

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

$$\left. \begin{array}{l} \text{If } a^3 + b^3 + c^3 - 3abc = 0 \\ \text{OR} \\ a^3 + b^3 + c^3 = 3abc \end{array} \right\} \text{ then either} \\ a+b+c=0 \\ \text{OR} \\ a=b=c$$

*coaching center*

388. If  $a^3 + b^3 + c^3 = 3abc$  and  $a, b, c$  are positive numbers, then find

$$\frac{2a+7b+9c}{a+2b+3c}$$

$$\frac{2a+7b+9c}{a+2b+3c}$$

यदि  $a^3 + b^3 + c^3 = 3abc$  है और  $a, b, c$  धनात्मक संख्याएँ हैं, तो

$$\frac{2a+7b+9c}{a+2b+3c}$$

$$\frac{2a+7b+9c}{a+2b+3c}$$

ज्ञात करो।

$$\begin{array}{r} 3 \overline{) 18a} \\ \underline{6a} \end{array}$$

a)  $\frac{4}{9}$

b) 1

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

d) Can't determined

या  $a+b+c=0$

या  $a=b=c$  ✓



coaching center

389. If  $a^3 + b^3 + c^3 = 3abc$  and  $a, b, c$  are positive numbers.

Which option is correct?

यदि  $a^3 + b^3 + c^3 = 3abc$  है और  $a, b, c$  धनात्मक संख्याएँ हैं तो कौन सा विकल्प सही है?

a)  $a + b + c = 0$

b)  $a = b = c$

~~c) Both a and b~~

d) Can't say

$a + b + c = 0$  OR  $a = b = c$

~~X~~

✓

coaching center

390. If  $a^3 + b^3 + c^3 = 3abc$  and  $a, b, c$  are distinct numbers. Which option is correct?

$$a \neq b \neq c$$

यदि  $a^3 + b^3 + c^3 = 3abc$  है और  $a, b, c$  भिन्न संख्याएँ हैं तो कौन सा विकल्प सही है?

~~a)  $a + b + c = 0$~~

b)  $a = b = c$

c) Both a and b

d) Can't say

$a + b + c = 0$

OR  $a = b = c$

X

coaching center

391. If  $u, v$  and  $w$  are real numbers such that  $u^3 - 8v^3 - 27w^3 = 18uvw$ , then which one of the following is correct ?

यदि  $u, v$  और  $w$  वास्तविक संख्याएं हैं जैसे कि  $u^3 - 8v^3 - 27w^3 = 18uvw$ , तो निम्न में से कौन सा सही है?

a)  $u - v + w = 0$

b)  $u = -v = -w$

~~c)  $u - 2v = 3w$~~

d)  $u + 2v = -3w$

$$\underbrace{(u)^3}_{a} - \underbrace{(2v)^3}_{b} - \underbrace{(3w)^3}_{c} = 3 \times u \times \underbrace{-2v \times -3w}_{+}$$

$u - 2v - 3w = 0 \quad \text{OR} \quad u = -2v = -3w$

coaching center

392. 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 सम्बन्ध है :

a)  $x + y + z = 0$

b)  $x - 3y + 4z = 0$

c)  $x + 3y = 4z$

~~d)  $x + 3y + 4z = 0$~~

$$x^3 + (3y)^3 + (4z)^3 = \checkmark$$

$$x + 3y + 4z = 0 \quad \text{OR} \quad x = 3y = 4z$$

coaching center

393. 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  $(\overset{a}{x-7})^3 + (\overset{b}{x-8})^3 + (\overset{c}{x+6})^3 = 3(x-7)(x-8)(x+6)$  है, तो  $x$  का मान क्या है ?

a) 6

b) 8

c) 10

d) 3

$$a+b+c=0$$

$$3x-9=0$$

$$x=3$$

coaching center

394. 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)  $\frac{5}{6}$~~     a)  $\frac{1}{3}$     b)  $\frac{1}{3}$     b)  $\frac{1}{3}$     c)  $\frac{2}{3}$     c)  $\frac{2}{3}$     d)  $\frac{3}{4}$     d)  $\frac{3}{4}$

$$a + b + c = 0$$

$$\Rightarrow 12x - 10 = 0$$

$$x = \frac{5}{6}$$

coaching center



395. If  $(5x - 3)^3 + (2x + 5)^3 + 27(4 - 3x)^3 = 9(3 - 5x)(2x + 5)(3x - 4)$ ,  
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

$\downarrow$   
a

$\downarrow$   
b

$\downarrow$   
c

$$\left[ \frac{3(4-3x)}{c} \right]^3$$

$$3 \overbrace{(3-5x)(2x+5)(3x-4)}^3$$

$\frac{3}{-a} \quad \frac{b}{b} \quad \frac{3}{-c}$

$$a+b+c=0$$

$$\Rightarrow -2x+14=0$$

$$\Rightarrow 7=x$$

coaching center

$$a+b+c=0$$

$$\Rightarrow 4x+8=0$$

$$\Rightarrow x=-2$$

396. If  $(\frac{2x+3}{a})^3 + (\frac{x-8}{b})^3 + (\frac{x+13}{c})^3 = (\frac{2x+3}{a})(\frac{3x-24}{3b})(\frac{x+13}{c})$ , then what is the value of  $x$ ?

