9
34. If $a^2 + \frac{2}{a^2} = 16$, then find the value of $\frac{72a^2}{a^4 + 2 + 8a^2}$.
 यदि $a^2 + \frac{2}{a^2} = 16$ है, तो $\frac{72a^2}{a^4 + 2 + 8a^2}$ का मान ज्ञात करें।
 (A) 3 (B) 1
 (C) 4 (D) 2
35. If $x + \frac{1}{x} = 4$, then find the value of $x^{44} + \frac{1}{x^4}$.
 यदि $x + \frac{1}{x} = 4$ है, तो $x^{44} + \frac{1}{x^4}$ का मान ज्ञात कीजिए।
 (A) 136 (B) 194
 (C) 162 (D) 128
36. If $p + \frac{1}{p} = 112$, find $(p - 112)^{15} + \frac{1}{p^{15}}$.
 यदि $p + \frac{1}{p} = 112$ है, तो $(p - 112)^{15} + \frac{1}{p^{15}}$ का मान ज्ञात करें।
 (A) 10 (B) 0
 (C) 15 (D) 1
37. If $x + \frac{1}{x} = 5$, $x \neq 0$ then the value of $\frac{x^4 + \frac{1}{x^2}}{x^2 - 3x + 1}$ is equal to:
 यदि $x + \frac{1}{x} = 5$, $x \neq 0$ है, तो $\frac{x^4 + \frac{1}{x^2}}{x^2 - 3x + 1}$ का मान है :
 (A) 55 (B) 60
 (C) 65 (D) 50
38. If $x = 3 + 2\sqrt{2}$, then the value of $x^2 + \frac{1}{x^2}$ is :
 यदि $x = 3 + 2\sqrt{2}$ है, तो $x^2 + \frac{1}{x^2}$ का मान है :
 (A) 30 (B) 36
 (C) 32 (D) 34
39. If $4x^2 + y^2 = 40$ and $xy = 6$ ($x > 0, y > 0$) then the value of $2x + y$ is
 यदि $4x^2 + y^2 = 40$ और $xy = 6$ ($x > 0, y > 0$) हो, तो $2x + y$ का मान है :
 (A) 24 (B) 16
 (C) 4 (D) 8
40. If $x^3 + 27y^3 + 64z^3 = 36xyz$, then the relationship between x, y and z is :
 यदि $x^3 + 27y^3 + 64z^3 = 36xyz$ हो, तो x, y और z में संबंध है :
 (A) $x + y + z = 0$ (B) $x - 3y + 4z = 0$
 (C) $x + 3y = 4z$ (D) $x + 3y + 4z = 0$
41. If $x = \sqrt[3]{5} + 2$, then the value of $x^3 = 6x^2 + 12x - 12$ is equal to :
 यदि $x = \sqrt[3]{5} + 2$ है, तो $x^3 = 6x^2 + 12x - 12$ का मान है :
 (A) 0 (B) 2
 (C) 1 (D) -1

42. If $a^2 + \frac{1}{a^2} = 98$, $a > 0$, then the value of $a^3 + \frac{1}{a^3}$ will be:

यदि $a^2 + \frac{1}{a^2} = 98$, $a > 0$ है, तो $a^3 + \frac{1}{a^3}$ का मान है :

- (A) 960 (B) 950
(C) 970 (D) 870

43. If $\sqrt{x} = \sqrt{3} - \sqrt{5}$, then the value of $x^2 - 16x + 6$ is :

यदि $\sqrt{x} = \sqrt{3} - \sqrt{5}$ है, तो $x^2 - 16x + 6$ का मान है :

- (A) 0 (B) 4
(C) 2 (D) -2

Solution

1. (D) $a^3 + b^3 = 20$, $(a + b) = 5$
ATQ $(a + b)^3 = a^3 + b^3 + 3ab(a + b)$
 $\Rightarrow 125 = 20 + 15ab$
 $\Rightarrow ab = 7$
So $(a^2 + b^2) = (a + b)^2 - 2ab$
 $= 25 - 14 = 11$
 $\Rightarrow (a^4 + b^4) = (a^2 + b^2)^2 - 2a^2b^2$
 $= 121 - 98 = 23$

2. (D) ATQ $x + y = 4$, $xy = 2$
 $\Rightarrow x - y = \sqrt{(x + y)^2 - 4xy} = \sqrt{8}$
 $y + z = 5$, $yz = 3$
 $\Rightarrow y - z = \sqrt{(y + z)^2 - 4yz} = \sqrt{13}$
 $z + x = 6$, $zx = 4$
 $\Rightarrow z - x = \sqrt{(z + x)^2 - 4zx} = \sqrt{20}$
 $x + y + z = \frac{4 + 5 + 6}{2} = \frac{15}{2}$
 $xyz = \sqrt{2 \times 3 \times 4} = 2\sqrt{6}$
As we know

$$x^3 + y^3 + z^3 - 3xyz = \frac{1}{2}(x + y + z)[(x - y)^2 + (y - z)^2 + (z - x)^2]$$

$$\Rightarrow x^3 + y^3 + z^3 - 3xyz = \frac{1}{2} \times \frac{15}{2} \times 41 = 153.75$$

3. (B) $x = 1 + \sqrt{2} \Rightarrow \frac{1}{x} = \sqrt{2} - 1$
So $\left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)^2 = \sqrt{x + \frac{1}{x} + 2}$
 $\sqrt{x} + \frac{1}{\sqrt{x}} = \sqrt{2\sqrt{2} + 2} = \sqrt{4.828} = 2.1973$

4. (D) $a = 3x\sqrt{y}$, $b = 2y\sqrt{x}$
ATQ $\frac{4ab}{a^2 - b^2} = \sqrt{xy}$
 $\Rightarrow \frac{4 \times 3x\sqrt{y} \times 2y\sqrt{x}}{9x^2y - 4y^2x} = \sqrt{xy}$
 $\Rightarrow 24xy = 9x^2y - 4y^2x$
 $\Rightarrow 9x - 4y = 24$

5. (B) For maximum $(1 + a) = (1 + b) = (1 + c) = (1 + d)$

$$a = b = c = d = \frac{1}{2}$$

$$(1 + a)(1 + b)(1 + c)(1 + d)$$

$$\Rightarrow \left(1 + \frac{1}{2}\right)\left(1 + \frac{1}{2}\right)\left(1 + \frac{1}{2}\right)\left(1 + \frac{1}{2}\right)$$

$$\Rightarrow \left(\frac{3}{2}\right)^4 = \frac{81}{16}$$

6. (A) $y = 4 - x$
 $x^3 + y^3 = 16$
 $x^3 + (4 - x)^3 = 16$
 $12x^2 - 48x + 48 = 0$
 $x^2 - 4x + 4 = 0$
 $(x - 2)(x - 2) = 0$
 $x = 2$; 2
 $y = 2$
 $x^4 + y^4 = 16 + 16 = 32$

7. (A) $\frac{3(a^2 - b^2)(b^2 - c^2)(c^2 - a^2)}{3(a - b)(b - c)(c - a)}$
 $= (a + b)(b + c)(c + a)$

8. (D) $x^1 + \frac{1}{x^4} + 2 = 14161 \Rightarrow x^2 + \frac{1}{x^2} = 119$
 $x^2 + \frac{1}{x^2} + 2 = 121 \Rightarrow x + \frac{1}{x} = 11$

9. (A) $(a - b)(a^2 + b^2 + ab) = 324$
 $18(a^2 + b^2 + ab) = 324$
 $a^2 + b^2 + ab = 18 \dots(i)$
 $(a - b)^2 = a^2 + b^2 - 2ab \dots(ii)$
 $324 = a^2 + b^2 - 2ab \dots(ii)$
eq. (i) & eq. (ii)
 $a^2 + b^2 - 2ab = 324$
 $a^2 + b^2 + ab = 18$
 $-3ab = 306$
 $ab = -102$

10. (A) $x - \frac{1}{x} = 13$
squaring both side
 $x^2 + \frac{1}{x^2} - 2 = 169 \Rightarrow x^2 + \frac{1}{x^2} = 171$

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11. (D) ATQ, $(a + b + c) = 2$
 $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 0$
 $\Rightarrow ab + bc + ac = 0$
 $ac = \frac{4}{b} \Rightarrow abc = 4$
 $a^3 + b^3 + c^3 = 28$
 $a^3 + b^3 + c^3 = (a + b + c)[a^2 + b^2 + c^2 - ab - bc - ac] + 3abc$
 $28 = 2[a^2 + b^2 + c^2] + 12$
 $a^2 + b^2 + c^2 = 8$

12. (B) As we know,
 $x^3 + y^3 + z^3 - 3xyz = (x + y + z)(x^2 + y^2 + z^2 - xy - yz - xz)$
 $\Rightarrow (x^2 + y^2 + z^2 - xy - yz - xz) = \frac{75 - 3 \times 15}{10}$
 $= 3$

13. (B) $(2x + y)^3 = 8x^3 + y^3 + 6xy(2x + y)$
 $\Rightarrow 8x^3 + y^3 = (6)^3 - 6 \times 4 \times 6 = 72$

14. (B) ATQ,
 $2^{x+y-2z} = 8^{8z-5y} = 2^{24z-15y}$
 So, $x + y - 2z = 24z - 15 - 3y$
 $\Rightarrow x + 4y - 26z = -15$... (i)
 $5^{4y-6z} = 25^{y+z} = 5^{2y+2z}$
 So, $4y - 6z = 2y + 2z$
 $\Rightarrow 2y = 8z$
 $\Rightarrow y = 4z$... (ii)
 $3^{4x-3z} = 9^{x+z} = 3^{2x+2z}$
 $\Rightarrow 4x - 3z = 2x + 2z$
 $\Rightarrow x = \frac{5}{2}z$... (iii)

By eq.(i), eq.(ii) and eq.(iii)
 $\frac{5}{2}z + 16z - 26z = -15$
 $\Rightarrow \frac{-15z}{2} = -15$
 $\Rightarrow z = 2$
 So, $y = 8$ and $x = 5$
 $2x + 3y + 5z = 2 \times 5 + 3 \times 8 + 5 \times 2 = 44$

15. (A) $x^4 + \frac{1}{x^4} = \frac{257}{16}$
 $\Rightarrow x^2 + \frac{1}{x^2} = \sqrt{\frac{257}{16} + 2} = \frac{17}{4}$
 $\Rightarrow x + \frac{1}{x} = \sqrt{\frac{17}{4} + 2} = \frac{5}{2}$

So, $\left(x^3 + \frac{1}{x^3}\right) = \left(x + \frac{1}{x}\right)^3 - 3\left(x + \frac{1}{x}\right)$
 $= \left(\frac{5}{2}\right)^3 - 3\left(\frac{5}{2}\right)$
 $= \frac{125}{8} - \frac{15}{2} = \frac{65}{8}$

16. (D) $(x + y) = \sqrt{x^2 + y^2 + 2xy} = \sqrt{32 + 2 \times 16}$
 $= \pm 8$

So, $\frac{8}{13} \left(x^3 + \frac{1}{x^3}\right) = \frac{8}{13} \times \frac{65}{8} = 5$

17. (C) $(a + 2b)^2 - (a - 2b)^2$
 $= (a + 2b + a - 2b)(a + 2b - a + 2b)$
 $= 2a \times 4b = 8ab$

18. (B) $x + y = 14$
 $x^3 + y^3 = 1064$
 As we know
 $(x^3 + y^3) = (x + y)^3 - 3xy(x + y)$
 $\Rightarrow 1064 = (14)^3 - 3xy(14)$
 $\Rightarrow 42xy = (14)^3 - 1064$
 $\Rightarrow xy = \frac{196 - 76}{3} = 40$
 So $(x - y)^2 = (x + y)^2 - 4xy$
 $= (14)^2 - 4 \times 40 = 36$

19. (B) As we know
 $x^3 + y^3 + z^3 - 3xyz = \frac{1}{2}(x + y + z)((x - y)^2 + (y - z)^2 + (z - x)^2)$
 $= \frac{1}{2}(255 + 256 + 257)(1 + 1 + 4)$
 $= 3 \times 768 = 2304$

20. (A) ATQ $x + \frac{1}{x} = 8$
 So,
 $\frac{5x}{x^2 + 1 - 6x} = \frac{5}{x + \frac{1}{x} - 6} = \frac{5}{2} = 2.5$

21. (C) $2x^2 - 5x - 12$
 $= 2x^2 - 8x + 3x - 12$
 $= 2x(x - 4) + 3(x - 4)$
 $= (2x + 3)(x - 4)$

22. (B) $x^4 - 4x^3 - 4x^3 + 16x^2$
 $x^3(x-4) - 4x^2(x-4)$
 $x^2(x-4)^2 \dots\dots\dots(i)$

$x = 2 + \sqrt{3}$
 from eq (i)
 $\Rightarrow (2 + \sqrt{3})^2 [2 + \sqrt{3} - 4]^2$
 $\Rightarrow 1$

23. (B) $2a + 3b = 8, ab = 5$
 $\Rightarrow 4a^2 + 9b^2 + 2 \times 2a \times 3b = 64$
 $\Rightarrow 4a^2 + 9b^2 = 64 - 12 \times 5 = 4$

24. (D) $x + y = 15$
 $xy = 14$
 $\Rightarrow (x - y) = \sqrt{(x + y)^2 - 4xy}$
 $= \sqrt{225 - 56}$
 $= \sqrt{169}$
 $= 13$

25. (D) As we know
 $a^3 + b^3 + c^3 - 3abc = \frac{1}{2}(a + b + c)[(a - b)^2 + (b - c)^2 + (c - a)^2]$
 $= \frac{1}{2} \times (355 + 356 + 357)(1 + 1 + 4) = 3204$

26. (D) $x + \frac{1}{x} = 4$
 $\left(x + \frac{1}{x}\right)^2 = 16$
 $x^2 + \frac{1}{x^2} = 14$
 $\left(x^2 + \frac{1}{x^2}\right)^2 = 196$

27. (A) $(a + b)^2 = a^2 + 2ab + b^2$
 $64 = [a^2 + 2ab + b^2]$
 $64 - 3ab = [a^2 + 2ab + b^2] - 3ab$
 $28 = a^2 - ab + b^2 \dots\dots\dots(i)$
 $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
 $= 8 \times 28$
 $= 224$

28. (A) Check by option
 $4x^2 + 2x - 3y + 9y^2 - 12xy$
 If $2x - 3y$ is the factor of equation then
 $2x - 3y = 0$
 $2x = 3y \dots\dots\dots(i)$
 Put value in the equation
 $\Rightarrow (3y)^2 + 3y - 3y + 9y^2 - 18y^2 = 0$
 $\Rightarrow 9y^2 + 9y^2 - 18y^2 = 0$
 $\Rightarrow 0 = 0$
 So $2x - 3y$ is the factor of $4x^2 + 2x + 3y + 9y^2 - 12xy$

29. (B) Check by option (B)
 $a^2x^2 + 2abxy + b^2y^2$
 If $(ax + by)$ is the factor of the equation then
 $ax + by$
 then $ax + by = 0$
 $ax = -by \dots\dots\dots(i)$
 Put value in the equation
 $\Rightarrow (-by) + 2by(-by) + b^2y^2$
 $\Rightarrow 2b^2y^2 - 2b^2y^2$
 $\Rightarrow 0$
 So $(ax + by)$ is the factor of $a^2x^2 + 2abxy + b^2y^2$.

