

43. If $p + q = r$; $pqr = -36$ then find $p^3 + q^3 - r^3 = ?$

[A] 72

[C] 0

[B] 105

☒ [D] 108

$$p + q - r = 0$$

$$= 3pqx - r$$

$$= -3x - 36$$



44. If $x+y+z=120$, then find $\frac{(x-20)^3+(y-40)^3+(z-60)^3}{(x-20)(y-40)(z-60)}$?

यदि $x+y+z=120$ है, तो $\frac{(x-20)^3+(y-40)^3+(z-60)^3}{(x-20)(y-40)(z-60)}$?

[A] 3 ✓

[C] 1

[B] 0

[D] 2

$$(x-20)+(y-40)+(z-60)=0$$

~~3~~

45. If $x = a(b - c)$, $y = b(c - a)$, $z = c(a - b)$, then $\left(\frac{x}{a}\right)^3 + \left(\frac{y}{b}\right)^3 + \left(\frac{z}{c}\right)^3 = ?$

[A] $\frac{xyz}{3abc}$

[B] $3xyzabc$

[C] $\frac{3xyz}{abc}$

[D] $\frac{xyz}{abc}$

$$\left(\frac{x}{a}\right) + \left(\frac{y}{b}\right) + \left(\frac{z}{c}\right)$$

$$= \cancel{b-c} + \cancel{c-a} + \cancel{a-b} \\ = 0$$



46. **If $a - b + c = \sqrt{6}$ & $a^3 + 3abc = b^3 - c^3$, then find $a(a+b) + b(b+c) + c(c-a)$?**
यदि $a - b + c = \sqrt{6}$ & $a^3 + 3abc = b^3 - c^3$ है, तो $a(a+b) + b(b+c) + c(c-a)$ ज्ञात कीजिये?
- [A] ~~0~~ [B] 1
[C] -1 [D] 3
- $a(a+b) + b(b+c) + c(c-a) = 0$

$$a - b + c = \sqrt{6}$$

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



47. If $2x - y + 3z = 0$, then find the value of $\frac{4x^2}{yz} - \frac{y^2}{2xz} + \frac{27z^2}{2xy}$?

यदि $2x - y + 3z = 0$ है, तो $\frac{4x^2}{yz} - \frac{y^2}{2xz} + \frac{27z^2}{2xy}$ का मान ज्ञात कीजिये?

[A] -9

[B] 18

[C] -3

[D] 9

$$= \frac{4x^3 - y^3 + 27z^3}{2xyz} = \frac{3x^2x - y^2y + 3z^2z}{2xyz}$$



8. If a, b, c are three distinct real numbers such that $a^3 + b^3 + c^3 = 3abc$ then $\frac{(a+b)^2}{2ab} + \frac{(b+c)^2}{2bc} + \frac{(c+a)^2}{2ca} = ?$

अगर a, b, c तीन अलग-अलग वास्तविक संख्याएँ हैं जैसे $a^3 + b^3 + c^3 = 3abc$ तो $\frac{(a+b)^2}{2ab} + \frac{(b+c)^2}{2bc} + \frac{(c+a)^2}{2ca} = ?$

[A] 3
[C] 1.5 ✓

[B] 1
[D] 2

$a+b+c=0$

$$\frac{c^2}{2ab} + \frac{a^2}{2bc} + \frac{b^2}{2ca}$$

$$= \frac{c^3 + a^3 + b^3}{2abc}$$

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

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

व्यंजक $(a + b - c)^3 + (a - b + c)^3 - 8a^3$ का मान ज्ञात करें।

[A] $6a(a+b-c)(a-b+c)$

[B] $6a(a-b+c)(c-a-b)$

[C] $3a(a+b-c)(a-b+c)$

[D] $3a(a-b+c)(c-a-b)$

50. Simplify the following expression:

निम्नलिखित व्यंजक का मान ज्ञात कीजिए:

$$\frac{(a^2 - 4b^2)^3 + (4b^2 - 16c^2)^3 + (16c^2 - a^2)^3}{(a - 2b)^3 + (2b - 4c)^3 + (4c - a)^3}$$

