

(v.v.v.v imp)



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

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

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

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

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

याद करो

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

If a, b and c are in arithmetic

Progression, then

$(b-d), b, (b+d)$

$$a^2 + b^2 + c^2 - ab - bc - ca = 3d^2 \checkmark$$

$$(a + b + c) = 3b$$

$\downarrow$ $\downarrow$ $\downarrow$
 $b-d$ b $b+d$

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

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

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

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



$$a^3 + b^3 + c^3 - 3abc = (a + b + c) \cdot (a^2 + b^2 + c^2 - ab - bc - ca) \quad \times$$
$$= (a + b + c) \cdot \frac{1}{2} [(a - b)^2 + (b - c)^2 + (c - a)^2] \quad \checkmark$$

Example:-

If,

$$a = 71$$

$$b = 75$$

$$c = 77$$

तो $a^3 + b^3 + c^3 - 3abc = ?$

$$= \frac{1}{2} \times 223 \times [16 + 4 + 36]$$

$$= \frac{1}{2} \times 223 \times 56$$

$$= 6244$$

Trick

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

$$\downarrow \quad \times \quad \downarrow$$
$$3b \quad \times \quad 3d^2$$

If a, b & c are in A.P with common difference 'd'

$$\text{तो } a^3 + b^3 + c^3 - 3abc = 3b \times 3d^2 = 9bd^2$$
$$= 9 \times \text{Middle no.} \times (\text{Common Diff})^2$$

Example:-

If,

$$a = 51$$

$$b = 54$$

$$c = 57$$

$$d = 3$$

$$\text{तो } a^3 + b^3 + c^3 - 3abc = ?$$

$$= 9 \times 54 \times 3^2$$
$$= 81 \times 54$$
$$= 4374 \text{ ans}$$

53. Factorize the given algebraic expression.

दिए गए बीजीय व्यंजक का गुणनखंड कीजिए।

$$x^3 + 27y^3 + 64z^3 - 36xyz$$

[A] $(x + 3y + 4z)(x^2 + 9y^2 + 16z^2 + 3xy + 12yz + 4xz)$

[B] $(x + 3y + 4z)(x^2 + 9y^2 + 16z^2 - 12xy - 3yz - 4xz)$

[C] $(x - 3y - 4z)(x^2 + 9y^2 + 16z^2 - 3xy - 12yz - 4xz)$

[D] $(x + 3y + 4z)(x^2 + 9y^2 + 16z^2 - 3xy - 12yz - 4xz)$

$$(x)^3 + (3y)^3 + (4z)^3 - 3x \cdot 3y \cdot 4z$$

54. $(2x + 3y + 4z) \cdot (4x^2 + 9y^2 + 16z^2 - 6xy - 12yz - 8xz) = ?$

[A] ~~$8x^3 - 27y^3 - 64z^3 - 72xyz$~~

[B] ~~$8x^3 + 27y^3 - 64z^3 + 72xyz$~~

[C] ~~$8x^3 + 27y^3 + 64z^3 + 72xyz$~~

☒ [D] $8x^3 + 27y^3 + 64z^3 - 72xyz$

$$(2x)^3 + (3y)^3 + (4z)^3 - 3 \times 2x \times 3y \times 4z$$

55. Which of the following is a factor of $3\sqrt{3}x^3 + 2\sqrt{2}y^3 - 18xy + 6\sqrt{6}$?
निम्नलिखित में से कौन सा $3\sqrt{3}x^3 + 2\sqrt{2}y^3 - 18xy + 6\sqrt{6}$ का गुणनखंड है?

(CDS 2023)

[A] ~~$\sqrt{3}x + \sqrt{2}y - \sqrt{3}$~~

[B] ~~$\sqrt{3}x + \sqrt{2}y - \sqrt{6}$~~

[C] $3x^2 + 2y^2 - \sqrt{18}x - \sqrt{12}y - \sqrt{6}xy + 6$

[D] ~~$3x^2 + 2y^2 + \sqrt{18}x + \sqrt{12}y - \sqrt{6}xy + 6$~~

$(\sqrt{3}x)^3 + (\sqrt{2}y)^3 + (\sqrt{6})^3 - 3 \times \sqrt{3}x \times \sqrt{2}y \times \sqrt{6}$

56. If $\frac{8x^3+64y^3+125z^3-120xyz}{(2x+4y+5z)} = (A\sqrt{2}x^2 + \frac{B}{\sqrt{2}}y^2 + 5Cz^2 - 8xy - 20yz - Dxz)$, then find $A^2 + B^2 - C^2 - D^2$?

यदि $\frac{8x^3+64y^3+125z^3-120xyz}{(2x+4y+5z)} = (A\sqrt{2}x^2 + \frac{B}{\sqrt{2}}y^2 + 5Cz^2 - 8xy - 20yz - Dxz)$ है, तो $A^2 + B^2 - C^2 - D^2$ ज्ञात कीजिए

[A] 395

[C] 345

[B] 408

[D] 375

$$A\sqrt{2} = 4 \quad 5C = 25$$

$$A = 2\sqrt{2} \quad C = 5$$

$$B = 16\sqrt{2} \quad D = 10$$

$$8 + 512 - 25 - 100$$

$$= 395$$

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



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

यदि $a = 500$, $b = 502$ और $c = 504$ है, तो $a^3 + b^3 + c^3 - 3abc$ का मान क्या होगा?