$x^4 + \frac{1}{x^4} = 194$
 30. (A) $(x + y)^3 = x^3 + y^3 + 3xy(x + y)$
 $64 = 12 + 12xy$
 $xy = \frac{13}{3} \dots\dots\dots(i)$
 $(x + y)^2 = x^2 + y^2 + 2xy$
 $16 = x^2 + y^2 + \frac{26}{3}$
 $x^2 + y^2 = \frac{22}{3} \dots\dots\dots(ii)$
 $(x^2 + y^2) = x^4 + y^4 + 2x^2y^2$
 $\left(\frac{22}{3}\right)^2 = x^4 + y^4 + 2\left(\frac{169}{9}\right)$
 $x^4 + y^4 = \frac{484}{9} - \frac{338}{9}$
 $= \frac{146}{9}$

31. (A) $(x - y)^2 = x^2 - 2xy + y^2$
 $169 + 4xy = x^2 + 2xy + y^2 + 4x$
 $169 + 100 = (x + y)^2$
 $x^2 - y^2 = (x - y)(x + y) = 13\sqrt{269}$

32. (D) ATQ,

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

$$\Rightarrow x^2 + \frac{1}{x^2} = 66$$

$$\Rightarrow x^4 + \frac{1}{x^4} = 4354$$

33. (C) $a + 3b = 12$

$$ab = 9$$

So,

$$(a - 3b) = \sqrt{(a + 3b)^2 - 12ab}$$

$$= \sqrt{144 - 108} = 6$$

34. (A) ATQ, $a^2 + \frac{2}{a^2} = 16$

$$\text{So, } \frac{72a^2}{a^4 + 2 + 8a^2} = \frac{72}{a^2 + \frac{2}{a^2} + 8} = 3$$

35. (B) $x + \frac{1}{x} = 4$

$$x^2 + \frac{1}{x^2} = 14 \Rightarrow x^4 + \frac{1}{x^4} = 194$$

36. (B) $P - 112 = -\frac{1}{P}$

$$(P - 112)^{15} = \left(-\frac{1}{P}\right)^{15} \Rightarrow (P - 112)^{15} + \frac{1}{P^{15}} = 0$$

37. (A) $\Rightarrow \frac{x^3 + \frac{1}{x^3}}{x + \frac{1}{x} - 3}$

$$\Rightarrow \frac{125 - 15}{5 - 3} \Rightarrow \frac{110}{2} = 55$$

38. (D) $x = 3 + 2\sqrt{2}$

$$\frac{1}{x} = 3 - 2\sqrt{2} = 6$$

$$x^2 + \frac{1}{x^2} = 36 - 2$$

$$x^2 + \frac{1}{x^2} = 34$$

39. (D) $y = \frac{6}{x}$

$$4x^2 + \frac{36}{x^2} = 40$$

$$x^2 + \left(\frac{3}{x}\right)^2 + 6 - 6 = 10$$

$$\left(x + \frac{3}{x}\right)^2 = 16 \Rightarrow x + \frac{3}{x} = 4$$

$$x^2 - 4x + 3 = 0$$

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

$$x(x - 3) - 1(x - 3) = 0$$

$$(x - 3)(x - 1)$$

$$\text{at } x = 3, x = 1$$

$$y = 2, y = 6$$

$$\text{Now, } 2x + y$$

$$\Rightarrow 6 + 2 = 8$$

40. (D) $a^3 + b^3 + c^3 - 3abc = 0$

$$a + b + c = 0$$

$$\Rightarrow x^3 + (3y)^3 + (yz)^3 - 3 \times x \times 3y \times yz = 0$$

$$x + 3y + 4z = 0$$

41. (C) $(x - 2) = \sqrt[3]{5}$

Both Side Cube

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

$$x^3 - 6x^2 + 12x - 8 = 5$$

$$x^3 - 6x^2 + 12x = 13$$

$$\Rightarrow x^3 - 6x^2 + 12x - 12$$

$$\Rightarrow 13 - 12$$

$$\Rightarrow 1$$

42. (C) $\left(a + \frac{1}{a}\right)^2 = a^2 + \frac{1}{a^2} + 2 = 98 + 2 = 100$

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

$$a^3 + \frac{1}{a^3} = \left(a + \frac{1}{a}\right)^3 - 3\left(a + \frac{1}{a}\right) = 1000 - 30 = 970$$

43. (C) $x = 3 + 5 - 2\sqrt{15} = 8 - 2\sqrt{15}$

$$x - 8 = -2\sqrt{15}$$

Square Both Side

$$(x - 8)^2 = (-2\sqrt{15})^2$$

$$x^2 - 16x = -4$$

$$= x^2 - 16x + 6$$

$$= -4 + 6$$

$$= 2$$

1. If $x + y = 7$ and $xy = 10$, then the value of $\left(\frac{1}{x^3} + \frac{1}{y^3}\right)$ is :
- यदि $x + y = 7$ और $xy = 10$ हो, तो $\left(\frac{1}{x^3} + \frac{1}{y^3}\right)$ का मान ज्ञात कीजिये ?
- (A) 0.543 (B) 0.131
(C) 0.133 (D) 0.453
2. If $8x^2 + y^2 - 12x - 4xy + 9 = 0$, then the 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
3. If $x + y + z = 19$, $xyz = 216$ and $xy + yz + zx = 114$, then the value of $\sqrt{x^3 + y^3 + z^3 + xyz}$ is :
- यदि $x + y + z = 19$, $xyz = 216$ और $xy + yz + zx = 114$ हो, तो $\sqrt{x^3 + y^3 + z^3 + xyz}$ का मान ज्ञात कीजिये ?
- (A) 32 (B) 30
(C) 28 (D) 35
4. If $a^2 + 4b^2 + 49c^2 + 18 = 2(2b + 28c - a)$, then the value of $(3a + 2b + 7c)$ is :
- यदि $a^2 + 4b^2 + 49c^2 + 18 = 2(2b + 28c - a)$ है तो $(3a + 2b + 7c)$ का मान कितना है :
- (A) 0 (B) 2
(C) 1 (D) 3
5. If $a + b + c = 5$, $a^2 + b^2 + c^2 = 27$ and $a^3 + b^3 + c^3 = 125$, then the value of $4abc$ is :
- यदि $a + b + c = 5$, $a^2 + b^2 + c^2 = 27$ और $a^3 + b^3 + c^3 = 125$ है, तो $4abc$ का मान है :
- (A) -20 (B) -15
(C) 15 (D) 20
6. If $3\sqrt{3}x^3 - 2\sqrt{2}y^3 = (\sqrt{3}x - \sqrt{2}y)(Ax^2 - Bxy + Cy^2)$ then the value of $(A^2 - B^2 + C^2)$ is :
- यदि $3\sqrt{3}x^3 - 2\sqrt{2}y^3 = (\sqrt{3}x - \sqrt{2}y)(Ax^2 - Bxy + Cy^2)$ है, तो $(A^2 - B^2 + C^2)$ का मान है :
- (A) 10 (B) 17
(C) 7 (D) 1
7. If $24\sqrt{3}x^2 + 2\sqrt{2}y^3 = (2\sqrt{3}x + \sqrt{2}y)(Ax^2 + Bxy + Cy^2)$ then $(2A + \sqrt{6}B - C)$ is equal to :
- यदि $24\sqrt{3}x^2 + 2\sqrt{2}y^3 = (2\sqrt{3}x + \sqrt{2}y)(Ax^2 + Bxy + Cy^2)$ है, तो $(2A + \sqrt{6}B - C)$ बराबर है :
- (A) 10 (B) 14
(C) 6 (D) 8
8. If $a + b + c = 4$ and $ab + bc + ca = 1$, then the value of $a^3 + b^3 + c^3 - 3abc$ is :
- यदि $a + b + c = 4$ और $ab + bc + ca = 1$ है, तो $a^3 + b^3 + c^3 - 3abc$ का मान है :
- (A) 50 (B) 60
(C) 52 (D) 47
9. If $a^3 + b^3 = 110$ and $a + b = 5$, then $(a + b)^2 - 3ab$ is equal to :
- यदि $a^3 + b^3 = 110$ और $a + b = 5$ है, तो $(a + b)^2 - 3ab$ का मान है :
- (A) 52 (B) 32
(C) 42 (D) 22
10. If $a + b + c = 5$ and $a^2 + b^2 + c^2 = 33$, then what is the value of $a^3 + b^3 + c^3 - 3abc$?
- यदि $a + b + c = 5$ और $a^2 + b^2 + c^2 = 33$ है, तो $a^3 + b^3 + c^3 - 3abc$ का मान क्या है ?
- (A) 195 (B) 180
(C) 192 (D) 185
11. If $40\sqrt{5}x^3 - 3\sqrt{3}y^3 = (2\sqrt{5}x - \sqrt{3}y)(Ax^2 + Bxy + Cy^2)$, then what is the value of $\sqrt{B^2 + C^2 - A}$?
- यदि $40\sqrt{5}x^3 - 3\sqrt{3}y^3 = (2\sqrt{5}x - \sqrt{3}y)(Ax^2 + Bxy + Cy^2)$ है, तो $\sqrt{B^2 + C^2 - A}$ का मान क्या है ?
- (A) 11 (B) 7
(C) 8 (D) 9

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

यदि $x^2 + 1 = 3x$ है, तो $\frac{(x^4 + x^{-2})}{(x^2 + 5x + 1)}$ का मान है :

- (A) $2\frac{1}{3}$ (B) $2\frac{1}{4}$ (C) $4\frac{1}{2}$ (D) $3\frac{1}{2}$

13. If x is real and $x^4 - 5x^2 - 1 = 0$, when the value of $\left(x^6 - 3x^2 + \frac{3}{x^2} - \frac{1}{x^6} + 1\right)$ is :

यदि x वास्तविक है और $x^4 - 5x^2 - 1 = 0$ है, तो

$\left(x^6 - 3x^2 + \frac{3}{x^2} - \frac{1}{x^6} + 1\right)$ का मान है :

- (A) 126 (B) 110
(C) 116 (D) 96

14. If $24\sqrt{3}x^3 + 5\sqrt{5}y^3 = (2\sqrt{3}x + \sqrt{5}y)(Ax^2 + Bxy + Cy^2)$ find the value of $5A - \sqrt{15}B + C$

यदि $24\sqrt{3}x^3 + 5\sqrt{5}y^3 = (2\sqrt{3}x + \sqrt{5}y)(Ax^2 + Bxy + Cy^2)$ है, तो $5A - \sqrt{15}B + C$ का मान क्या है ?

- (A) 108 (B) 128
(C) 109 (D) 35

15. If/यदि $x + \frac{1}{x} = 7$, then/है, तो $x^3 + \frac{1}{x^3}$ is equal to/का मान है :

- (A) 300 (B) 322
(C) 364 (D) 343

16. If $250\sqrt{2}x^3 - 5\sqrt{5}y^3 = (5\sqrt{2}x - \sqrt{5}y)(Ax^2 + Bxy + Cy^2)$, then the value of $(A + C - \sqrt{10}B)$ is :

यदि $250\sqrt{2}x^3 - 5\sqrt{5}y^3 = (5\sqrt{2}x - \sqrt{5}y)(Ax^2 + Bxy + Cy^2)$ है, तो $(A + C - \sqrt{10}B)$ का मान होगा :

- (A) 10 (B) 5
(C) $5\sqrt{2}$ (D) $2\sqrt{5}$

17. If $x \neq -1, 2$ and 5 , then the simplified value of

$\left\{\frac{2(x^3 - 8)}{x^2 - x - 2} \times \frac{x^2 + 2x + 1}{x^2 - 4x - 5} \div \frac{x^2 + 2x + 4}{3x - 15}\right\}$ is equal to :

यदि $x \neq -1, 2$ और 5 है, तब

$\left\{\frac{2(x^3 - 8)}{x^2 - x - 2} \times \frac{x^2 + 2x + 1}{x^2 - 4x - 5} \div \frac{x^2 + 2x + 4}{3x - 15}\right\}$ का सरलीकृत

मान बराबर है :

- (A) $\frac{1}{6}$ (B) 6 (C) $\frac{3}{2}$ (D) $\frac{2}{3}$

18. If $x + y + z = 19, x^2 + y^2 + z^2 = 133$, then the value of $x^3 + y^3 + z^3 - 3xyz$ is :

यदि $x + y + z = 19, x^2 + y^2 + z^2 = 133$ है, तो $x^3 + y^3 + z^3 - 3xyz$ का मान है :

- (A) 361 (B) 342
(C) 380 (D) 352

19. If $8(x + y)^3 - (x - y)^3 = (x + 3y)(Ax^2 + Bxy + Cy^2)$, then the value of $(A - B - C)$ is :

यदि $8(x + y)^3 - (x - y)^3 = (x + 3y)(Ax^2 + Bxy + Cy^2)$ है, तो $(A - B - C)$ का मान है :

- (A) -2 (B) -6
(C) 10 (D) 14

20. If $9a^2 + 16b^2 + c^2 + 25 = 24, (a + b)$, then the value of $(3a + 4b + 5c)$ is :

यदि $9a^2 + 16b^2 + c^2 + 25 = 24, (a + b)$ है तो $(3a + 4b + 5c)$ का मान है :

- (A) 9 (B) 6
(C) 7 (D) 10

21. If $x^2 - 6x + 1 = 0$, then the value of

$\left(x^4 + \frac{1}{x^2}\right) \div (x^2 + 1)$ is :

यदि $x^2 - 6x + 1 = 0$ है, तो $\left(x^4 + \frac{1}{x^2}\right) \div (x^2 + 1)$ का मान है :

- (A) 39 (B) 33
(C) 35 (D) 36

22. If $x + y + z = 3$ and $xy + yz + zx = -18$, then what is the value of $x^3 + y^3 + z^3 - 3xyz$?

यदि $x + y + z = 3$ और $xy + yz + zx = -18$ है, तो $x^3 + y^3 + z^3 - 3xyz$ का मान क्या है ?

- (A) 187 (B) 217
(C) 191 (D) 189

23. If $8(a + b)^3 + (a - b)^3 = (3a + b)(Aa^2 + Bab + Cb^2)$, then what is the value of $(A + B - C)$?

यदि $8(a + b)^3 + (a - b)^3 = (3a + b)(Aa^2 + Bab + Cb^2)$ है, तो $(A + B - C)$ का मान क्या है ?

- (A) 2 (B) 4
(C) 10 (D) 11

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24. If $(x-7)^3 + (x-8)^3 + (x+6)^3 = 3(x-7)(x-8)(x+6)$, then what is the value of x ?
 यदि $(x-7)^3 + (x-8)^3 + (x+6)^3 = 3(x-7)(x-8)(x+6)$ है, तो x का मान क्या है?
 (A) 6 (B) 8
 (C) 10 (D) 3
25. If $x - \frac{1}{x} = 10$, then $x^3 - \frac{1}{x^3}$ is equal to :
 यदि $x - \frac{1}{x} = 10$ है, तो $x^3 - \frac{1}{x^3}$ बराबर है :
 (A) 970 (B) 1000
 (C) 1030 (D) 1100
26. If $a^2 + b^2 = 88$ and $ab = 6$, ($a > 0, b > 0$) then what is the value of $(a^3 + b^3)$?
 यदि $a^2 + b^2 = 88$ और $ab = 6$, ($a > 0, b > 0$) है, तो $(a^3 + b^3)$ का मान क्या है?
 (A) 980 (B) 1180
 (C) 820 (D) 1000
27. If $x^4 + x^{-4} = 2207$, ($x > 0$) then the value of $x + x^{-1}$ is :
 यदि $x^4 + x^{-4} = 2207$, ($x > 0$) है, तो $x + x^{-1}$ का मान है :
 (A) 19 (B) 7
 (C) 11 (D) 9
28. If $(3x-7)^3 + (3x-8)^3 + (3x+6)^3 = 3(3x-7)(3x-8)(3x+6)$, then what is the value of x ?
 यदि $(3x-7)^3 + (3x-8)^3 + (3x+6)^3 = 3(3x-7)(3x-8)(3x+6)$ है, तो x का मान ज्ञात कीजिये ?
 (A) 3 (B) 1
 (C) 4 (D) 2
29. If $x^4 + x^{-4} = 1442$, ($x > 0$) then the value of $x + x^{-1}$ is :
 यदि $x^4 + x^{-4} = 1442$, ($x > 0$) है, तो $x + x^{-1}$ का मान है :
 (A) 7 (B) $\sqrt{40}$
 (C) 6 (D) 15
30. If $x + \frac{1}{x} = 10$, then $x^3 + \frac{1}{x^3}$ is equal to :
 यदि $x + \frac{1}{x} = 10$ है, तो $x^3 + \frac{1}{x^3}$ का मान ज्ञात कीजिये ?
 (A) 970 (B) 1030
 (C) 1000 (D) 1100
31. If $a^2 + b^2 = 99$ and $ab = 11$, ($a > 0, b > 0$) then the value of $(a^3 + b^3)$ is :
 यदि $a^2 + b^2 = 99$ और $ab = 11$, ($a > 0, b > 0$) है, तो $(a^3 + b^3)$ का मान है :
 (A) 1250 (B) 968
 (C) 1100 (D) 1080
32. If $a^2 + b^2 = 135$ and $ab = 7$, ($a > 0, b > 0$) then the value of $(a^3 - b^3)$ is :
 यदि $a^2 + b^2 = 135$ और $ab = 7$, ($a > 0, b > 0$) है, तो $(a^3 - b^3)$ का मान है :
 (A) 1562 (B) 1600
 (C) 1680 (D) 1350
33. If $(2x-7)^3 + (2x-8)^3 + (2x-3)^3 = 3(2x-7)(2x-8)(2x-3)$, then what is the value of x ?
 यदि $(2x-7)^3 + (2x-8)^3 + (2x-3)^3 = 3(2x-7)(2x-8)(2x-3)$ है, तो x का मान क्या है ?
 (A) 4 (B) 2
 (C) 1 (D) 3
34. If $x^4 + x^{-4} = 1442$, ($x > 0$), then the value of $x + x^{-1}$ is :
 यदि $x^4 + x^{-4} = 1442$, ($x > 0$) है, तो $x + x^{-1}$ का मान होगा :
 (A) $\sqrt[3]{10}$ (B) $\sqrt[3]{10}$
 (C) $\sqrt[3]{10}$ (D) 15
35. If $x = \sqrt{3} - \sqrt{2}$, then the value of $x^3 - x^{-3}$ is :
 यदि $x = \sqrt{3} - \sqrt{2}$ है, तो $x^3 - x^{-3}$ का मान होगा :
 (A) $22\sqrt{3}$ (B) $-22\sqrt{2}$
 (C) $22\sqrt{2}$ (D) $-22\sqrt{3}$
36. If $5^{3x} + 12^{3x} = 13^{3x}$, then the value of x is :
 यदि $5^{3x} + 12^{3x} = 13^{3x}$ है, तो x का मान होगा :
 (A) 2 (B) 8
 (C) 1 (D) 4
37. If $(2x+7)^3 + (2x+8)^3 + (2x+3)^3 = 3(2x+7)(2x+8)(2x+3)$, then what is the value of x ?
 यदि $(2x+7)^3 + (2x+8)^3 + (2x+3)^3 = 3(2x+7)(2x+8)(2x+3)$ है, तो x का मान क्या है ?
 (A) -2 (B) 3
 (C) 2 (D) -3
38. If $(x+7)^3 + (2x+8)^3 + (2x+3)^3 = 3(x+7)(2x+8)(2x+3)$, then what is the value of x ?
 यदि $(x+7)^3 + (2x+8)^3 + (2x+3)^3 = 3(x+7)(2x+8)(2x+3)$ है, तो x का मान है ?
 (A) -3.6 (B) 3.6
 (C) 2.4 (D) -2.4
39. If $3^{\sqrt{x}} + 4^{\sqrt{x}} = 5^{\sqrt{x}}$ then the value of x is :
 यदि $3^{\sqrt{x}} + 4^{\sqrt{x}} = 5^{\sqrt{x}}$ है, तो x का मान है :
 (A) 8 (B) 2
 (C) 4 (D) 1