[A] $-(a+2b)(b+2c)(4c+a)$

[C] $(a+2b)(b+2c)(4c+a)$

☒ [B] $2(a+2b)(b+2c)(4c+a)$

[D] $4(a+2b)(b+2c)(4c+a)$

$$\frac{3(a^3 - 4b^3)(4b^3 - 16c^3)(16c^3 - a^3)}{3(a - 2b)(2b - 4c)(4c - a)}$$

51. If $(11x + 8)^3 + (2 - x)^3 - 27(2x - 5)^3 = 9(11x + 8)(x - 2)(2x - 5)$, then find $\sqrt{x^2 - 36}$?

यदि $(11x + 8)^3 + (2 - x)^3 + [-3(2x - 5)]^3 = 9(11x + 8)(x - 2)(2x - 5)$ है, तो $\sqrt{x^2 - 36}$ ज्ञात कीजिये?

(ICAR Assistant 2022)

[A] $9/2$

[C] $9/4$

[B] $7/2$

✓ [D] $7/4$

$$\sqrt{\frac{25}{4} - 36}$$

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

$$4x + 25 = 0$$

$$x = -\frac{25}{4}$$



52. **If** $(x - \frac{1}{2})^3 + (2x - \frac{3}{2})^3 + (3x - \frac{2}{3})^3 = \frac{1}{4}(2x - 1)(4x - 3)(9x - 2)$, **then find** $\sqrt{x} + \frac{1}{\sqrt{x}}$?

यदि $(x - \frac{1}{2})^3 + (2x - \frac{3}{2})^3 + (3x - \frac{2}{3})^3 = \frac{1}{4}(2x - 1)(4x - 3)(9x - 2)$ है, तो $\sqrt{x} + \frac{1}{\sqrt{x}}$ ज्ञात कीजिए?

☒ [A] 13/6

[B] 25/12

[C] 13/3

[D] 8/3



53. **If $(4x - 3)^3 + (2x + 5)^3 + (5x - 7)^3 = (4x - 3)(6x + 15)(5x - 7)$ and $x \neq \frac{5}{11}$, then $x = ?$**

यदि $(4x - 3)^3 + (2x + 5)^3 + (5x - 7)^3 = (4x - 3)(6x + 15)(5x - 7)$ और $x \neq \frac{5}{11}$ तब $x = ?$

[A] 3
[C] $\frac{11}{5}$

[B] 4
[D] -5

$$2x=8$$

$$x=4$$

54. If $2x + 3y + 4z = 11$, $8x^3 + 27y^3 + 64z^3 = 105$ and $xyz = 1$, then the value $4x^2 + 9y^2 + 16z^2 - 6xy - 12yz - 8xz$ is:

यदि $2x+3y+4z=11$, $8x^3+27y^3+64z^3=105$ और $xyz=1$ है, तो $4x^2+9y^2+16z^2-6xy-12yz-8xz$ का मान बताए।

[A] 3
[C] 5

[B] 4
[D] 1

✘

$$105 - 3 \times 11 \times 4 = 11 \cdot (\text{~~~~~?~~~~~})$$

$$\frac{33}{11} = ?$$

55. If $a^3 + b^3 + c^3 - 3abc = 273$, and $(a+b+c) = 13$, find the value of $(a-b)^2 + (b-c)^2 + (c-a)^2$.

यदि $a^3 + b^3 + c^3 - 3abc = 273$ और $(a+b+c) = 13$ है, तो $(a-b)^2 + (b-c)^2 + (c-a)^2$ का मान ज्ञात कीजिए।

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[A] 42
[C] 36

[B] 54
[D] 50

$$\cancel{273}^{\cancel{21}} = \cancel{\frac{1}{2}} \times \cancel{13} \times [\text{---}^?]]$$



56. **If $a + b + c = 11$ & $ab + bc + ca = 28$, then find the value of $a^3 + b^3 + c^3 - 3abc$?**

यदि $a + b + c = 11$ & $ab + bc + ca = 28$ है, तो $a^3 + b^3 + c^3 - 3abc$ का मान ज्ञात कीजिये?

