

$$a^3 + b^3 + c^3 - 3abc = (a + b + c) \cdot (a^2 + b^2 + c^2 - ab - bc - ca) \rightarrow \textcircled{1}$$

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

$$a^3 + b^3 + c^3 - 3abc = (a + b + c) \cdot [(a + b + c)^2 - 3(ab + bc + ca)] \rightarrow \textcircled{3}$$

$$a^3 + b^3 + c^3 - 3abc = \frac{1}{2}(a + b + c) \cdot [3(a^2 + b^2 + c^2) - (a + b + c)^2] \rightarrow \textcircled{4}$$

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

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

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

$$a + b + c \checkmark$$

$$ab + bc + ca \checkmark$$

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

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

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

$$a+b+c \checkmark$$

$$a^2 + b^2 + c^2 \checkmark$$

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



100. If $x + y + z = 25$, $x^3 + y^3 + z^3 = 85$ and $xyz = 20$, then find the value of $x^2 + y^2 + z^2 - xy - yz - zx$.

यदि $x + y + z = 25$, $x^3 + y^3 + z^3 = 85$ और $xyz = 20$ है, तो $x^2 + y^2 + z^2 - xy - yz - zx$ का मान ज्ञात करें।

[A] 2

[B] 1

[C] 4

[D] 3

$$85 - 3 \times 20 = 25 \times (\quad)$$

$$1 = \quad$$

101. 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

[B] 4

[C] 5

[D] 1

$$105 - 3x \cdot 3y \cdot 4z = 11 \times (\quad)$$

$$\frac{105 - 72}{11} = \quad$$

③

102. 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

[B] 54

[C] 36

[D] 50

$$\cancel{273} = \cancel{\frac{1}{2}} \times \cancel{13} \times [(a-b)^2 + (b-c)^2 + (c-a)^2] \quad \neq$$

103. 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

#

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

$$= 11 \times (121 - 3 \times 28)$$

$$= 11 \times 37$$

$$= 407$$

104. If $a + b + c = 9$ and $ab + bc + ca = -22$, then the value $a^3 + b^3 + c^3 - 3abc$ is:

यदि $a + b + c = 9$ and $ab + bc + ca = -22$ है, तो $a^3 + b^3 + c^3 - 3abc$ का मान क्या है?

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✓ [A] 1323

[B] 1571

[C] 783

[D] 487

$$= 9 \times [9^2 - 3(-22)]$$

$$= 9 \times 147$$

$$\begin{array}{r} 81 \\ +66 \\ \hline \end{array}$$

105. If $a + b - c = 7$ and $ab - bc - ca = 21$, then $a^3 + b^3 - c^3 + 3abc = ?$

यदि $a + b - c = 7$ और $ab - bc - ca = 21$ है, तो $a^3 + b^3 - c^3 + 3abc = ?$

[A] 124

[B] 117

[C] -98

[D] 98

put $c=0$

$$\downarrow$$
$$7x(7^2 - 3x^2)$$

$$= 7x - 14$$

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

यदि $a + b + c = 7$ और $a^3 + b^3 + c^3 - 3abc = 175$ हो, तो $ab + bc + ca$ का मान क्या होगा?

[A] 7

[B] 8

[C] 6

[D] 9

$$\overset{25}{175} = \cancel{7} \times [7^2 - 3(ab + bc + ca)]$$

$$\overset{8}{-24} = -3(ab + bc + ca)$$

107. If $a + b + c = 15$, $ab + bc + ca = 48$ and $abc = 16$, then find the value of $a^3 + b^3 + c^3$.

अगर $a + b + c = 15$, $ab + bc + ca = 48$ और $abc = 16$ है, तो $a^3 + b^3 + c^3$ का मान ज्ञात कीजिए।

(SSC CPO 2025)

[A] 1212

[C] 1321

~~[B] 1263~~

[D] 1441

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

$$? - 48 = 15 \times (225 - 144)$$

$$\begin{aligned} ? &= 15 \times 81 + 48 \\ &= 1263 \end{aligned}$$

109. If $a + b + c = 1$, $ab + bc + ca = -22$ and $abc = -40$, then what is the value of $(a^3 + b^3 + c^3) + 5$?

यदि $a + b + c = 1$, $ab + bc + ca = -22$ और $abc = -40$ है, तो $(a^3 + b^3 + c^3) + 5$ का मान क्या है?

[A] -53

[B] 57

[C] -48

[D] 45

-53

$$? - 3 \times (-40) = 1 \times (1^3 - 3 \times -22)$$

$$? = 67 - 120$$

$$= -53$$

110. 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 $xy + yz + zx$?

x, y और z वास्तविक संख्या हैं। यदि $x^3 + y^3 + z^3 = 13$, $x + y + z = 1$, और $xyz = 1$ है, तो $xy + yz + zx$ का मान क्या है?

[A] -1

[B] 1

[C] 3

[D] -3

$$13 - 3 \times 1 = 1 \times [1^2 - 3(xy + yz + zx)]$$

$$\cancel{13} - \cancel{3} = \cancel{1} \times [1^2 - 3(xy + yz + zx)]$$

111. 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

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

$$\begin{array}{r} 11 \times 139 \\ 1540 \end{array}$$

$$1604 - 3xyz = 1529$$

$$\begin{array}{l} 75 = 3xyz \\ 25 = xyz \end{array}$$

112. 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 $a^3 + b^3 + c^3 = -11$ है, तो $\frac{a}{bc} + \frac{b}{ac} + \frac{c}{ab}$ का मान क्या है?