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40. If $x = 2 - \sqrt{3}$ then the value of $x^3 - x^{-3}$ is :
 यदि $x = 2 - \sqrt{3}$ तो $x^3 - x^{-3}$ का मान है :
 (A) $-30\sqrt{3}$ (B) $30\sqrt{3}$
 (C) $-30\sqrt{2}$ (D) $30\sqrt{2}$
41. If $(x-8)^3 + (2x+16)^3 + (2x-13)^3 = 3(x-8)(2x+16)(2x-13)$, then what is the value of x ?
 यदि $(x-8)^3 + (2x+16)^3 + (2x-13)^3 = 3(x-8)(2x+16)(2x-13)$ है, तो x का मान ज्ञात कीजिये ?
 (A) 0.7 (B) -1
 (C) 1 (D) 0
42. If $3^{4/x} + 4^{4/x} = 5^{4/x}$, then the value of x is:
 यदि $3^{4/x} + 4^{4/x} = 5^{4/x}$ है, तो x का मान है:
 (A) 4 (B) 2
 (C) 8 (D) 16
43. If $x = 2 + \sqrt{3}$ then the value of $x^3 + x^{-3}$ is :
 यदि $x = 2 + \sqrt{3}$ है, तो $x^3 + x^{-3}$ का मान ज्ञात कीजिये ?
 (A) 52 (B) -52
 (C) $-52\sqrt{3}$ (D) $52\sqrt{3}$
44. If $x = 2 + \sqrt{3}$, then the value of $x^3 - x^{-3}$ is:
 यदि $x = 2 + \sqrt{3}$ है, तो $x^3 - x^{-3}$ का मान ज्ञात कीजिये ?
 (A) -52 (B) $-30\sqrt{3}$
 (C) $30\sqrt{3}$ (D) 52
45. If $6^{4/x} + 8^{4/x} = 10^{4/x}$, then the value of x is:
 यदि $6^{4/x} + 8^{4/x} = 10^{4/x}$ है, तो x का मान ज्ञात कीजिए ?
 (A) 2 (B) 16
 (C) 4 (D) 8
46. If $(x-7)^3 + (2x+8)^3 = 3(x-7)(2x+8)(2x-3)$, then what is the value of x ?
 यदि $(x-7)^3 + (2x+8)^3 = 3(x-7)(2x+8)(2x-3)$ है, तो x का मान ज्ञात कीजिए ?
 (A) 1.6 (B) 2.4
 (C) 1.2 (D) 0.4
47. If $a^3 + b^3 = 1344$ and $a + b = 28$, then $(a+b)^2 - 3ab$ is equal to :
 यदि $a^3 + b^3 = 1344$ और $a + b = 28$ है, तो $(a+b)^2 - 3ab$ बराबर है :
 (A) 24 (B) 16
 (C) 32 (D) 48
48. If $x = 2 + \sqrt{5}$ then the value of $(x^3 - x^{-3})$ is :
 यदि $x = 2 + \sqrt{5}$ है, तो $(x^3 - x^{-3})$ का मान है :
 (A) -52 (B) 52
 (C) 76 (D) -76
49. If $x^4 + x^{-4} = 47$, ($x > 0$), then the value of $2(2x-3)^2$ is :
 यदि $x^4 + x^{-4} = 47$, ($x > 0$) है, तो $2(2x-3)^2$ का मान है :
 (A) 2 (B) 3
 (C) 5 (D) 10
50. If $x = 2 + \sqrt{5}$ then the value of $x^3 + x^{-3}$ is:
 अगर $x = 2 + \sqrt{5}$ है, तो $x^3 + x^{-3}$ मान है:
 (A) $40\sqrt{5}$ (B) $34\sqrt{5}$
 (C) $46\sqrt{5}$ (D) $36\sqrt{5}$
51. If $a^3 - b^3 = 899$ and $a - b = 31$, then $(a-b)^2 + 3ab$ is equal to:
 यदि $a^3 - b^3 = 899$ तथा $a - b = 31$ है, तो $(a-b)^2 + 3ab$ बराबर है:
 (A) 35 (B) 31
 (C) 16 (D) 29
52. If $x^4 + x^{-4} = 194$, ($x > 0$), then the value of $(2x-4)^2$ is:
 यदि $x^4 + x^{-4} = 194$ है, ($x > 0$) है, तो $(2x-4)^2$ का मान ज्ञात कीजिए।
 (A) 15 (B) 20
 (C) 12 (D) 16
53. If $x - \frac{1}{x} = 7$, then $x^3 - \frac{1}{x^3}$ is equal to —
 यदि $x - \frac{1}{x} = 7$ है, तो $x^3 - \frac{1}{x^3}$ का मान ज्ञात कीजिये ?
 (A) 480 (B) 364
 (C) 376 (D) 500
54. If $x^4 + x^{-4} = 1154$, ($x > 0$), then the value of $2(x-3)^2$ is:
 यदि $x^4 + x^{-4} = 1154$, ($x > 0$) है, तो $2(x-3)^2$ का मान ज्ञात कीजिये ?
 (A) 16 (B) 12
 (C) 20 (D) 15
55. If $a^3 - b^3 = 899$ and $a - b = 29$, then $(a-b)^2 + 3ab$ is equal to:
 यदि $a^3 - b^3 = 899$ और $a - b = 29$ है, तो $(a-b)^2 + 3ab$ का मान ज्ञात कीजिये ?
 (A) 35 (B) 29
 (C) 16 (D)
56. If $(3x+1)^3 + (x-3)^3 + (2x-4)^3 = 6(3x+1)(x-3)(x-2)$, then x is equal to:
 यदि $(3x+1)^3 + (x-3)^3 + (2x-4)^3 = 6(3x+1)(x-3)(x-2)$ है, तो x बराबर होगा ?
 (A) 3 (B) 1
 (C) 2 (D) $-\frac{1}{3}$

57. The value of the expression $\frac{1}{4} \left\{ \left(a + \frac{1}{a} \right)^2 - \left(a - \frac{1}{a} \right)^2 \right\}$ is:

दिए गए व्यंजक $\frac{1}{4} \left\{ \left(a + \frac{1}{a} \right)^2 - \left(a - \frac{1}{a} \right)^2 \right\}$ का मान है:

- (A) $\frac{1}{2}$ (B) $\frac{1}{4}$ (C) 1 (D) 4

58. a, b, c are three positive numbers, 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 संख्याएं इस प्रकार हैं कि $(a + b + c) = 20$, $a^2 + b^2 + c^2 = 152$ है। $(ab + bc + ca)$ का मान बराबर है—
(A) 124 (B) 110
(C) 112 (D) 102

59. If $(x + y)^{\frac{1}{3}} + (y + z)^{\frac{1}{3}} = -(z + x)^{\frac{1}{3}}$, then $(x^3 + y^3 + z^3)$ can be expressed as —

अगर $(x + y)^{\frac{1}{3}} + (y + z)^{\frac{1}{3}} = -(z + x)^{\frac{1}{3}}$, है, तो $(x^3 + y^3 + z^3)$ को इस प्रकार व्यक्त किया जा सकता है—

- (A) $\frac{1}{8}xyz$ (B) $(x + y)(y + z)(z + x)$
(C) $\frac{3}{8}(x + y)(y + z)(z + x)$ (D) $3xyz$

60. If $a + \frac{1}{a} = 2$, what is the value of $\left(a^1 - \frac{1}{a^4} \right)$?

अगर $a + \frac{1}{a} = 2$ है, तो $\left(a^1 - \frac{1}{a^4} \right)$ का मूल्य क्या है?

- (A) 0 (B) $\frac{1}{4}$ (C) 1 (D) 4

61. If $a + \frac{1}{a} = 3$, then the value of $\left(a^6 + \frac{1}{a^6} \right)$ is equal to:

यदि $a + \frac{1}{a} = 3$ है, तो $\left(a^6 + \frac{1}{a^6} \right)$ किसके समान होगा?

- (A) 319 (B) 322
(C) 780 (D) 730

62. If $\frac{1}{a^3} + \frac{1}{b^3} + \frac{1}{c^3} = 0$, then $(a + b + c)^6$ is equal to:

यदि $\frac{1}{a^3} + \frac{1}{b^3} + \frac{1}{c^3} = 0$ है, तो $(a + b + c)^6$ किसके समान होगा?

- (A) 81 abc (B) $729a^2b^2c^2$
(C) 729 abc (D) $81 a^2b^2c^2$

63. If $a + b - c = 12$ and $a^2 + b^2 + c^2 = 110$, then यदि $a + b - c = 12$ और $a^2 + b^2 + c^2 = 110$ है, तो

- (p) $ab + bc + ca = 34$
(q) $ab + bc - ca = 17$
(r) $ab - bc + ca = 17$
(s) $ab - bc - ca = 17$

which among the following relations is true? निम्नलिखित में से कौन सा संबंध सही है?

- (A) r (B) q
(C) p (D) s

64. If $a^2 + b^2 = 169$, $ab = 60$, $(a > b)$, then $(a^2 - b^2)$ is equal to —

यदि $a^2 + b^2 = 169$, $ab = 60$, $(a > b)$ है, तो $(a^2 - b^2)$ किसके समान होगा?

- (A) 149 (B) 129
(C) 119 (D) 139

65. If/यदि $x = \frac{1}{12.13} + \frac{1}{13.14} + \frac{1}{14.45} + \dots + \frac{1}{23.24}$

$$y = \frac{1}{36.27} + \frac{1}{37.38} + \frac{1}{38.39} + \dots + \frac{1}{71.72},$$

then/हो, तो $\frac{x}{y}$ is equal to/किसके समान होगा?

- (A) $\frac{1}{3}$ (B) $\frac{1}{24}$ (C) $\frac{1}{72}$ (D) 3

66. If $\frac{10}{7} (1 - 2.43 \times 10^{-3}) = 1.417 + x$, then x is equal to:

यदि $\frac{10}{7} (1 - 2.43 \times 10^{-3}) = 1.417 + x$ है, तो x बराबर है—

- (A) 0.0417 (B) 0.417
(C) 0.0081 (D) 0.81

67. If $(3x + 1)^3 + (x - 3)^3 + (4 - 2x)^3 + 6(3x + 1)(x - 3)(x - 2) = 0$, then x is equal to:

यदि $(3x + 1)^3 + (x - 3)^3 + (4 - 2x)^3 + 6(3x + 1)(x - 3)(x - 2) = 0$ है, तो x बराबर है—

- (A) -1 (B) $-\frac{1}{2}$ (C) 1 (D) $\frac{1}{2}$

68. If $(1.25)(1 - 6.4 \times 10^{-5}) = 1.2496 + a$, then a is equal to:

अगर $(1.25)(1 - 6.4 \times 10^{-5}) = 1.2496 + a$ है, तो a बराबर है:
(A) 0.0016 (B) 0.00016
(C) 0.0032 (D) 0.00032

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69. If/अगर $(a + b + 4)\{ab + 4(a + b)\} - 4ab = 0$

and/तथा $a \neq -4, b \neq -4,$

then/है, तो, $\left\{ \frac{1}{(a + b + 4)^{117}} - 2^{-234} \right\}$ is equal to/बराबर है—

- (A) $\frac{1}{4^{117}}$ (B) $\frac{1}{2^{117}}$
 (C) $-\frac{1}{2^{234}}$ (D) 0

70. Given, $a + \frac{1}{a} = 2$, what is the value of

$$\left(a^{118} + \frac{1}{a^{117}} \right)^2$$

अगर $a + \frac{1}{a} = 2$ है, तो $\left(a^{118} + \frac{1}{a^{117}} \right)$ का मान ज्ञात कीजिये ?

- (A) 118 (B) 1
 (C) 2 (D) 117

71. If $a = \sqrt{8} - \sqrt{7}$ and $a = \frac{1}{b}$, then $\frac{a^2 + b^2 - 3ab}{a^2 + ab + b^2}$ is equal to:

यदि $a = \sqrt{8} - \sqrt{7}$ है और $a = \frac{1}{b}$ है, तो $\frac{a^2 + b^2 - 3ab}{a^2 + ab + b^2}$

किसके समान होगा ?

- (A) $\frac{27}{31}$ (B) $\frac{27}{32}$
 (C) $\frac{29}{33}$ (D) $\frac{29}{31}$

72. Given that x, y, z are positive real numbers, if $(x + y)^2 - z^2 = 8, (y + z)^2 - x^2 = 10$ and $(x + z)^2 - y^2 = 7$, then $(x + y + z)$ is equal to:

दिया गया है कि x, y, z धनात्मक वास्तविक संख्याएं हैं, यदि $(x + y)^2 - z^2 = 8, (y + z)^2 - x^2 = 10$ और $(x + z)^2 - y^2 = 7$ है, तो $(x + y + z)$ किसके समान होगा ?

- (A) 5 (B) 7
 (C) 8 (D) 6

73. If $a + b + c = 5$ and $ab + cb + ca = 4$, then $a^3 + b^3 + c^3 - 3abc$ is equal to:

यदि $a + b + c = 5$ और $ab + cb + ca = 4$ है, तो $a^3 + b^3 + c^3 - 3abc$ किसके समान होगा ?