☒ [A] 407

[B] 1639

[C] 2255

[D] 1093

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

$$= 11 \times (11^2 - 3 \times 28)$$

$$= 11 \times 37$$



57. If $a + b + c = 7$, $a^3 + b^3 + c^3 - 3abc = 175$, then the what is. The value of $ab + bc + ca = ?$

[A] 7

[C] 6

☒ [B] 8

[D] 9

$$\overset{25}{\cancel{175}} = \cancel{7} \cdot (7^2 - 3 \times ?)$$

$$\frac{-24}{-3} = ?$$

58. If $a + b + c = 5$, and $a^2 + b^2 + c^2 = 33$, then 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 है:

[A] 195

[C] 175

[B] 180

[D] 185

$$= \frac{1}{2}(a+b+c) [3(a^2+b^2+c^2) - (a+b)^2]$$

$$= \frac{1}{2} \times 5 \times (99 - 25)$$

$$= \cancel{5} \times \cancel{37}$$

59. If $a + b + c = 3$, $ab + bc + ca = -10$ and $abc = -24$, the the value of $\frac{a^2}{bc} + \frac{b^2}{ac} + \frac{c^2}{ab}$ is:

यदि $a + b + c = 3$, $ab + bc + ca = -10$ और $abc = -24$ है, तो $\frac{a^2}{bc} + \frac{b^2}{ac} + \frac{c^2}{ab}$ का मान क्या होगा?

(a) $-\frac{15}{8}$ ✓

(b) $\frac{63}{8}$

(c) $\frac{15}{8}$

(d) $-\frac{39}{8}$

$$= \frac{a^3 + b^3 + c^3}{abc} = \frac{45}{-24}$$

$$\underline{a^3 + b^3 + c^3} + 72 = 3 \times (3^3 - 3 \times 10)$$

$$\begin{aligned} ? &= 117 - 72 \\ &= 45 \end{aligned}$$

60. If $x+y+z=11$, $xy+yz+zx=-6$ & $x^3 + y^3 + z^3 = 1604$, then find the value of xyz ?

यदि $x+y+z=11$, $xy+yz+zx=-6$ & $x^3 + y^3 + z^3 = 1604$ है, तो xyz का मान ज्ञात कीजिये?

[A] 25

[B] 24

[C] 35

[D] 21

$$1604 - 3xyz = 11 \times (11^2 - 3 \times -6)$$

$$1604 - 3xyz = 1529$$

$$75 = 3xyz$$



61. 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] 1296
[C] 1225 [D] 1250



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

यदि $x + y + z = 7$, $x^2 + y^2 + z^2 = 85$ और $x^3 + y^3 + z^3 = 913$ है, तो $\sqrt[3]{xzy}$ का मान ज्ञात करें।

[A] 4

[B] 2

[C] 1

[D] 8

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

$$913 - 3xyz = \frac{1}{2} \times 7 \times (3 \times 85 - 7^2)$$

$$913 - 3xyz = 721$$

$$192 = 3xyz$$

$$64 = xyz$$

63. If $a+b+c = 1$, $ab + bc + ca = -8$ and $a^3 + b^3 + c^3 = -11$, then what is the value of $\frac{a}{bc} + \frac{b}{ac} + \frac{c}{ab}$?