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

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

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

$$\begin{aligned} a^2 + b^2 + c^2 &= (a + b + c)^2 - 2(ab + bc + ca) \\ &= 1 - 2(-8) = 17 \end{aligned}$$

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

$$-11 - 3abc = 25$$

$$abc = -12$$

113. 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] $-\frac{39}{8}$

$$= \frac{a^3 + b^3 + c^3}{abc} = \frac{45}{-24} = -\frac{15}{8}$$

$$? - 3 \times -24 = 3 \cdot [3^2 - 3(-10)]$$

$$? + 72 = 117$$

$$? = 45$$



114. 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:

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[A] 195

[C] 175

[B] 180

[D] 185

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

$$= \frac{1}{2} \times 5 \times [99 - 25]$$

$$= \frac{1}{2} \times 5 \times 74 = 185$$

115. If $x + y + z = 2$, $x^3 + y^3 + z^3 - 3xyz = 74$, then $(x^2 + y^2 + z^2)$ is equal to:

यदि $x + y + z = 2$, $x^3 + y^3 + z^3 - 3xyz = 74$ है, तो $(x^2 + y^2 + z^2)$ का मान ज्ञात करें। ✓

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[A] 22

[B] 29

[C] 26

[D] 24

$$74 = \frac{1}{3} \times \cancel{3} \times [3(x^2 + y^2 + z^2) - \cancel{3}]$$

$$\frac{74}{\cancel{3}} = \cancel{3}(x^2 + y^2 + z^2)$$

116. If $x + y + z = 1$, $x^2 + y^2 + z^2 = 2$ and $x^3 + y^3 + z^3 = 3$, then what is the value of xyz ?

यदि $x + y + z = 1$, $x^2 + y^2 + z^2 = 2$ तथा $x^3 + y^3 + z^3 = 3$ है, तो xyz का मान क्या है?

[A] $1/3$

[B] $1/6$

[C] $1/2$

[D] $1/4$

$$\frac{1}{6} = xyz$$

$$3 - 3xyz = \frac{1}{2} \times 1 \times [3x^2 - 1^2]$$

$$3 - 3xyz = \frac{5}{2}$$

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

117. 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] 3

[C] 1

[D] 0

$$189 - 3abc = \frac{1}{2} \times 6^3 \times (3 \times 32 - 6^2)$$

$$189 - 3abc = 180$$

$$9 = 3abc$$

118. 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] -8
 $-4 + 6 + 9$

$16 + 36 + 81$

[B] 6
 $-64 + 216 + 729$

[C] 8

[D] -6

$= \sqrt[3]{-216} = -6$

$\frac{11 \times 133}{2}$

$881 - 3xyz = \frac{1}{2} \times 11 [399 - 121]$

$881 - 3xyz = 1529$

$3xyz = 648$

$xyz = -216$

119. 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 $x + y + z = 6$, $xyz = -10$ और $x^2 + y^2 + z^2 = 30$ है, तो $(x^3 + y^3 + z^3)$ का मान क्या होगा?

[A] 135

[C] 130

[B] 127

[D] 132

$$? - 3 \times -10 = \frac{1}{2} \times 6^3 \times [3 \times 30 - 6^2]$$

$$? + 30 = 162$$

$$? = 132$$

120. If $x + y + z = 10$, $x^2 + y^2 + z^2 = 38$, $5xyz = 150$ and $(xy + yz + zx) = 31$, then what is the value of $2(x^3 + y^3 + z^3)$?

यदि $x + y + z = 10$, ~~$x^2 + y^2 + z^2 = 38$~~ , ~~$5xyz = 150$~~ और $(xy + yz + zx) = 31$ है, तो $2(x^3 + y^3 + z^3)$ का मान ज्ञात कीजिए। $= 2 \times 160$

(RRB NTPC GRADUATE LEVEL CBT-1 2026)

[A] 520

[B] 320

[C] 260

[D] 160

$$? - 3 \times 30 = 10 \times (10^2 - 3 \times 31)$$

$$? = 160$$

108. The sum of three numbers is 80 and the sum of the squares of these three numbers is 2,650. If the product of the three numbers is 13,500, then find the sum of the cubes of the given three numbers.

तीन संख्याओं का योग 80 है और इन तीनों संख्याओं के वर्गों का योग 2,650 है। यदि तीनों संख्याओं का गुणनफल 13,500 है, तो दी गई तीनों संख्याओं के घनों का योग ज्ञात कीजिए।

SSC CHSL PRE 2025

[A] 1,46,580

[B] 87,860

[C] 1,90,075

[D] 1,02,500

$$a+b+c=80$$

$$a^2+b^2+c^2=2650$$

$$abc=13500$$

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

$$? - 3 \times 13500 = \frac{1}{2} \times 80^3 - 3 \times 13500$$

$$? = 40 \times 1550 + 3 \times 13500$$



121. 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

[B] 8

[C] 12

[D] 6

+ वे चर x, y, z लेते हैं

but $y = z = 0$

$$x^3 = 3$$

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

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

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

यदि $\frac{p}{q} + \frac{q}{r} + \frac{r}{p} = 8$ और $\frac{q}{p} + \frac{r}{q} + \frac{p}{r} = 11$ है, तो $\frac{p^3}{q^3} + \frac{q^3}{r^3} + \frac{r^3}{p^3} = ?$

[A] 251

[D] 339

= 251

[C] 264

[D] 248

$$\left(\frac{p}{q}\right)^3 + \left(\frac{q}{r}\right)^3 + \left(\frac{r}{p}\right)^3 - 3 \times 1 = 8 \times [8^2 - 3 \times 11]$$

123. 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

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