- (A) 62 (B) 72
 (C) 68 (D) 65

Solution

1. (C) $\frac{1}{x^3} + \frac{1}{y^3} = \frac{x^3 + y^3}{(xy)^3} = \frac{(x + y)^3 - 3xy(x + y)}{(xy)^3}$
 $= \frac{(7)^3 - 3 \times 10 \times 7}{10^3} = \frac{343 - 210}{1000} = \frac{133}{1000} = 0.133$

2. (B) $8x^2 + y^2 - 12x - 4xy + 9 = 0$
 $(4x^2 + y^2 - 4xy) + (4x^2 - 12x + 9) = 0$
 $(2x - y)^2 + (2x - 3)^2 = 0$
 $\Rightarrow 2x = y \quad 2x = 3$
 $x = \frac{3}{2} \quad y = 3$

3. (D) $x^3 + y^3 + z^3 - 3xyz = (x + y + z)(x^2 + y^2 + z^2 - xy - yz - zx)$
 $(19)^2 = x^2 + y^2 + z^2 + 2 \times 114$
 $= x^2 + y^2 + z^2 = 361 - 228 = 133$
 $= x^3 + y^3 + z^3 - 3xyz = (19)(133 - 114) = 19^2$
 $= \sqrt{x^3 + y^3 + z^3 - 3xyz + 4xyz}$
 $= \sqrt{19^2 + 4 \times 216} \Rightarrow \sqrt{361 + 864}$
 $= \sqrt{1225} = 35$

4. (B) $a^2 + 4b^2 + 49c^2 + 18 = 4b + 56c - 2a$
 $(a^2 + 2a + 1) + [(2b)^2 - 2(2b) + 1] + [(7c)^2 - 2(7c) + 4] + 4 = 0$
 $(a + 1)^2 + (2b - 1)^2 + (7c - 4)^2 = 0$
 $\Rightarrow a = -1, b = \frac{1}{2}, c = \frac{4}{7}$

$\Rightarrow 3(-1) + 2\left(\frac{1}{2}\right) + 7\left(\frac{4}{7}\right)$
 $\Rightarrow -3 + 1 + 4$
 $\Rightarrow 2$

5. (A) $a^3 + b^3 + c^3 - 3abc$
 $= (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$
 $125 - 3abc = (5) \left(27 - \frac{(25 - 27)}{2} \right)$
 $125 - 3abc = 5(28)$
 $125 - 3abc = 140$
 $3abc = -15$
 $\Rightarrow abc = -5$
 $\Rightarrow 4abc = -20$

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

Comparing with original equation

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

$A^2 - B^2 + C^2 = 9 + 4 - 6 = 7$

7. (A) $(2\sqrt{3}x)^3 + (\sqrt{2}y)^3 = (2\sqrt{3}x + \sqrt{2}y)$

$(12x^2 + 2y^2 + 2\sqrt{6}xy)$

Comparing with original equation

$A = 12, B = -2\sqrt{6}, C = 2$

$= 2(12) + \sqrt{6}(-2\sqrt{6}) - 2$

$= 24 - 12 - 2 = 10$

8. (B) $a^3 + b^3 + c^3 - 3abc$

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

$= (4) (4^2 - 3(1))$

$= 4 (13) \Rightarrow 52$

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

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

Required

$110 = 5(R)$

$R = 22$

10. (D) $a^3 + b^3 + c^3 - 3abc = (5) \left(33 - \frac{(5^2 - 33)}{2} \right)$

$= (5) (33 + 4)$

$= 5 \times 37$

$= 185$

11. (B) $(2\sqrt{5}x)^3 - (\sqrt{3}y)^3 = (2\sqrt{5}x - \sqrt{3}y)$

$(20x^2 + 3y^2 + 2\sqrt{15}xy)$

$\sqrt{B^2 + C^2 - A}$

$= \sqrt{60 + 9 - 20}$

$= \sqrt{69 - 20} = \sqrt{49}$

$= 7$

12. (B) $x + \frac{1}{x} = 3$

$\frac{x^3 + 1}{x^3} = \frac{27 - 9}{3 + 5}$

$\frac{x^3 + 1}{x + \frac{1}{x} + 5} = \frac{27 - 9}{3 + 5}$

$= \frac{18}{8} = \frac{9}{4} = 2\frac{1}{4}$

13. (A) $x^2 - \frac{1}{x^2} = 5$

$= \left[x^6 - \frac{1}{x^6} - 3 \left(x^2 - \frac{1}{x^2} \right) + 1 \right]$

$= \left[x^6 - \frac{1}{x^6} - 15 + 1 \right] \Rightarrow x^6 - \frac{1}{x^6} - 14$

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

$= x^6 - \frac{1}{x^6} - 3 \times 5 = 125$

$= x^6 - \frac{1}{x^6} = 140$

$= 140 - 14 = 126$

14. (D) $(2\sqrt{3}x)^3 + (\sqrt{5}y)^3 = (2\sqrt{3}x + \sqrt{5}y)(12x^2 + 5y^2 + 2\sqrt{15}yx)$

$A = 12, B = -2\sqrt{15}, C = 5$

$\therefore 5A - \sqrt{15}B + C = 60 - 30 + 5$

$= 35$

15. (B) $x + \frac{1}{x} = 7$

$x^3 + \frac{1}{x^3} = 343 - 3 \times 7 = 343 - 21$

$= 322$

16. (B) $(5\sqrt{2}x)^3 - ((\sqrt{5})y)^3$

$= (5\sqrt{2}x - \sqrt{5}y) (50x^2 + 5y^2 + 5\sqrt{10}xy)$

Comparing with original equation

$A = 50, B = 5\sqrt{10}, C = 5$

$\Rightarrow A + C - \sqrt{10}B = 50 + 5 - 50 = 5$

17. (B) $\frac{2(x^3 - 8)}{(x^2 - x - 2)} \times \frac{(x^2 + 2x + 1)}{(x^2 - 4x - 5)} \div \frac{(x^2 + 2x + 4)}{3x - 15}$

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

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

$$\begin{aligned}
 18. (A) \quad x^3 + y^2 + z^3 - 3xyz &= (19) \left(133 - \left(\frac{361-133}{2} \right) \right) \\
 &= 19 \left(133 - \frac{228}{2} \right) \\
 &= (19) (133 - 114) \\
 &= 19 \times 19 = 361
 \end{aligned}$$

$$\begin{aligned}
 19. (A) \quad (2(x+y))^3 - (x-y)^3 \\
 &= (2x+2y-x+y) [2(x+y)]^2 \\
 &\quad + (x-y)^2 + 2(x^2-y^2) \\
 &= (x+3y) [4x^2+4y^2+8xy \\
 &\quad + x^2+y^2-2xy+2x^2-2y^2] \\
 &= (x+3y) (7x^2+3y^2+6xy) \\
 &\text{Comparing with original equation} \\
 &A = 7, B = 6, C = 3 \\
 &A - B - C = -2
 \end{aligned}$$

$$\begin{aligned}
 20. (C) \quad [(3a)^2 - 2 \times (3a) \times 4 + 4^2] + [(4b)^2 - 2 \times (4b) \times 3 + 3^2] + C^2 = 0 \\
 \Rightarrow (3a-4)^2 - (4b-3)^2 + c^2 = 0 \\
 \Rightarrow a = \frac{4}{3} \quad b = \frac{3}{4} \quad c = 0 \\
 \Rightarrow 3a + 4b + 5c = 3\left(\frac{4}{3}\right) + 4\left(\frac{3}{4}\right) + 5(0) \\
 = 4 + 3 + 0 = 7
 \end{aligned}$$

$$\begin{aligned}
 21. (B) \quad x + \frac{1}{x} = 6 \\
 \frac{\left(x^2 + \frac{1}{x^2}\right)}{x^2 + 1} = \frac{x^3 + \frac{1}{x^3}}{x + \frac{1}{x}} = \frac{6^3 - 3 \times 6}{6} \\
 = \frac{198}{6} = 33
 \end{aligned}$$

$$\begin{aligned}
 22. (D) \quad x^3 + y^3 + z^3 - 3xyz &= (3) (9 + 36 + 18) \\
 &= 3 \times 63 = 189
 \end{aligned}$$

$$\begin{aligned}
 23. (A) \quad (2(a+b))^3 + (a-b)^3 \\
 &= (2a+2b+a-b) (4(a+b)^2 + (a-b)^2 \\
 &\quad - 2(a^2-b^2)) \\
 &= (3a+b) (4a^2+4b^2+8ab+a^2-b^2 \\
 &\quad - 2ab-2a^2+2b^2) \\
 &= (3a+b) (3a^2+7b^2+6ab) \\
 &= A = 3, B = 6, C = 7 \\
 &= A + B - C = 3 + 6 - 7 = 2
 \end{aligned}$$

$$\begin{aligned}
 24. (D) \quad a^3 + b^3 + c^3 &= 3abc \\
 a + b + c &= 0 \\
 (x-7) + (x-8) + (x+6) &= 0 \\
 3x-9 &= 0 \\
 \Rightarrow x &= 3
 \end{aligned}$$

$$25. (C) \quad x - \frac{1}{x} = 10$$

$$\begin{aligned}
 x^3 - \frac{1}{x^3} &= \left(x - \frac{1}{x}\right)^3 + 3\left(x - \frac{1}{x}\right) \\
 &= (10)^3 + 3 \times 10 \\
 &= 1000 + 30 = 1030
 \end{aligned}$$

$$\begin{aligned}
 26. (C) \quad a^3 + b^3 &= (a+b)^3 - 3ab(a+b) \\
 (a+b)^2 &= 88 + 12 = 100 \\
 \Rightarrow a+b &= 10 \\
 a^3 + b^3 &= (10)^3 - 3 \times 6 \times 10 \\
 &= 1000 - 180 = 820
 \end{aligned}$$

$$27. (B) \quad x^4 + \frac{1}{x^4} = 2207$$

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

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

$$\begin{aligned}
 28. (B) \quad a^3 + b^3 + c^3 &= 3abc \\
 a + b + c &= 0 \\
 3x - 7 + 3x - 8 + 3x + 6 &= 0 \\
 9x - 9 &= 0 \\
 x &= 1
 \end{aligned}$$

$$29. (B) \quad x^4 + \frac{1}{x^4} = 1442$$

$$x^2 + \frac{1}{x^2} = 38$$

$$\Rightarrow x + \frac{1}{x} = \sqrt{40}$$

$$30. (A) \quad x + \frac{1}{x} = 10$$

$$\begin{aligned}
 x^3 + \frac{1}{x^3} &= (10)^3 - 3(10) \\
 &= 1000 - 30 = 970
 \end{aligned}$$

$$\begin{aligned}
 31. (B) \quad a^3 + b^3 &= (a+b)^3 - 3ab(a+b) \\
 a^2 + b^2 &= (a+b)^2 - 2ab \\
 99 &= (a+b)^2 - 2 \times 11 \\
 (a+b)^2 &= 121 \\
 \Rightarrow a+b &= 11 \\
 \Rightarrow a^3 + b^3 &= (11)^3 - 3 \times 11 \times 11 \\
 &= 1331 - 363 \\
 &= 968
 \end{aligned}$$

32. (A) $a^3 - b^3 = (a - b)(a^2 + b^2 + ab)$
 $(a - b)^2 = a^2 + b^2 - 2ab$
 $= 135 - 2 \times 7$
 $= 135 - 14 = 121$

$a - b = 11$
 $a^3 - b^3 = (11)(135 + 7)$
 $= 11 \times 142 = 1562$

33. (D) $a^3 + b^3 + c^3 = 3abc$
 $\Rightarrow a + b + c = 0$
 $2x + 7 + 2x - 8 + 2x - 3 = 0$
 $6x - 18 = 0$
 $x = 3$

34. (A) $x^4 + \frac{1}{x^4} = 1442$

$x^2 + \frac{1}{x^2} = 38$

$x + \frac{1}{x} = \sqrt{40}$
 $= 2\sqrt{10}$

35. (B) $x = \sqrt{3} - \sqrt{2}$ $\frac{1}{x} = \sqrt{3} + \sqrt{2}$

$x - \frac{1}{x} = -2\sqrt{2}$
 $= x^3 - \frac{1}{x^3} = 16\sqrt{2} + 3(-2\sqrt{2})$
 $= -16\sqrt{2} - 6\sqrt{2}$
 $= -22\sqrt{2}$

36. (B) $5^{4\sqrt{x}} + 12^{3\sqrt{x}} = 13^{3\sqrt{x}}$
 From option $x = 8$

37. (D) $a^3 + b^3 + c^3 = 3abc$
 $a + b + c = 0$
 $(2x + 7) + (2x + 8) + (2x + 3) = 0$
 $6x + 18 = 0$
 $x = -3$

38. (A) $a^3 + b^3 + c^3 = 3abc$
 $\Rightarrow a + b + c = 0$
 $x + 7 + 2x + 8 + 2x + 3 = 0$
 $5x + 18 = 0$
 $x = -\frac{18}{5}$
 $= -3.6$

39. (A) By hit & trail
 $x = 8$

40. (A) $x = 2 - \sqrt{3}$ $\frac{1}{x} = 2 + \sqrt{3}$
 $x - \frac{1}{x} = -2\sqrt{3} \Rightarrow x^3 - \frac{1}{x^3} = -24\sqrt{3} + 3(-2\sqrt{3})$
 $= -24\sqrt{3} - 6\sqrt{3} = -30\sqrt{3}$

41. (C) $a^3 + b^3 + c^3 = 3abc$
 $\Rightarrow a + b + c = 0$
 $(x - 8) + (2x + 16) + (2x - 13) = 0$
 $5x - 5 = 0$
 $x = 1$

42. (D) $3^{4/x} + 4^{4/x} = 5^{4/x}$
 By hit & trial
 $x = 16$

43. (A) $x = 2 + \sqrt{3}$
 $\frac{1}{x} = 2 - \sqrt{3}$
 $\Rightarrow x + \frac{1}{x} = 4$
 $\Rightarrow x^3 + \frac{1}{x^3} = 64 - 3 \times 4$
 $= 52$

44. (D) $x = 2 + \sqrt{3}$

$\frac{1}{x} = 2 - \sqrt{3}$
 $x + \frac{1}{x} = 4$
 $\Rightarrow x^3 + \frac{1}{x^3} = 64 - 12 = 52$

45. (B) $6^{1/\sqrt{x}} + 8^{1/\sqrt{x}} = 10^{1/\sqrt{x}}$
 By hit & trail
 $x = 16$

46. (D) $a^3 + b^3 + c^3 = 3abc$
 $\Rightarrow a + b + c = 0$
 $x - 7 + 2x + 8 + 2x - 3 = 0$
 $5x - 2 = 0$
 $x = \frac{2}{5}$
 $= 0.4$

47. (D) $(a + b)^2 - 3ab = a^2 + b^2 - ab$
 $a^3 + b^3 = (a + b)(a^2 + b^2 - ab)$
 $1344 = 28(a^2 + b^2 - ab)$
 $\Rightarrow a^2 + b^2 - ab = 48$