अगर  $(2x+3)^3 + (x-8)^3 + (x+13)^3 = (2x+3)(3x-24)(x+13)$ , तो  $x$  का मान क्या है?

a) -1.5

b) -2.5

c) -2

d) -1

coaching center

297. If  $(2a+3)^3 + (3a-1)^3 + (4a-5)^3 = 3(2a+3)(4a-5)(3a-1)$   
 and  $a^x > 1$ , then  $(3a^y + 2) = ?$   $\frac{x}{z} \quad \frac{4a-5}{z} \quad \frac{3a-1}{y}$

यदि  $(2a+3)^3 + (3a-1)^3 + (4a-5)^3 = 3(2a+3)(4a-5)(3a-1)$   
 है, और  $a > 1$  तो  $(3a+2) = ?$

a) 8

b) 11

~~c) 14~~

d) 3

$$x+y+z=0$$

$$9a-3=0$$

$$\Rightarrow a = \frac{3}{9} = \frac{1}{3}$$

X

OR

$$x=y=z$$

$$2a+3 = 3a-1 = 4a-5$$

$$4=a$$

coaching center

# All forms of $a^3 + b^3 + c^3 - 3abc$

$$\begin{aligned} a^3 + b^3 + c^3 - 3abc &= (a+b+c)(a^2 + b^2 + c^2 - ab - bc - ca) \quad \text{①} \\ &= (a+b+c) \left[ \frac{1}{2} \left[ (a-b)^2 + (b-c)^2 + (c-a)^2 \right] \right] \quad \text{②} \\ &= (a+b+c) \left[ (a+b+c)^2 - 3(ab+bc+ca) \right] \quad \text{③} \\ &= (a+b+c) \left[ \frac{1}{2} \left[ 3(a^2+b^2+c^2) - (a+b+c)^2 \right] \right] \quad \text{④} \end{aligned}$$

coaching center

$$\underline{a^3+b^3+c^3-3abc} = (a+b+c) \left[ \underline{a^2+b^2+c^2} - \underline{(ab+bc+ca)} \right] \text{--- (1)}$$

✓

$$= (a+b+c) \left[ (a+b+c)^2 - 3(ab+bc+ca) \right] \text{--- (3)}$$

$$= (a+b+c) \frac{1}{2} \left[ 3(a^2+b^2+c^2) - (a+b+c)^2 \right] \text{--- (4)}$$

$(a+b+c)$

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

$ab+bc+ca$

coaching center

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

e1

*coaching center*

398. If  $x = z = 225$  and  $y = 226$  then the value of  $x^3 + y^3 + z^3 - 3xyz$  is

अगर  $x = z = 225$  और  $y = 226$  तो  $x^3 + y^3 + z^3 - 3xyz$  का मान:

a) 765

~~b) 676~~

c) 674

d) 576

$$x = 225$$

$$z = 225$$

$$y = 226$$

②

$$= 676 \times \frac{1}{2} [0 + 1 + 1]$$

coaching center

299. If  $a = 34, b = c = 33$ , then the value of  $a^3 + b^3 + c^3 - 3abc$  is

अगर  $a = 34, b = c = 33$  है तो  $a^3 + b^3 + c^3 - 3abc$ :

a) 0

b) 111

c) 101

~~d) 100~~

$$a=34 \quad b=33 \quad c=33$$

$$100 \times \frac{1}{2} [1+0+1]$$

coaching center



400. If  $a = 299, b = 298, c = 297$  then the value of  $2a^3 + 2b^3 + 2c^3 - 6abc$  is

यदि  $a = 299, b = 298, c = 297$  हो, तो  $2a^3 + 2b^3 + 2c^3 - 6abc$  का मान बताएं ?