यदि $a + b + c = 1$, $ab + bc + ca = -8$ और $a^3 + b^3 + c^3 = -11$ हैं, तो $\frac{a}{bc} + \frac{b}{ac} + \frac{c}{ab}$ का मान ज्ञात करें।

[A] $\frac{4}{3}$
[C] $\frac{7}{12}$

[B] $-\frac{17}{12}$ ✓
[D] $-\frac{5}{4}$

$$= \frac{a^2 + b^2 + c^2}{abc} \rightarrow \frac{17}{-12}$$

$$a^2 + b^2 + c^2 = 1^2 - 2 \times -8 = 17$$

$$-11 - 3abc = 1 \times (1^3 - 3 \times -8)$$

$$-11 - 3abc = 25$$

$$-3abc = 36$$

$$abc = -12 \checkmark$$

64. 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 $R = x + y - z$, तो $P^3 + Q^3 + R^3 - 3PQR$ का मान क्या है?

- [A] 9
[C] 12

- [B] 8
[D] 6

put $y = z = 0$

$$x^3 = 3$$

$$\begin{aligned} P &= -x \\ Q &= x \\ R &= x \end{aligned}$$

$$\begin{aligned} & -x^3 + x^3 + x^3 + 3x^3 \\ &= 4x^3 \\ &= 4 \times 3 \\ &= 12 \checkmark \end{aligned}$$

65. If $\frac{p}{q} + \frac{q}{r} + \frac{r}{p} = 8$ and $\frac{q}{p} + \frac{r}{q} + \frac{p}{r} = 11$, then $\frac{p^3}{q^3} + \frac{q^3}{r^3} + \frac{r^3}{p^3} = ?$

[A] 251

[C] 264

[B] 339

[D] 248

$$\left(\frac{p}{q}\right)^3 + \left(\frac{q}{r}\right)^3 + \left(\frac{r}{p}\right)^3 - 3 = 8 \times [8^2 - 3 \times 11]$$

$$? = 248 + 3$$

66. If $a^2 - bc = \alpha, b^2 - ac = \beta, c^2 - ab = \gamma$, then what is $\frac{a\alpha + b\beta + c\gamma}{(a+b+c)(\alpha+\beta+\gamma)}$ equal to?

यदि $a^2 - bc = \alpha, b^2 - ac = \beta, c^2 - ab = \gamma$ है, तो $\frac{a\alpha + b\beta + c\gamma}{(a+b+c)(\alpha+\beta+\gamma)}$ बराबर है ?

(CDS 2023)

- [A] $a+b-c$
[C] $-a+b+c$

- [B] $a-b+c$
[D] 1

$$\begin{aligned} &a(a^2 - bc) \\ &+ b(b^2 - ac) \\ &+ c(c^2 - ab) \end{aligned}$$

$$\frac{a^3 + b^3 + c^3 - 3abc}{(a+b+c)(a^2 + b^2 + c^2 - ab - bc - ca)}$$

67. If $a + b + c = 7$, $abc = -72$ and $\underline{a^2b + b^2a + b^2c + c^2b + a^2c + c^2a = -246}$, then $a^3 + b^3 + c^3 = ?$

[A] ~~673~~

[C] ~~218~~

☒ [B] 1513

~~[D] 669~~

#

$$(a+b+c)^3 = a^3 + b^3 + c^3 + 3 \cdot [a^2b + b^2a + b^2c + c^2b + c^2a + a^2c] + 6abc$$

$$343 = ? + 3 \times (-246) + 6(-72)$$

$$343 + 3 \times 246 + 6 \times 72 = ?$$

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

यदि $x + y + z = 13$, $x^2 + y^2 + z^2 = 91$ और $xz = y^2$ है, तो z और x के बीच अंतर ज्ञात करें।

(a) 3

☒ (b) 8

(c) 5

(d) 9

$$xy + yz + zx = \frac{13^2 - 91}{2} = 39$$

$$\# \quad y \cdot (x + z + y) = 39$$

$$y \times 13 = 39$$

$$y = 3 \Rightarrow x + z = 10$$

$$xz = 9$$