48. (C) $x = 2 + \sqrt{5}$
 $\frac{1}{x} = \sqrt{5} - 2$

$x - \frac{1}{x} = 4$
 $x^3 - \frac{1}{x^3} = 64 + 3 \times 4$
 $= 76$

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49. (D) $x^1 + x^{-1} = 47$
 $\therefore x + \frac{1}{x} = 3$
 $x - \frac{1}{x} = \sqrt{5}$
 So, $2x = 3 + \sqrt{5}$
 $2(2x-3)^2 = 2 \times (\sqrt{5})^2 = 10$
50. (B) $x = 2 + \sqrt{5}$ $\frac{1}{x} = \sqrt{5} - 2$
 $x + \frac{1}{x} = 2\sqrt{5}$
 $x^3 + \frac{1}{x^3} = 40\sqrt{5} - 3(2\sqrt{5})$
 $= 40\sqrt{5} - 6\sqrt{5}$
 $= 34\sqrt{5}$
51. (D) $a^2 + b^2 + ab$
 $a^3 - b^3 = (a-b)(a^2 + b^2 + ab)$
 $899 = 31(a^2 + b^2 + ab)$
 $\Rightarrow a^2 + b^2 + ab = \frac{899}{31} = 29$
52. (C) $x^1 + \frac{1}{x^1} = 194$
 $x^2 + \frac{1}{x^2} = 14$
 $x + \frac{1}{x} = 4$
 $x^2 + 1 = 4x$
 $\Rightarrow x^2 - 4x + 1 = 0$... (i)
 $(2x-4)^2 = 4x^2 + 16 - 16x$... (ii)
 From eq. (i) $4x^2 - 16x + 4 = 0$
 $\Rightarrow 4x^2 - 16x = -4$
 Putting value of $4x^2 - 16x$ in equation (ii)
 $-4 + 16 = 12$
53. (B) $x - \frac{1}{x} = 7$
 $x^3 - \frac{1}{x^3} = 343 + 3(7)$
 $= 343 + 21 = 364$
54. (A) $x^2 + \frac{1}{x^2} = 34$
 $x + \frac{1}{x} = 6$
 $\Rightarrow x^2 + 1 - 6x = 0$... (i)
- $\Rightarrow 2(x-3)^2 = 2x^2 + 18 - 12x$... (ii)
 From (i) ...
 $2x^2 - 12x = -2$
 Putting value of $2x^2 - 12x$ in eq. (ii)
 $\Rightarrow -2 + 18 = 16$
55. (D) $a^2 + b^2 + ab$
 $a^3 - b^3 = (a-b)(a^2 + b^2 + ab)$
 $899 = 29(a^2 + b^2 + ab)$
 $a^2 + b^2 + ab = \frac{899}{29} = 31$
56. (B) $a^3 + b^3 + c^3 = 3abc$
 $\Rightarrow a + b + c = 0$
 $(3x+1) + (x-3) + (2x-4) = 0$
 $6x-6 = 0$
 $x = 1$
57. (C) Put $a = 1$
 $= \frac{1}{4} \left\{ \left(a + \frac{1}{a} \right)^2 - \left(a - \frac{1}{a} \right) \right\}$
 $= \frac{1}{4} (2^2) = 1$
58. (A) $(20)^2 = 152 + 2(ab + bc + ca)$
 $\Rightarrow ab + bc + ca = \frac{400 - 152}{2} = \frac{248}{2}$
 $= 124$
59. (C) $(x+y)^3 + (y+z)^3 + (z+x)^3 = 0$
 $\Rightarrow (x+y) + (y+z) + (z+x) = 3(x+y)^{\frac{1}{3}}(y+z)^{\frac{1}{3}}(z+x)^{\frac{1}{3}}$
 $\Rightarrow (x+y+z)^3 = \frac{27}{8}(x+y)(y+z)(z+x)$
 $\Rightarrow x^3 + y^3 + z^3 + 3(x+y)(y+z)(z+x)$
 $= \frac{27}{8}(x+y)(y+z)(z+x)$
 $\Rightarrow x^3 + y^3 + z^3 = \frac{3}{8}(x+y)(y+z)(z+x)$
60. (A) put $a = 1$
 $\left(a^1 - \frac{1}{a^1} \right) = 1 - 1 = 0$
61. (B) $a + \frac{1}{a} = 3$
 $a^3 + \frac{1}{a^3} = 18$
 $a^6 + \frac{1}{a^6} = 324 - 2 = 322$

62. (B) $a^{\frac{1}{3}} = x$ $b^{\frac{1}{3}} = y$ $c^{\frac{1}{3}} = z$

$$x + y + z = 0$$

$$(x^3 + y^3 + z^3)^6 = (3xyz)^6$$

$$= 36 \times a^{\frac{6}{3}} \times b^{\frac{6}{3}} \times c^{\frac{6}{3}}$$

$$= 729a^2b^2c^2$$

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

$$144 = 110 + 2(ab - bc - ca)$$

$$34 = 2(ab - bc - ca)$$

$$\Rightarrow ab - bc - ca = 17$$

64. (C) $(a - b)^2 = 169 + 2 \times 60$

$$= 169 - 120$$

$$= 49$$

$$\Rightarrow a - b = 7$$

$$\Rightarrow a + b = 17$$

$$\Rightarrow a^2 - b^2 = 17 \times 7 = 119$$

65. (D) $x = \frac{+1}{12} - \frac{1}{24} = \frac{+1}{24}$

$$y = \frac{+1}{36} - \frac{1}{72} = \frac{+1}{72}$$

$$\frac{x}{y} = \frac{\left(\frac{1}{24}\right)}{\left(\frac{1}{72}\right)} = 3$$

66. (C) $10 - 2.43 \times 10^{-2} = 1.417 \times 7 + 7x$

$$\Rightarrow x = 0.0081$$

67. (A) $a^3 + b^3 + c^3 - 3abc = 0$

$$\Rightarrow a + b + c = 0$$

$$\Rightarrow (3x + 1) + (x - 3) + (4 - 2x) = 0$$

$$\Rightarrow 2x + 2 = 0$$

$$\Rightarrow x = -1$$

68. (C) $(1.25)(1 - 6.4 \times 10^{-5}) = 1.2496 + a$

$$\Rightarrow a = 0.0032$$

69. (D) $(a + b + 4)(ab + 4(a + b)) - 4ab = 0$

$$\text{Put } a = b = 0$$

$$\frac{1}{(a+b+4)^{117}} - 2^{234} = \frac{1}{4^{117}} - \frac{1}{2^{234}}$$

$$= \frac{1}{4^{117}} - \frac{1}{2^{234}} = 0$$

70. (C) put $a = 1$

$$\text{required value} = 1 + 1 = 2$$

71. (A) $a = \sqrt{8} - \sqrt{7}$

$$b = \sqrt{8} + \sqrt{7}$$

$$a + b = 2\sqrt{8} \Rightarrow 4\sqrt{2}$$

$$ab = 1$$

$$\frac{a^2 + b^2 - 3ab}{a^2 + b^2 + ab} = \frac{(a+b)^2 - 5ab}{(a+b)^2 - ab}$$

$$\Rightarrow \frac{(4\sqrt{2})^2 - 5}{(4\sqrt{2})^2 - 1} \Rightarrow \frac{32 - 5}{32 - 1} \Rightarrow \frac{27}{31}$$

72. (A) $(x + y)^2 - z^2 = 8$

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

$$(x + z)^2 - y^2 = 7$$

adding all equation

$$x^2 + y^2 + 2xy - z^2 = 8$$

$$y^2 + z^2 + 2yz - x^2 = 10$$

$$x^2 + z^2 + 2xz - y^2 = 7$$

$$x^2 + y^2 + z^2 + 2(xy + yz + zx) = 25$$

$$x + y + z = 5$$

73. (D) $a + b + c = 5$

$$ab + bc + ca = 4$$

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

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

$$= 5(25 - 3 \times 4)$$

$$= 5 \times 13 = 65$$

$$\Rightarrow \frac{35\sqrt{3} - 7 - 15 + \sqrt{3}}{46} = \frac{a + b\sqrt{3}}{23}$$

$$\Rightarrow \frac{36\sqrt{3} - 22}{2} = a + b\sqrt{3}$$

$$\Rightarrow a + b\sqrt{3} = -11 + 18\sqrt{3}$$

on comparing,

$$a = -11, b = 18$$

$$b - a = 18 - (-11) = 29$$

12. (B) $x + \frac{1}{x} = 3$

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

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

1. What is the value of $a - b$ when $a^2 + b^2 - 6a - 6b + 18 = 0$?
 $a - b$ का मान क्या है, जबकि $a^2 + b^2 - 6a - 6b + 18 = 0$ है?
 (A) 0 (B) 3
 (C) 6 (D) 9
2. The quadratic equation $(1 + a^2)x^2 + 2abx + (b^2 - c^2) = 0$ has only one root. what is the value of $c^2(1+a^2)$?
 द्विघात समीकरण $(1+a^2)x^2 + 2abx + (b^2 - c^2) = 0$ का केवल एक मूल है, तो $c^2(1+a^2)$ का मान क्या है?
 (A) a^2 (B) b^2
 (C) c^2 (D) ab
3. Determine the value of $\frac{a^2 + b^2}{a^3 + b^3}$ when $a = 2 + \sqrt{3}$ and $b = 2 - \sqrt{3}$
 $\frac{a^2 + b^2}{a^3 + b^3}$ का मान ज्ञात करें, जब $a = 2 + \sqrt{3}$ और $b = 2 - \sqrt{3}$ है?
 (A) 0.27 (B) 0.42
 (C) 0.58 (D) 0.93
4. If $3\sqrt{2} + \sqrt{18} + \sqrt{50} = 15.55$, then what is the value of $\sqrt{32} + \sqrt{72}$?
 यदि $3\sqrt{2} + \sqrt{18} + \sqrt{50} = 15.55$ है, तो $\sqrt{32} + \sqrt{72}$ का मान क्या है?
 (A) 13.22 (B) 10.83
 (C) 14.13 (D) 16.54
5. Determine the value of $\frac{a}{b} + \frac{b}{a}$ when $a + b = 8$ and $ab = 4$.
 $\frac{a}{b} + \frac{b}{a}$ का मान ज्ञात करें, जब $a + b = 8$ और $ab = 4$ है।
 (A) 4 (B) 8
 (C) 12 (D) 14
6. Find the value of $x^3 - y^3$, if $x - y = 4$ and $xy = 12$.
 $x^3 - y^3$ का मान ज्ञात करें, यदि $x - y = 4$ और $xy = 12$ है।
 (A) 198 (B) 208
 (C) 218 (D) 228
7. Which of the following value of 'x' satisfies the equation $81^{1+x} = 243^{2x+8}$?
 'x' के निम्न मानों में से कौनसा समीकरण $81^{1+x} = 243^{2x+8}$ को संतुष्ट करता है?
 (A) 3 (B) 4
 (C) 5 (D) 6
8. What will be the value of $r^2 + p^2 + s^2 - rp - ps - rs$ when $r = 4$, $p = 2$ and $s = 8$?
 $r^2 + p^2 + s^2 - rp - ps - rs$ का मान क्या होगा, जबकि $r = 4$, $p = 2$ और $s = 8$ है?
 (A) 8 (B) 18
 (C) 28 (D) 38
9. The value of $1 + 2^2 + 2^3 + 2^4 + \dots + 2^9$ is ____.
 $1 + 2^2 + 2^3 + 2^4 + \dots + 2^9$ का मान ____ है?
 (A) 255 (B) 511
 (C) 1021 (D) 2047
10. What will be the value of $a^3 + b^3$, if $a^2 + b^2 = 32$ and $a + b = 8$?
 $a^3 + b^3$ का मूल्य क्या होगा, अगर $a^2 + b^2 = 32$ और $a + b = 8$ है?
 (A) 8 (B) 32
 (C) 128 (D) 256
11. Find the value of 'y' if $(\sqrt[3]{y^8}) = 225$
 'y' का मान ज्ञात करें, यदि $(\sqrt[3]{y^8}) = 225$ है।
 (A) 10 (B) 12
 (C) 15 (D) 18
12. Find the sum of $0.00005 + 0.88885 + 0.77775 + 0.66665 + 0.55555$.
 $0.00005 + 0.88885 + 0.77775 + 0.66665 + 0.55555$ का योग ज्ञात करें?
 (A) 2.88885 (B) 2.88875
 (C) 3.6875 (D) 2.9875
13. If $x + \frac{4}{x} = 4$, then find the value of $x^6 + 1$
 यदि $x + \frac{4}{x} = 4$ है, तो $x^6 + 1$ का मान ज्ञात करें?
 (A) 51 (B) 65
 (C) 78 (D) 82

14. If $\frac{-5x}{3} + 2 = x - 6$ then find the value of 'x'

यदि $\frac{-5x}{3} + 2 = x - 6$ है, तो का 'x' मान ज्ञात करें?

- (A) 1 (B) 2
(C) 3 (D) 4

15. If $x + \frac{1}{x} = -2$, then find the value of $x^{631} + \frac{1}{x^{632}}$

यदि $x + \frac{1}{x} = -2$ है, तो $x^{631} + \frac{1}{x^{632}}$ का मान ज्ञात करें?

- (A) -2 (B) -1
(C) 0 (D) 2

16. If $9^x = \sqrt[11]{243}$, then what is the value of x?

यदि $9^x = \sqrt[11]{243}$ है, तो x का मान क्या है?

- (A) 5/11 (B) 5/22
(C) 5/7 (D) 5/33

17. Find the value of $27a^3 + \frac{1}{a^3}$, if $9a^2 + \frac{1}{a^2} = 43$

$27a^3 + \frac{1}{a^3}$ का मान ज्ञात करें, यदि $9a^2 + \frac{1}{a^2} = 43$ है।

- (A) 240 (B) 280
(C) 320 (D) 360

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

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

- (A) 11 (B) $11\sqrt{2}$
(C) 22 (D) $22\sqrt{2}$

19. If $XY = \frac{a+2}{3}$ and $\frac{y}{x} = \frac{1}{3}$, then find the value of $\frac{x^2+y^2}{x^2-y^2}$

यदि $xy = \frac{a+2}{3}$ और $\frac{y}{x} = \frac{1}{3}$ है, तो $\frac{x^2+y^2}{x^2-y^2}$ का मान ज्ञात करें?

- (A) 1 (B) 2
(C) 3 (D) 4

20. Assum $57 + 59 + 109 = 0$, then find the value of $57^3 + 59^3 + 109^3$

कल्पना कीजिए कि $57 + 59 + 109 = 0$ है, तो $57^3 + 59^3 + 109^3$ का मान क्या होगा?

- (A) 1099701 (B) 1099601
(C) 1099801 (D) 1098701

21. If $x = \frac{\sqrt{5}+1}{\sqrt{5}-1}$ and $y = \frac{\sqrt{5}-1}{\sqrt{5}+1}$, then find the value of $x^2 - y^2$

यदि $x = \frac{\sqrt{5}+1}{\sqrt{5}-1}$ और $y = \frac{\sqrt{5}-1}{\sqrt{5}+1}$ है, तो $x^2 - y^2$ का मान ज्ञात करें।

- (A) $\sqrt{5}$ (B) $2\sqrt{5}$
(C) $3\sqrt{5}$ (D) $4\sqrt{5}$

22. What is the value of 'x' in $2\sqrt{3x} - 5\sqrt{27x} + \sqrt{108x} = -21$?

$2\sqrt{3x} - 5\sqrt{27x} + \sqrt{108x} = -21$? में 'x' का मान क्या है?

- (A) 0.33 (B) 1
(C) 3 (D) 9

23. If $y - \frac{1}{y} = 4$, then find the value of $\left(y^3 - \frac{1}{y^3}\right)$

यदि $y - \frac{1}{y} = 4$, है तो $\left(y^3 - \frac{1}{y^3}\right)$ का मान क्या होगा?

- (A) 64 (B) 76
(C) 88 (D) 90

24. If $a = \sqrt{5+2\sqrt{2}}$ and $b = \sqrt{5-2\sqrt{2}}$, then find the value of $a^2 - b^2$.

यदि $a = \sqrt{5+2\sqrt{2}}$ और $b = \sqrt{5-2\sqrt{2}}$ है, तो $a^2 - b^2$ का मान क्या होगा?

- (A) 2 (B) 4
(C) $2\sqrt{2}$ (D) $4\sqrt{2}$

25. Determine the value of $\frac{x+y}{x+2y}$ when $\frac{2x+y}{x+4y} = 3$

$\frac{x+y}{x+2y}$ का मान ज्ञात कीजिए, यदि $\frac{2x+y}{x+4y} = 3$ है।

- (A) $\frac{3}{5}$ (B) $\frac{7}{10}$ (C) $\frac{4}{5}$ (D) $\frac{10}{9}$

26. If $x = 4 + \sqrt{15}$, then what is the value of

$\left[x^2 + \left(\frac{1}{x^2}\right)\right]$?

यदि $x = 4 + \sqrt{15}$ है, तो $\left[x^2 + \left(\frac{1}{x^2}\right)\right]$ का मान क्या है?