a) 5154

b) 5267

~~c) 5364~~

d) 5456

$$\begin{aligned} & 2(a^3 + b^3 + c^3 - 3abc) \\ &= 2 \times 894 \times \frac{1}{2} [1+1+1] \\ &= 5364 \end{aligned}$$

coaching center

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

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

a) 30

~~b) 15~~

c) -30

d) 15

$$15 = \frac{30}{2} = \frac{(a+b+c) \cdot \frac{1}{2} (\text{scribble})}{(\text{scribble})}$$

coaching center

402. 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, जहां  $K$  का मान

- 7 है 6 0 3  
 a) 1033 b) 933 c) 1026 d) 921

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

$$= 0.98k$$

$$\Rightarrow 98 \times \frac{1}{2} \times [20.66] = 98k$$

Digital Sum

$$x=1 \quad y=4 \quad z=3$$

$$3 \times \frac{1}{2} (9+1+4) = 8 \times k$$

$$\begin{array}{r} 441 \\ 13.69 \\ \hline 2.56 \end{array}$$

$$\begin{array}{r} \overline{5 \quad 16} \\ 330 \\ x-y=2.1 \end{array}$$

$$\begin{array}{r} y-z=3.7 \\ z-x=1.6 \end{array}$$

$$\begin{array}{r} \overline{1 \quad 36} \\ 310 \end{array}$$

$$\begin{array}{r} 90+6 \\ +2 \end{array}$$

403. Simplify the following expression.

निम्नलिखित व्यंजक को हल कीजिए।  $a \leftarrow (59 \times 59 \times 59) + (54 \times 54 \times 54) + (57 \times 57 \times 57) - 3(59)(54)(57)$   $\rightarrow b \rightarrow c$

a) 76

b) 170

$$(59 + 54 + 57)$$

c) 38

~~d) 19~~

$$\frac{\cancel{(a+b+c)} \left( \frac{1}{2} [25+9+4] \right)}{\cancel{(a+b+c)}} = \frac{1}{2} \times 38 = 19$$

coaching center

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

e1

*coaching center*

404. If  $x + y + z = 6$  and  $xy + yz + zx = 10$  then the value of  $x^3 + y^3 + z^3 - 3xyz$  is:

अगर  $x + y + z = 6$  और  $xy + yz + zx = 10$  है तो  $x^3 + y^3 + z^3 - 3xyz$  का मान:

a) 36

b) 40

c) 42

d) 48

①

$$6 \times [16 - 10] = 36$$

$$\begin{array}{r} x^2 + y^2 + z^2 = 36 \\ - 20 \\ \hline 16 \end{array}$$

③

$$6 [36 - 30] = 36$$

405. If  $x + y + z = 1$ ,  $xy + yz + zx = -1$ ,  $xyz = -1$ , then  $x^3 + y^3 + z^3 = ?$

यदि  $x + y + z = 1$ ,  $xy + yz + zx = -1$ ,  $xyz = -1$  है, तो  $x^3 + y^3 + z^3$  का मान होगा ?

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

①

$$\boxed{1} + 3 = 1(3 - (-1)) = 4$$

1

$$1 - (-2) = 3$$

③

$$\bigcirc + 3 = 1(1 + 3) = 4$$

1

coaching center

406. 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

①  
 $\text{○} + 36 = 2[26 + 11] = 74$   
38

$4 + 22 = 26$

$\sqrt{38 - 2} = 6$

③  
 $\text{□} + 36 = 2[4 + 33] = 74$

coaching center



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

e1

*coaching center*

407. If  $x + y + z = 6$  and  $x^2 + y^2 + z^2 = 20$  then the value of  $x^3 + y^3 + z^3 - 3xyz$  is

अगर  $x + y + z = 6$  और  $x^2 + y^2 + z^2 = 20$  है तो  $x^3 + y^3 + z^3 - 3xyz$  का मान:

a) 64

b) 70

✓ c) 72

d) 76

①

$$6 \times (20 - 8) = 72$$

$$\frac{36 - 20}{2} = 8$$

④

$$6 \times \frac{1}{2} \times [60 - 36]$$

$\begin{array}{r} 12 \\ -24 \\ \hline \end{array}$

coaching center

408. If  $a + b + c = 15$  and  $a^2 + b^2 + c^2 = 83$  then the value of  $a^3 + b^3 + c^3 - 3abc$  is

अगर  $a + b + c = 15$  और  $a^2 + b^2 + c^2 = 83$  तो  $a^3 + b^3 + c^3 - 3abc$  का मान:

a) 200

~~b) 180~~

c) 190

d) 210

①

$$15 \left( 83 - \overset{12}{71} \right) =$$

$$\begin{array}{r} 225 \\ -83 \\ \hline 142 \\ \hline 2 = 71 \end{array}$$

④

$$15 \times \frac{1}{2} \left[ \overset{12}{\cancel{24}} 9 - 225 \right]$$