- (A) 62 (B) 64
(C) 34 (D) 36

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- 27.** If $x + y + z = 6$ and $xy + zx + zy = 10$, then find the value of $x^3 + y^3 + z^3 - 3xyz$.
 यदि $x + y + z = 6$ और $xy + zx + zy = 10$ है, तो $x^3 + y^3 + z^3 - 3xyz$ का मान ज्ञात करें।
 (A) 16 (B) 26
 (C) 36 (D) 46
- 28.** If p & $q = p^2 + 4pq - q^2$ then find the value of $(3&6) + (4&5)$.
 यदि p & $q = p^2 + 4pq - q^2$ है, तो $(3&6) + (4&5)$ का मान ज्ञात करें।
 (A) 98 (B) 106
 (C) 116 (D) 126
- 29.** If $S + \frac{1}{S} = 4$, then find the value of $S^2 + \frac{1}{S^2}$.
 यदि $S + \frac{1}{S} = 4$ है, तो $S^2 + \frac{1}{S^2}$ का मान ज्ञात करें।
 (A) 14 (B) 16
 (C) 20 (D) 24
- 30.** If $x = \frac{4}{2\sqrt{3} + 3\sqrt{2}}$ then find the value of $\left(x + \frac{1}{x}\right)$.
 यदि $x = \frac{4}{2\sqrt{3} + 3\sqrt{2}}$ तो $\left(x + \frac{1}{x}\right)$ का मान क्या होगा?
 (A) $\frac{(10\sqrt{3} + 15\sqrt{2})}{12}$ (B) $\frac{(10\sqrt{3} - 15\sqrt{2})}{12}$
 (C) $\frac{-(10\sqrt{3} - 33\sqrt{2})}{12}$ (D) $\frac{(10\sqrt{3} + 33\sqrt{2})}{12}$
- 31.** If $p + \frac{1}{p} = \sqrt{10}$, then the value of $p^4 + \frac{1}{p^4}$.
 यदि $p + \frac{1}{p} = \sqrt{10}$ है, तो $p^4 + \frac{1}{p^4}$ का मान ज्ञात करें।
 (A) 52 (B) 60
 (C) 62 (D) 65
- 32.** If $z = 6 - 2\sqrt{3}$, then find the value of $\left(\sqrt{z} - \frac{1}{\sqrt{z}}\right)^2$.
 यदि $z = 6 - 2\sqrt{3}$ है, तो $\left(\sqrt{z} - \frac{1}{\sqrt{z}}\right)^2$ का मान ज्ञात करें।
 (A) $\frac{102 - 46\sqrt{3}}{4}$ (B) $\frac{102 - 46\sqrt{3}}{2}$
 (C) $\frac{102 - 46\sqrt{3}}{24}$ (D) $\frac{12 - 46\sqrt{3}}{24}$
- 33.** If $(x - 7)^2 + (y + 10)^2 + (z - 6)^2 = 0$, then find the value of $x + y + z$.
 यदि $(x - 7)^2 + (y + 10)^2 + (z - 6)^2 = 0$ है, तो $x + y + z$ का मान ज्ञात करें।
 (A) 1 (B) 3
 (C) 5 (D) 7
- 34.** The two equations $x - 4y = 0$ and $4x + 3y = 19$ have a solution (a, b) . Find the value of $\frac{ab}{a + 4b}$.
 दो समीकरणों $x - 4y = 0$ और $4x + 3y = 19$ के पास एक समाधान (a, b) है। $\frac{ab}{a + 4b}$ का मान निकालें।
 (A) $\frac{1}{4}$ (B) $\frac{1}{2}$ (C) $\frac{1}{8}$ (D) $\frac{1}{5}$
- 35.** If $(8, 2)$ is a solution of $x + 4y - 2k = 0$, then find the value of k^2 .
 यदि $(8, 2)$ हल है, समीकरण $x + 4y - 2k = 0$ का, तो k^2 का मान ज्ञात कीजिए।
 (A) 36 (B) 49
 (C) 64 (D) 81
- 36.** If $a^3 + a - 1 = 0$ then find the value of $a^6 + a^4 + a - 2$.
 यदि $a^3 + a - 1 = 0$ है, तो $a^6 + a^4 + a - 2$ का मान ज्ञात करें।
 (A) -1 (B) 0
 (C) 1 (D) 2
- 37.** What is value of $(6x^2 - 5y^2)(6x^2 + 5y^2)$, if $x = \frac{1}{\sqrt{3}}$ and $y = \frac{1}{\sqrt{5}}$?
 $(6x^2 - 5y^2)(6x^2 + 5y^2)$ का मान क्या है, यदि $x = \frac{1}{\sqrt{3}}$ और $y = \frac{1}{\sqrt{5}}$ है?
 (A) 2 (B) 3
 (C) 4 (D) 5
- 38.** If $x = \frac{\sqrt{2} + 1}{\sqrt{2} - 1}$ and $y = \frac{\sqrt{2} - 1}{\sqrt{2} + 1}$, then what is the value of $x + y$?
 यदि $x = \frac{\sqrt{2} + 1}{\sqrt{2} - 1}$ तथा $y = \frac{\sqrt{2} - 1}{\sqrt{2} + 1}$ है, तो $x + y$ का मान क्या है?
 (A) 6 (B) $\sqrt{2}$
 (C) 3 (D) $3\sqrt{2}$

39. Determine the value of $x^2 + y^2$ when $x^3 - y^3 = 54$, $x - y = 18$ and $xy = 2$.
 $x^2 + y^2$ का मान निकालिए, जबकि $x^3 - y^3 = 54$, $x - y = 18$ और $xy = 2$ है।

- (A) 0 (B) 1
 (C) 2 (D) 3

40. If $16^{2x+6} = 64$, then what is the value x ?
 यदि $16^{2x+6} = 64$ है, तो x का मान ज्ञात करें।

- (A) $-\frac{9}{4}$ (B) $\frac{9}{4}$ (C) $-\frac{18}{4}$ (D) $\frac{18}{4}$

41. Find the value of 'x', If $8^x \times 32^x = 2^{10}$
 'x' का मान ज्ञात करें, यदि $8^x \times 32^x = 2^{10}$ है।

- (A) $\frac{1}{8}$ (B) $\frac{10}{8}$ (C) $\frac{20}{8}$ (D) $\frac{30}{8}$

42. If $11a + 11b = 29282$ find the value of $\frac{a+b}{4}$

यदि $11a + 11b = 29282$ है, तो $\frac{a+b}{4}$ का मान ज्ञात करें।

- (A) 661.5 (B) 663.5
 (C) 665.5 (D) 667.5

43. Find 'x' if $\sqrt{(2+7x)} = \sqrt{(3x+4)}$

'x' का मान ज्ञात करें, यदि $\sqrt{(2+7x)} = \sqrt{(3x+4)}$ है।

- (A) 0.5 (B) 1
 (C) 1.5 (D) 2

44. If $\frac{\sqrt{x+5} + \sqrt{x}}{\sqrt{x+5} - \sqrt{x}} = 5$, then find the value of 'x'.

यदि $\frac{\sqrt{x+5} + \sqrt{x}}{\sqrt{x+5} - \sqrt{x}} = 5$ है, तो 'x' का मान ज्ञात कीजिए।

- (A) 1 (B) 2
 (C) 3 (D) 4

45. If $\frac{6\sqrt{3} + 7\sqrt{2}}{\sqrt{108} + \sqrt{50}} = a + b\sqrt{6}$, then find the value of $\frac{6a}{b}$

यदि $\frac{6\sqrt{3} + 7\sqrt{2}}{\sqrt{108} + \sqrt{50}} = a + b\sqrt{6}$, है, तो $\frac{6a}{b}$ का मान ज्ञात कीजिए।

- (A) 9 (B) 19
 (C) 38 (D) 42

46. Find the value of $n + \frac{3n}{2} + \frac{9n}{4} + \dots \infty$

$n + \frac{3n}{2} + \frac{9n}{4} + \dots \infty$ का मान ज्ञात कीजिए।

- (A) 0 (B) 1
 (C) 2 (D) Infinity / अनंत

47. If $2x^2 + 2y^2 = 4a$, then find the value of

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

यदि $2x^2 + 2y^2 = 4a$ है, तो $\frac{2a}{x^2 - a} + \frac{2a}{y^2 - a}$ का मान ज्ञात

कीजिए।

- (A) 0 (B) 1
 (C) 10 (D) 11

48. If $\frac{2x + 3y}{3x - 4y} = \frac{11}{7}$, then the value of $\frac{x}{y}$ is

यदि $\frac{2x + 3y}{3x - 4y} = \frac{11}{7}$ है, तो $\frac{x}{y}$ का मान _____ होगा।

- (A) $\frac{65}{19}$ (B) $\frac{68}{19}$ (C) $\frac{67}{19}$ (D) $\frac{64}{19}$

49. Find the value of $\sqrt{(2x-5)^2} + 2\sqrt{(x-1)^2}$, if $1 < x < 2$.

$\sqrt{(2x-5)^2} + 2\sqrt{(x-1)^2}$ का मान ज्ञात कीजिए, यदि $1 < x < 2$ है।

- (A) 1 (B) 2
 (C) 3 (D) 4

50. If $\left(\frac{5}{7}\right)^{4x} \left(\frac{7}{5}\right)^{3x-1} = \left(\frac{7}{5}\right)^6$, then find the value of x which satisfies the equation.

यदि $\left(\frac{5}{7}\right)^{4x} \left(\frac{7}{5}\right)^{3x-1} = \left(\frac{7}{5}\right)^6$ है, तो x का वह मान ज्ञात करें जो

इस समीकरण को संतुष्ट करेगा।

- (A) -1 (B) -7
 (C) 1 (D) 7

51. If $\frac{x^{32} - 1}{x^{16}} = 5$ then find the value of $\frac{x^{96} - 1}{x^{48}}$.

यदि $\frac{x^{32} - 1}{x^{16}} = 5$ तो $\frac{x^{96} - 1}{x^{48}}$ का मान ज्ञात कीजिए?

- (A) 40 (B) 70
 (C) 140 (D) 180

52. If the arithmetic mean of two numbers is 7 and the geometric mean of the same two numbers is $2\sqrt{10}$. Then find the numbers x and y respectively, such that $x > y$.

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यदि दो संख्याओं का अंकगणितीय माध्य 7 है और उसी दो संख्या का ज्यामितीय माध्य $2\sqrt{10}$ है, तो क्रमशः x और y संख्या ज्ञात कीजिए, जैसे कि $x > y$ है।

- (A) 4, 10 (B) 2, 5
(C) 5, 2 (D) 10, 4

53. If $y = 1^3 + 2^3 + 3^3 + 4^3 + 5^3 + 6^3$, then find the value of $y-1$.

यदि $y = 1^3 + 2^3 + 3^3 + 4^3 + 5^3 + 6^3$ है, तो $y-1$ का मान ज्ञात कीजिए ?

- (A) 429
(B) 439
(C) 440
(D) 441

54. If $\sqrt{y} = \sqrt{4} - \sqrt{6}$, then find the value of $y^2 - 20y + 12$.

यदि $\sqrt{y} = \sqrt{4} - \sqrt{6}$ है, तो $y^2 - 20y + 12$ का मान ज्ञात कीजिए।

- (A) 4 (B) 8
(C) 10 (D) 12

55. What is the value of $x^4 + y^4$ when the value of $x^3 + y^3 = 8$ and $x + y = 2$?

$x^4 + y^4$ का मान क्या है, जबकि $x^3 + y^3 = 8$ और $x + y = 2$ का मान है ?

- (A) 2
(B) 8
(C) 16
(D) 32

56. Determine the value of $\left(y - \frac{1}{y}\right)^2$ when

$$y^4 + \frac{1}{y^4} = 34$$

$\left(y - \frac{1}{y}\right)^2$ का मान ज्ञात कीजिए, यदि $y^4 + \frac{1}{y^4} = 34$ है।

- (A) 1 (B) 2
(C) 3 (D) 4

57. If $u + v = 10$ and $uv = 16$, then find the value of

$$\frac{u^2 - v^2}{uv}$$

यदि $u + v = 10$ और $uv = 16$ है, तो $\frac{u^2 - v^2}{uv}$ का मान ज्ञात कीजिए।

- (A) 0 (B) $\frac{15}{8}$ (C) $\frac{15}{4}$ (D) $\frac{15}{2}$

58. If $x^2 + y^2 + z^2 - 8x + 6y - 4z + 29 = 0$, then find the value of $z(x+y)$

यदि $x^2 + y^2 + z^2 - 8x + 6y - 4z + 29 = 0$ है, तो $z(x+y)$ का मान कीजिए।

- (A) 1 (B) 2
(C) 3 (D) 4

59. What is the value equation $a^3 + b^3 + c^3 - 3abc$ if $a^2 + b^2 + c^2 = ab + bc + ca + 4$ and $a + b + c = 4$.

$a^3 + b^3 + c^3 - 3abc$ का मान क्या होगा यदि $a^2 + b^2 + c^2 = ab + bc + ca + 4$ और $a + b + c = 4$ है।

- (A) 0 (B) 1
(C) 16 (D) 256

Solution

1. (A) $a^2 + b^2 - 6a - 6b + 18 = 0$
 $a^2 - 2 \times a \times 3 + 9 + b^2 - 2 \times b \times 3 + 9 = 0$
 $(a - 3)^2 + (b - 3)^2 = 0$
 $a = 3, b = 3$
 $a - b = 0$

2. (B) $(1 + a^2)x^2 + 2abx + b^2 - c^2 = 0$
 $b^2 - 4ac = 0$
 $4a^2b^2 = 4[b^2 + a^2b^2 - c^2 - a^2c^2]$
 $c^2 + a^2 = b^2$

3. (A) $a = 2 + \sqrt{3}, b = 2 - \sqrt{3}$,
 $a + b = 4; ab = 1$
 $\frac{a^3 + b^3}{a^3 + b^3} \Rightarrow \frac{(a+b)^3 - 2ab}{(a+b)^3 - 3ab(a+b)}$
 $\Rightarrow \frac{16 - 2}{64 - 3 \times 4} = \frac{14}{52} = 0.27$

4. (C) $3\sqrt{2} + \sqrt{18} + \sqrt{50} = 15.55$

$$3\sqrt{2} + 3\sqrt{2} + 5\sqrt{2} = 15.55$$

$$11\sqrt{2} = 15.55$$

$$\sqrt{2} = \frac{15.55}{11} = 1.413$$

$$\sqrt{32} + \sqrt{72} \Rightarrow 4\sqrt{2} + 6\sqrt{2}$$

$$\Rightarrow 10\sqrt{2}$$

$$= 10 \times 1.413$$

$$= 14.13$$

5. (D) $\frac{a}{b} + \frac{b}{a} \Rightarrow \frac{a^2 + b^2}{ab} \Rightarrow \frac{(a+b)^2 - 2ab}{ab}$
 $\Rightarrow \frac{64 - 8}{4} \Rightarrow \frac{56}{4} = 14$

6. (B) $x - y = x$
 $xy = 12$
 $x^3 - y^3 = (x - y)^3 + 3xy(x - y)$
 $\Rightarrow 64 + 144 = 208$
7. (B) $81^{1x+1} = 243^{2x+8}$
 $(3^4)^{4x+4} = (3^5)^{4x+8}$
 $3^{16x+16} = 3^{20x+40}$
 $16x + 16 - 20x - 40 = 0$
 $6x = 24$
 $x = 4$
8. (C) $r^2 + p^2 + s^2 - rp - ps - rs$
 $\Rightarrow \frac{r^3 + p^3 + s^3 - 3rps}{r + p + s}$
 $\Rightarrow \frac{64 + 8 + 512 - 3 \times 4 \times 2 \times 8}{14}$
 $\Rightarrow \frac{684 - 192}{14} \Rightarrow \frac{392}{14} = 28$
9. (C) $1 + 2^2 + 2^3 + 2^4 + \dots + 2^9$
 $1 + 4 + 8 + 16 + \dots + 2^9$
 $1 + \left[\frac{4(2^9 - 1)}{2 - 1} \right]$
 $1 + [4(256 - 1)]$
 $1 + (1020) = 1021$
10. (C) $a^2 + b^2 = 32, a + b = 8$
 $a^2 + b^2 + 2ab = 64$
 $2ab = 32$
 $ab = 16$
 $a^3 + b^3 = (a + b)^3 - 3ab(a + b)$
 $\Rightarrow 8^3 - 3 \times 16 \times 8$
 $\Rightarrow 512 - 384 = 128$
11. (C) $\sqrt[4]{y^8} = 225$
 $(y^8)^{\frac{1}{4}} = (15)^2$
 $y^2 = 15^2$
 $y = 15$
12. (A) $0.00005 + 0.88885 + 0.77775 + 0.66665 + 0.55555$
 $\Rightarrow 2.8885$
13. (B) $x + \frac{4}{x} = 4 \Rightarrow x^2 + 4 = 4x$
 $x^2 + 4x + 4 = 0$
 $(x + 2)^2 = 0$
 $x = -2$
 $\Rightarrow x^0 + 1$
 $\Rightarrow 2^0 + 1$
 $= 65$

14. (C) $\frac{-5x}{3} + 2 = x - 6$
 $-5x + 6 = 3x - 18$
 $-8x = -24$
 $x = 3$
15. (C) $x + \frac{1}{x} = -2 \Rightarrow x = -1$
 $x^{631} + \frac{1}{x^{632}} \Rightarrow -1 + 1 = 0$
16. (B) $9^x = (243)^{\frac{1}{11}}$
 $3^{2x} = 3^{\frac{5}{11}} \Rightarrow 2x = \frac{5}{11} \Rightarrow x = \frac{5}{22}$
17. (B) $9a^2 + \frac{1}{a^2} = 43$
 $(3a)^2 + \left(\frac{1}{a}\right)^2 + 2 \times 3a \times \frac{1}{a} = 43 + 6$
 $\left(3a + \frac{1}{a}\right)^2 = 49 \Rightarrow 3a + \frac{1}{a} = 7$
18. (D) $y = \sqrt{3} - \sqrt{2}$
 $\frac{1}{y} = \sqrt{3} + \sqrt{2}$
 $\frac{1}{y} - y = 2\sqrt{2}$
 $\frac{1}{y^3} - y^3 = \left(\frac{1}{y} - y\right)^3 + 3\left(\frac{1}{y} - y\right)$
 $\Rightarrow (2\sqrt{2})^3 + 6\sqrt{2}$
 $\Rightarrow 16\sqrt{2} + 6\sqrt{2} = 22\sqrt{2}$
19. (*)
20. (A) $57 + 59 + 109 = 0$
 $a + b + c = 0$
 $a^3 + b^3 + c^3 = 3abc$
 $57^3 + 59^3 + 109^3 = 3 \times 57 \times 59 \times 109$
 $\Rightarrow 1099701$
21. (C) $x = \frac{\sqrt{5} + 1}{\sqrt{5} - 1}, y = \frac{\sqrt{5} - 1}{\sqrt{5} + 1}$
 $x + y = \frac{(\sqrt{5} + 1)^2 + (\sqrt{5} - 1)^2}{4}$
 $= \frac{5 + 1 + 2\sqrt{5} + 5 + 1 - 2\sqrt{5}}{4}$
 $= 3$
 $x - y = \sqrt{5} \Rightarrow x^2 - y^2 = 3\sqrt{5}$

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22. (C) $2\sqrt{3x} - 5\sqrt{27x} + \sqrt{108x} = -21$
 $2\sqrt{3x} - 5 \times 3\sqrt{3x} + \sqrt{36 \times 3x} = -21$
 $2\sqrt{3x} - 15\sqrt{3x} + 6\sqrt{3x} = -21$
 $+7\sqrt{3x} = +21$
 $\sqrt{3x} = 3$
 $x = 3$

23. (B) $y - \frac{1}{y} = 4$
 $y^3 - \frac{1}{y^3} = \left(y - \frac{1}{y}\right)^3 + 3\left(y - \frac{1}{y}\right)$
 $\Rightarrow 4^3 + 3 \times 4$
 $\Rightarrow 64 + 12 = 76$

24. (B) $a = \sqrt{5 + 2\sqrt{2}}, b = \sqrt{5 - 2\sqrt{2}}$
 $a^2 = 5 + 2\sqrt{2}, b^2 = 5 - 2\sqrt{2}$
 $a^2 - b^2 = 4\sqrt{2}$

25. (D) $\frac{2x+y}{x+4y} = 3$
 $2x + y = 3x + 12y$
 $-x = 11y$

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

$$\frac{x+y}{x+2y} = \frac{11k-k}{11k-2k} \Rightarrow \frac{10k}{9k} \Rightarrow \frac{10}{9}$$

26. (A) $x = 4 + \sqrt{15}$
 $\frac{1}{x} = 4 - \sqrt{15}$

 $\Rightarrow x + \frac{1}{x} = 8$
 $\Rightarrow x^2 + \frac{1}{x^2} = \left(x + \frac{1}{x}\right)^2 - 2$
 $\Rightarrow 64 - 2 = 62$

27. (C) $x + y + z = 6$
 $xy + yz + zx = 10$
 $x^2 + y^2 + z^2 = 36 - 20$
 $x^2 + y^2 + z^2 = 16$
 $x^3 + y^3 + z^3 - 3xyz = (x + y + z) [x^2 + y^2 + z^2 - (xy + yz + zx)]$
 $= 6 [16 - 10]$
 $= 6 \times 6 = 36$

28. (C) p and $q = p^2 + 4pq - q^2$
 3 and $6 = 9 + 4 \times 3 \times 6 \Rightarrow 81 - 36 \Rightarrow 45$
 4 and $5 = 16 + 4 \times 4 \times 5 - 25 \Rightarrow 70$
 $\Rightarrow 71 + 45 \Rightarrow 116$

29. (A) $5 + \frac{1}{5} = 4$
 $5^4 + \frac{1}{5^2} = \left(5 + \frac{1}{5}\right)^2 - 2$
 $\Rightarrow 16 - 2 = 14$

30. (C) $x = \frac{4}{2\sqrt{3} + 3\sqrt{2}}$
 $x = \frac{4}{2\sqrt{3} + 3\sqrt{2}} \times \frac{2\sqrt{3} - 3\sqrt{2}}{2\sqrt{3} - 3\sqrt{2}}$
 $\Rightarrow \frac{2(3\sqrt{2} - 2\sqrt{3})}{3} \dots \dots \dots$ (i)
 $\frac{1}{x} = \frac{3}{2(3\sqrt{2} - 2\sqrt{3})} \times \frac{3\sqrt{2} + 2\sqrt{3}}{3\sqrt{2} + 2\sqrt{3}}$

$$\frac{3(3\sqrt{2} + 2\sqrt{3})}{12}$$

$$\Rightarrow \frac{3\sqrt{2} + 2\sqrt{3}}{4} \dots \dots \dots$$
 (ii)

Equation (i) & (ii) we get

$$x + \frac{1}{x} = \frac{2(3\sqrt{2} - 2\sqrt{3})}{3} + \frac{3\sqrt{2} + 2\sqrt{3}}{4}$$

$$\Rightarrow \frac{24\sqrt{2} - 16\sqrt{3} + 9\sqrt{2} + 6\sqrt{3}}{12}$$

$$\Rightarrow \frac{33\sqrt{2} - 10\sqrt{3}}{12} \Rightarrow \frac{-(10\sqrt{3} - 33\sqrt{2})}{12}$$

31. (C) $P + \frac{1}{P} = \sqrt{10}$
 $P^2 + \frac{1}{P^2} + 2 = 10$
 $P^2 + \frac{1}{P^2} + 8 \dots \dots \dots$ (i)
 $P^4 + \frac{1}{P^4} + 2 = 64$
 $P^4 + \frac{1}{P^4} = 62$

32. (C) $z = 6 - 2\sqrt{3}$

$$\frac{1}{z} = \frac{1}{6 - 2\sqrt{3}} \times \frac{6 + 2\sqrt{3}}{6 + 2\sqrt{3}} \Rightarrow \frac{1}{z} = \frac{6 + 2\sqrt{3}}{24}$$

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

$$\Rightarrow \frac{6}{1} - \frac{2\sqrt{3}}{1} + \frac{6 + 2\sqrt{3}}{24} - \frac{2}{1}$$

$$\Rightarrow \frac{144 - 48\sqrt{3} + 6 + 2\sqrt{3} - 48}{24}$$

$$\Rightarrow \frac{102 - 46\sqrt{3}}{24}$$

33. (B) $(x - 7)^2 + (y + 10)^2 + (z - 6)^2 = 0$

$x = 7, y = -10, z = 6$

$x + y + z = 7 - 10 + 6$

$\Rightarrow 3$

34. (B) $x - 4y = 0$

$x = 4y$ (i)

$4(4y) + 3y = 19$

$19y = 19$

$y = 1 \rightarrow a$

$x = 4 \rightarrow b$

$$\Rightarrow \frac{4}{8} = \frac{1}{2}$$

35. (C) $x + 4y - 2k = 0$

at (8, 2)

$8 + 8 = 2k$

$k = 8$

$k^2 = 64$

36. (A) $a^3 + a - 1 = 0$

$a = 1 - a^3$ (i)

$a^3 - 1 - a$ (ii)

$a^6 = 1 + a^2 - 2a$ (iii)

Equation (ii) are mult by a we get

$a^4 = a - a^2$ (iv)

Eq (i) and Eq (iii) and Eq (iv) we get

$a^6 + a^4 + a = 1 - a^3 + 1 + a^2 - 2a + a - a^2$

$a^6 + a^4 + a = 2 - (a^3 + a)$

$a^6 + a^4 + a - 2 = -1$

37. (B) $x = \frac{1}{\sqrt{3}}, y = \frac{1}{\sqrt{5}}$

$$x^2 = \frac{1}{3}, y^2 = \frac{1}{5}$$

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

$$\left(6 \times \frac{1}{3} - 5 \times \frac{1}{5}\right) \left(6 \times \frac{1}{3} + 5 \times \frac{1}{5}\right)$$

$(2 - 1)(2 + 1)$

$= 3$

38. (A) $x = \frac{\sqrt{2}+1}{\sqrt{2}-1}, y = \frac{\sqrt{2}-1}{\sqrt{2}+1}$

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

$$\Rightarrow \frac{2+1+2\sqrt{2}+2+1-2\sqrt{2}}{2-1}$$

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

$\Rightarrow 6$

39. (B) $x^3 - y^3 = 54, x - y = 18, xy = 2$

$(x - y)(x^2 + y^2 + xy) = 54$

$$x^2 + y^2 + xy = \frac{54}{18}$$

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

$x^2 + y^2 = 1$

40. (A) $16^{2x+6} = 64$

$4^{4x+12} = 4^3$

$4x + 12 = 3$

$4x = -9$

$x = \frac{-9}{4}$

41. (B) $8^x \times 32^x = 2^{10}$

$2^{3x} \times 2^{5x} = 2^{10}$

$2^{8x} = 2^{10}$

$8x = 10$

$x = \frac{10}{8}$

42. (C) $11a + 11b = 29282$

$a + b = 2662$

$$\frac{a + b}{4} = \frac{2662}{4}$$

665.5

43. (A) $2 + 7x = 3x + 4$

$4x = 2$

$x = \frac{1}{2} \Rightarrow x = 0.5$

44. (D) $\frac{\sqrt{x+5} + \sqrt{x}}{\sqrt{x+5} - \sqrt{x}} = \frac{5}{1}$

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

$$\frac{\sqrt{x+5}}{\sqrt{x}} = \frac{3}{2} \Rightarrow \frac{x+5}{x} = \frac{9}{4}$$

$9x = 4x + 20 \Rightarrow 5x = 20 \Rightarrow x = 4$

45. (B) $\frac{6\sqrt{3}+7\sqrt{2}}{\sqrt{108}+\sqrt{50}} = a + b\sqrt{6}$
 $\frac{6\sqrt{3}+7\sqrt{2}}{6\sqrt{3}+5\sqrt{2}} \times \frac{6\sqrt{3}-5\sqrt{2}}{6\sqrt{3}-5\sqrt{2}} = a + b\sqrt{6}$
 $\frac{108+42\sqrt{6}-30\sqrt{6}-70}{108-50} = a + b\sqrt{6}$
 $\frac{38+12\sqrt{6}}{58}$

$a = \frac{38}{58}, b = \frac{12}{58}$

$\frac{6a}{b} = \frac{6 \times 38}{122} = 19$

46. (D)

47. (A) $2x^2 + 2y^2 = 4a$
 $x^2 + y^2 = 2a$ (i)

$2a \left[\frac{1}{x^2 - a} + \frac{1}{y^2 - a} \right]$

$2a \left[\frac{x^2 + y^2 - 2a}{(x^2 - a)(y^2 - a)} \right] = 2a \left[\frac{2a - 2a}{(x^2 - a)(y^2 - a)} \right]$
 $= 0$

48. (A) $\frac{2x+3y}{3x-4y} = \frac{11}{7}$
 $14x + 21y = 33x - 44y$
 $-19x = -65y$

$\frac{x}{y} = \frac{65}{19}$

49. (C) $\sqrt{(2x-5)^2} + 2\sqrt{(x-1)^2}$
 Put $x = 1$

$\sqrt{(-3)^2} + 0 = 3$

Put $x = 2$

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

50. (B) $\left(\frac{5}{7}\right)^{4x} - \left(\frac{7}{5}\right)^{3x-1} = \left(\frac{7}{5}\right)^0$

$\frac{\left(\frac{7}{5}\right)^{3x-1}}{\left(\frac{7}{5}\right)^0} = \frac{1}{\left(\frac{5}{7}\right)^{4x}}$

$3x - 1 - 6 = 4x$
 $x = -7$

51. (C) $\frac{x^{32}-1}{x^{16}} = 5$

$x^{16} - \frac{1}{x^{16}} = 5$

$\left(x^{16}\right)^3 - \frac{1}{\left(x^{16}\right)^3} = (5)^3 + 3 \times 5$

$x^{18} - \frac{1}{x^{18}} = 140$

52. (D) $\frac{x+y}{2} = 7$

$x + y = 14$ (i)

$\sqrt{xy} = 2\sqrt{10}$

$xy = 40$

$y = \frac{40}{x}$ (ii)

Eq (i) & Eq (ii) we get

$x + \frac{40}{x} = 14$

$x^2 - 14x + 40 = 0$

$x^2 - 10x - 4x + 40 = 0$

$x(x-10) - 4(x-10) = 0$

$x = 10, x = 4$

Case - I

at $x = 10$

$y = 4$

Case - II

at $x = 4$

$y = 10$

But given $x > y$

$(10, x)$

53. (C) $y = 1^3 + 2^3 + 3^3 + 4^3 + 5^3 + 6^3$

$y = 1 + 8 + 27 + 64 + 125 + 216$

$y - 1 = 440$

54. (B) $\sqrt{y} = \sqrt{4} - \sqrt{6}$

$\sqrt{y} + \sqrt{6} = 2$

$y + 6 + 2\sqrt{6y} = 4$

$y + 2\sqrt{6y} = -2$(i)

$y^2 + 24y + 2y \times 2\sqrt{6y} = 4$

$y^2 + 24y + 2y(-2-y) = 4$

$y^2 + 24y + 4y - 2y^2 = 4$

$-y^2 + 20y - 4 = 0$

$y^2 - 20y + 4 + 8 = 8$

$y^2 - 20y + 12 = 8$

55. (C) $x^3 + y^3 = 8, x + y = 2$
 $(x + y)(x^2 + y^2 - xy) = 8$
 $2(4 - 2xy - xy) = 8$
 $4 - 3xy = 4$
 $xy = 0$
 $x^2 + y^2 = 4 - 2xy$
 $x^2 + y^2 = 4$
 $x^4 + y^4 + 2x^2y^2 = 16$
 $x^4 + y^4 = 16$

56. (D) $\left(y - \frac{1}{y}\right)^2 = y^2 + \frac{1}{y^2} - 2$
 $y^4 + \frac{1}{y^4} = 34 \dots\dots\dots (i)$
 $y^4 + \frac{1}{y^4} + 2 = 36$
 $y^2 + \frac{1}{y^2} = 6 \dots\dots\dots (ii)$
 Eq (i) & Eq (ii) we get
 $6 - 2 = 4$

and $x^3 + \frac{1}{x^3} = 27 - 9 = 18$

$x^7 + \frac{1}{x^7} = \left(x^3 + \frac{1}{x^3}\right)\left(x^3 + \frac{1}{x^3}\right) - \left(x + \frac{1}{x}\right)$
 $= 47 \times 18 - 3$
 $= 843$

13. (A) $x^4 + y^4 + x^2y^2 = 17 \frac{1}{16}$

$x^2 + y^2 - xy = 5 \frac{1}{4}$

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

$\frac{21}{4} \times (x^2 + y^2 + xy) = 17 \frac{1}{16}$

$(x^2 + y^2 + xy) = \frac{13}{4}$

$(x^2 + y^2) = \frac{17}{4}$

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

$= \frac{21}{4} + \frac{21}{4} - \frac{17}{4} = \frac{21}{4} + 1$

$(x-y)^2 = \frac{25}{4}$

57. (C) $U + V = 10, UV = 16$
 $U^2 + V^2 + 2UV - 4UV = 100 - 64$
 $U - V = 6$

$\frac{U^2 - V^2}{UV} \Rightarrow \frac{(U+V)(U-V)}{UV}$
 $\Rightarrow \frac{10 \times 6}{16} = \frac{15}{4}$

58. (B) $x^2 + y^2 + z^2 - 8x + 6y - 4z + 29 = 0$
 $x^2 - 2 \times x \times 4 + 16 + y^2 + 2xy \times 3 + 9 + z^2 - 2xz \times 2 + 4 = 0$
 $x = 4, y = -3, z = 2$
 $\Rightarrow z(x + y)$
 $\Rightarrow 2(4 - 3) = 2$

59. (C) $a^3 + b^3 + c^3 - 3abc$
 $a^2 + b^2 + c^2 - ab - bc - ca = 4$
 $a + b + c = 4$
 $(a + b + c)[a^2 + b^2 + c^2 - ab - bc - ca]$
 $4 \times 4 = 16$

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

(SSC CGL (PRE) - 2021)

ALGEBRA

बीजगणित

(Previous Year Questions)

1. If $(x + 6y) = 8$, and $xy = 2$, where $x > 0$, what is the value of $(x^3 + 216y^3)$?
यदि $(x + 6y) = 8$ और $xy = 2$ है जहाँ $x > 0$, तो $(x^3 + 216y^3)$ का मान क्या है?
(A) 476 (B) 288
(C) 368 (D) 224
2. If $x + y + 3 = 0$, then find the value of $x^3 + y^3 - 9xy + 9$.
यदि $x + y + 3 = 0$ है तो $x^3 + y^3 - 9xy + 9$ का मान ज्ञात कीजिए-
(A) 18 (B) -36
(C) -18 (D) 36
3. If $(4x + 2y)^3 + (4x - 2y)^3 = 16(Ax^3 + Bxy^2)$, then what is the value of $\frac{1}{2}(\sqrt{A^2 + B^2})$?
यदि $(4x + 2y)^3 + (4x - 2y)^3 = 16(Ax^3 + Bxy^2)$, तो $\frac{1}{2}(\sqrt{A^2 + B^2})$ का मान क्या है?
(A) 8 (B) 7
(C) 5 (D) 3
4. If $x = 4 + \sqrt{15}$, what is the value of $(x^2 + \frac{1}{x^2})$?
यदि $x = 4 + \sqrt{15}$ है, तो $(x^2 + \frac{1}{x^2})$ का मान क्या है?
(A) 54 (B) 62
(C) 72 (D) 48
5. If $a^2 + b^2 + c^2 = 6.25$ and $(ab + bc + ca) = 0.52$, what is the value of $(a + b + c)$, if $(a + b + c) < 0$?
यदि $a^2 + b^2 + c^2 = 6.25$ और $(ab + bc + ca) = 0.52$, है, तो $(a + b + c)$ का मान ज्ञात करें, यदि, $(a + b + c) < 0$ है?
(A) -2.7 (B) -2.8
(C) ±2.7 (D) ±2.8
6. Find the value of $70^3 + 20^3 - 90^3$.
 $70^3 + 20^3 - 90^3$ का मान ज्ञात कीजिए-
(A) -300000 (B) -378000
(C) 0 (D) 378000
7. If $x + y + z = 11$, $xy + yz + zx = -6$, and $x^3 + y^3 + z^3 = 1604$, then the value of xyz is :
यदि $x + y + z = 11$, $xy + yz + zx = -6$, और $x^3 + y^3 + z^3 = 1604$ है, तो xyz का मान कितना होगा?
(A) 5 (B) 1
(C) 25 (D) 4
8. If $a + b + c = 6$, $a^2 + b^2 + c^2 = 32$, and $a^3 + b^3 + c^3 = 189$, then the value of $abc - 3$ is :
यदि $a + b + c = 6$, $a^2 + b^2 + c^2 = 32$, और $a^3 + b^3 + c^3 = 189$ है, तो $abc - 3$ का मान बताइए।
(A) 2 (B) 0
(C) 3 (D) 1
9. If $a^2 + b^2 + 49c^2 + 18 = 2(b - 28c - a)$ then the value of $(a + b - 7c)$ is :
यदि $a^2 + b^2 + 49c^2 + 18 = 2(b - 28c - a)$ है, तो $(a + b - 7c)$ का मान बताइए-
(A) 3 (B) 2
(C) 4 (D) 1
10. If $8k^6 + 15k^3 - 2 = 0$, then the positive value of $(k + \frac{1}{k})$ is :
यदि $8k^6 + 15k^3 - 2 = 0$ है, तो $(k + \frac{1}{k})$ का धनात्मक मान क्या है?
(A) $2\frac{1}{8}$ (B) $8\frac{1}{8}$ (C) $2\frac{1}{2}$ (D) $8\frac{1}{2}$
11. If $x - y + z = 0$, then find the value of $\frac{y^2}{2xz} - \frac{x^2}{2yz} - \frac{z^2}{2xy}$.
यदि $x - y + z = 0$ है, तो $\frac{y^2}{2xz} - \frac{x^2}{2yz} - \frac{z^2}{2xy}$ का मान ज्ञात कीजिए-
(A) -6 (B) $\frac{3}{2}$
(C) $\frac{1}{2}$ (D) $-\frac{3}{2}$

12. What is the value of x, if

$$5\left(1 - \frac{x}{5}\right) - (5 - x) - \frac{1}{200} \text{ of } (20 - x) = 0.08?$$

यदि $5\left(1 - \frac{x}{5}\right) - (5 - x) - \frac{1}{200} \text{ of } (20 - x) = 0.08$ है,

तो x का मान क्या है ?

- (A) 36 (B) 18
(C) 24 (D) 9

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

यदि $x + y + z = 18$, $xyz = 81$ और $xy + yz + zx = 90$ है, तो $x^3 + y^3 + z^3 + xyz$ का मान क्या है ?

- (A) 1321 (B) 1250
(C) 1296 (D) 1225

14. If $x + y + z = 18$, $xyz = 81$ and $xy + yz + zx = 90$, then find the value of $\sqrt{x^3 + y^3 + z^3 + xyz}$.

यदि $x + y + z = 18$, $xyz = 81$ और $xy + yz + zx = 90$ है, तो $\sqrt{x^3 + y^3 + z^3 + xyz}$ का मान ज्ञात कीजिए।

- (A) 6 (B) 10
(C) 12 (D) 9

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

यदि $2\sqrt{2}x^3 - 3\sqrt{3}y^3 = (\sqrt{2}x - \sqrt{3}y)(Ax^2 - Bxy + Cy^2)$ है, तो $(A^2 + B^2 + C^2)$ का मान क्या है ?

- (A) 11 (B) 16
(C) 18 (D) 19

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

यदि $x + y + z = 2$, $xy + yz + zx = -11$ और $xyz = -12$ है, तो $x^3 + y^3 + z^3$ का मान क्या है ?

- (A) 42 (B) 38
(C) 36 (D) 40

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

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

यदि $\left(x^2 + \frac{1}{x^2}\right) = 23$ है जहाँ $x > 0$ है, तो $\left(x^3 + \frac{1}{x^3}\right)$ का

मान ज्ञात करें।

- (A) 140 (B) -140
(C) -110 (D) 110

18. If $a + b - c = 5$ and $ab - bc - ac = 10$, then find the value of $a^2 + b^2 + c^2$.

यदि $a + b - c = 5$ और $ab - bc - ac = 10$ है, तो $a^2 + b^2 + c^2$ का मान ज्ञात कीजिए।

- (A) 15 (B) 45
(C) 5 (D) 40

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

यदि $a^2 + b^2 + 49c^2 + 18 = 2(b - 28c - a)$ है, तो $(a - b - 7c)$ का मान क्या होगा ?

- (A) 2 (B) 1
(C) 3 (D) 4

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

यदि $2\sqrt{2}x^3 - 3\sqrt{3}y^3 = (\sqrt{2}x - \sqrt{3}y)(Ax^2 - Bxy + Cy^2)$ है, तो $\sqrt{(A^2 + B^2 + C^2)}$ का मान बताइए।

- (A) $\sqrt{11}$ (B) $\sqrt{21}$
(C) $\sqrt{19}$ (D) $\sqrt{17}$

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

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

- (A) 7 (B) 527
(C) 531 (D) 623

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

यदि $x + y + z = 7$, $xy + yz + zx = 8$ है, तो $x^3 + y^3 + z^3 - 3xyz$ का मान क्या होगा ?

- (A) 200 (B) 150
(C) 125 (D) 175

23. If $a^3 + b^3 = 218$ and $a + b = 2$, then the value of $\sqrt{1 - ab}$ is :

यदि $a^3 + b^3 = 218$ और $a + b = 2$, है तो $\sqrt{1 - ab}$ का मान क्या होगा ?

- (A) 5 (B) 3
(C) 4 (D) 6

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

यदि $a^2 + b^2 + 49c^2 + 18 = 2(b + 28c - a)$ है, तो $(2a - b + 7c)$ का मान बताइए।

- (A) 5 (B) -3
(C) -4 (D) 1

25. If $x^2 - 5x - 1 = 0$, what is the value of $\frac{x^6 - x^4 + x^2 - 1}{x^3}$?

यदि $x^2 - 5x - 1 = 0$ है, तो $\frac{x^6 - x^4 + x^2 - 1}{x^3}$ का मान क्या है?

- (A) 145 (B) 140
(C) 130 (D) 135

26. If $(x + y)^3 - (x - y)^3 - 3y(2x^2 - 3y^2) = ky^3$, then find the value of k.

यदि $(x + y)^3 - (x - y)^3 - 3y(2x^2 - 3y^2) = ky^3$ है, तो k का मान ज्ञात कीजिए।

- (A) 10.5 (B) 8
(C) 11 (D) 10

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

यदि $a + b + c = 11$ और $ab + bc + ca = 28$ है, तो $a^3 + b^3 + c^3 - 3abc$ का मान ज्ञात कीजिए।

- (A) 1639 (B) 407
(C) 2255 (D) 1093

28. If $\left(0.4x + \frac{1}{x}\right) = 5$, what is the value of $\left(0.064x^3 + \frac{1}{x^3}\right)$?

यदि $\left(0.4x + \frac{1}{x}\right) = 5$ है, तो $\left(0.064x^3 + \frac{1}{x^3}\right)$ का मान ज्ञात करें।

- (A) 125 (B) 110
(C) 119 (D) 105

29. If $x^2 + \frac{1}{x^2} = 18$, $x > 0$, then find the value of $x^3 + \frac{1}{x^3}$.

$x^2 + \frac{1}{x^2} = 18$, $x > 0$ तो $x^3 + \frac{1}{x^3}$ का मान ज्ञात कीजिए।

- (A) 52 (B) $17\sqrt{5}$
(C) $34\sqrt{5}$ (D) $46\sqrt{5}$

30. If $\sqrt{x} - \frac{1}{\sqrt{x}} = \sqrt{5}$, $x \neq 0$, then what is the value

of $\frac{\left(x^4 + \frac{1}{x^2}\right)}{(x^2 + 1)}$?

यदि $\sqrt{x} - \frac{1}{\sqrt{x}} = \sqrt{5}$, $x \neq 0$ है, तो $\frac{\left(x^4 + \frac{1}{x^2}\right)}{(x^2 + 1)}$ का मान क्या

है?

- (A) 42 (B) 44
(C) 48 (D) 46

31. If $6\sqrt{6} p^3 + 2\sqrt{2} q^3 = (\sqrt{6}p + \sqrt{2}q)(Sp^2 + Mq^2 - Npq)$, then the positive value of $\sqrt{S^2 + M^2 + 2N^2}$ is:

यदि $6\sqrt{6} p^3 + 2\sqrt{2} q^3 = (\sqrt{6}p + \sqrt{2}q)(Sp^2 + Mq^2 - Npq)$ है, तो $\sqrt{S^2 + M^2 + 2N^2}$ का धनात्मक मान क्या है?

- (A) 10 (B) 8
(C) 9 (D) 12

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

यदि $5x - \frac{1}{4x} 5x - \frac{1}{4x} = 6$, $x > 0$ है, तो $25x^2 - \frac{1}{16x^2}$ का मान ज्ञात कीजिए।

- (A) $6\sqrt{41}$ (B) 36
(C) $\sqrt{246}$ (D) $6\sqrt{31}$

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

यदि $a^2 + b^2 = 65$ और $ab = 8$, $a > b > 0$ है, तो $a^2 - b^2$ का मान ज्ञात कीजिए।

- (A) 72 (B) 60
(C) 65 (D) 63

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

यदि $x^4 - 79x^2 + 1 = 0$ है, तो $x + x^{-1}$ का मान लगभग कितना होगा?

- (A) 9 (B) 5
(C) 7 (D) 8

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

यदि $4x - 3y = 12$ और $xy = 5$ है, तो $\frac{16x^2 + 9y^2}{8}$ का मान

ज्ञात कीजिए।

- (A) 33
(B) 18
(C) 3
(D) 44

36. If/यदि $\left(a + \frac{1}{a} + 3\right)^2 = 16$,

where a is a non-zero real number, then find the value of $a^2 + \frac{1}{a^2}$.

जहाँ a एक शून्येतर वास्तविक संख्या है, तो $a^2 + \frac{1}{a^2}$ का मान ज्ञात कीजिए।

- (A) 3 (B) 47
(C) 49 (D) 7

Solution

1. (D) $x + 6y = 8, xy = 2$
 $\Rightarrow (x + 6y)^3 = 8^3$
 $= x^3 + 216y^3 + 3 \times x \times 6y (x + 6y) = 512$
 $\Rightarrow x^3 + 216y^3 + 3 \times 6 \times 2 \times 8 = 512$
 $\Rightarrow x^3 + 216y^3 = 512 - 288 = 224$

2. (C) $x + y + 3 = 0$
 put $x = -3, y = 0$
 $\Rightarrow x^3 + y^3 - 9xy + 9 = (-3)^3 + 0 - 0 + 9$
 $= -27 + 9 = -18$

Method II

$x + y = -3$
 $(x + y)^3 = -27$
 $x^3 + y^3 + 3xy(x + y) = -27$
 $x^3 + y^3 - 9xy = -27$

add 9 both sides
 $x^3 + y^3 - 9xy + 9 = -27 + 9 = -18$

3. (C) $(a + b)^3 + (a - b)^3 = 2(a^3 + 3ab^2)$
 $\Rightarrow (4x + 2y)^3 + (4x - 2y)^3 = 2(64x^3 + 3 \times 4x \times 4y^2)$
 $\Rightarrow 2(64x^3 + 48xy^2) = 16(Ax^3 + Bxy^2)$
 $A = 8, B = 6$

$\therefore \frac{1}{2} \sqrt{A^2 + B^2} = \frac{1}{2} \times 10 = 5$

4. (B) $x = 4 + \sqrt{15}, \frac{1}{x} = 4 - \sqrt{15}$
 $\therefore x + \frac{1}{x} = 8$

$x^2 + \frac{1}{x^2} = 64 - 2 = 62$

5. (A) $a^2 + b^2 + c^2 + 2(ab + bc + ca) = (a + b + c)^2$
 $\Rightarrow a + b + c = \sqrt{6.25 + 2 \times 0.52}$
 $= \sqrt{6.25 + 1.04} = \sqrt{7.29} = \pm 2.7$
 $\therefore a + b + c < 0$
 $\therefore a + b + c = -2.7$

6. (B) $70^3 + 20^3 - 90^3$
 $(70 + 20)^3$
 $70^3 + 20^3 - 70^3 - 20^3 - 3 \times 70 \times 20 \times 90$
 $= -378000$

7. (C) $x^3 + y^3 + z^3 = 3xyz + (x + y + z)[(x + y + z)^2 - 3(xy + yz + zx)]$
 $1604 = 3xyz + 11[121 + 18]$
 $\frac{1604 - 1528}{3} = xyz$

$\frac{76}{3} \Rightarrow 25$

8. (B) $a^3 + b^3 + c^3 = 3abc + 6[(A + B + C)^2 - 3(ab + bc + ca)]$
 $189 = 3abc + 6(36 - 3(ab + bc + ca))$
 $189 = 3abc + 6(30)$

$\frac{9}{3} = abc$

$3 = abc$
 $abc - 3 = 0$

9. (C) $a^2 + 2a + b^2 - 2b + 49c^2 + 2(28c) + 16 + 1 + 1$
 $(a + 1)^2 + (b - 1)^2 + (7c + 4)^2 \Rightarrow 0$
 $a \Rightarrow -1, b = 1, 7c = -4$

$a + b - 7c \Rightarrow -1 + 1 - 7\left(\frac{-4}{7}\right) \Rightarrow 4$

10. (C) $8k^6 + 15x^3 - 2 = 0$
 $8k^6 + 16k^3 - k^3 - 2 = 0$
 $8k^3(k^3 + 2) - 1(k^3 + 2)$
 $8k^3 = 1$

$k^3 = \frac{1}{8} = \frac{1}{2}$

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