[A] 15060

[C] 18072

[B] 12048

[D] 17040

$$= 9 \times 502 \times 4$$

58. If $(321)^3 + (325)^3 + (329)^3 - (321)(329)(975) = ?$

यदि $(321)^3 + (325)^3 + (329)^3 - 3(321)(329)(325) = ?$

~~[A] 46800~~

~~[B] 46150~~

~~[C] 40860~~

~~[D] 48900~~

$$d=4$$

$$= 9 \times 325 \times 16$$

59. If $x = 222$, $y = 222$, $z = 225$, then find $x^3 + y^3 + z^3 - 3xyz = ?$

यदि $x = 222$, $y = 222$, $z = 225$ है, तो $x^3 + y^3 + z^3 - 3xyz$ का मान ज्ञात कीजिए।

[A] 4950

[B] 5994

[C] 4683

[D] 6021

$$= 8+8+5-0=...$$

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

$$= \frac{1}{2} \times 669 \times [0+9+9]$$

$$= 669 \times 9$$

60. If $a = 335$, $b = 215$, $c = 180$ Then Find the value of $(a^3 + b^3 + c^3 - 3abc)$?
यदि $a = 335$, $b = 215$, $c = 180$ तो $(a^3 + b^3 + c^3 - 3abc)$ का मान ज्ञात कीजिए?

(SSC CHSL 2023 PRE)

[A] ~~15452630~~

[C] ~~14472250~~

[B] ~~14502230~~

[D] ~~15421320~~

$\div 125$

$\div 5$ ③

61. 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: 1.6

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 है।

[A] 1033
[C] 1026

[B] 933
[D] 921

1.5 से
भी

$$\frac{1}{2} \times \cancel{98} \times [4.41 + 13.69 + 2.56] = \cancel{.98}k$$

$$\frac{1}{2} \times \cancel{100} \times 20.66 = k$$

$$1033 = k$$



62. Find $\frac{(1205)^3 + (1207)^3 + (1209)^3 - 3(1205)(1207)(1209)}{3621}$?

$\frac{(1205)^3 + (1207)^3 + (1209)^3 - 3(1205)(1207)(1209)}{3621}$ ज्ञात कीजिये?

[A] 22

[C] 9

[B] 18

✓ [D] 12

$$\frac{a^3 + b^3 + c^3 - 3abc}{a + b + c} = a^2 + b^2 + c^2 - ab - bc - ca$$
$$= 3 \times 9^2$$

63. If $a = 2.84$, $b = 3.64$ and $c = 1.52$, then $\frac{a^3+b^3+c^3-3abc}{ab+bc+ca-(a^2+b^2+c^2)} = ?$

यदि $a = 2.84$, $b = 3.64$ और $c = 1.52$ है, तो $\frac{a^3+b^3+c^3-3abc}{ab+bc+ca-(a^2+b^2+c^2)} = ?$

[A] 8

[C] -27

[B] -8

[D] 12

$$= -(a+b+c)$$

$$= -8$$

64. If $a = 225$, $b = 197$ and $c = 178$, then find $\frac{a^3+b^3+c^3-3abc}{(a-b)^2+(b-c)^2+(c-a)^2} = ?$

यदि $a = 225$, $b = 197$ और $c = 178$ है, तो $\frac{a^3+b^3+c^3-3abc}{(a-b)^2+(b-c)^2+(c-a)^2}$ का मान ज्ञात कीजिए।

[A] 122

[C] 200

[B] 300

[D] 159

$$= \frac{a+b+c}{2}$$

$$= \frac{600}{2}$$

65. If $a = 356$, $b = -189$ and $c = -163$, then find the value of $\frac{(a-b)^2 + (b-c)^2 + (c-a)^2}{a^3 + b^3 + c^3 - 3abc}$.

यदि $a = 356$, $b = -189$ और $c = -163$, तो $\frac{(a-b)^2 + (b-c)^2 + (c-a)^2}{a^3 + b^3 + c^3 - 3abc}$ का मान क्या है?

[A] 2

[C] 1

[B] 0.5

[D] 4

$$= \frac{2}{a+b+c}$$

$$= \frac{2}{4}$$

66. If $(p - q) = 6$ and $(r - q) = 5$, find the value of $(p^3 + q^3 + r^3 - 3pqr)/(p + q + r)$.
यदि $(p - q) = 6$, $(r - q) = 5$, तो $(p^3 + q^3 + r^3 - 3pqr)/(p + q + r)$ का मान ज्ञात कीजिए।

SSC CHSL TIER – I 2022

[A] 45

[B] 40

[C] 31

[D] 30

$$\begin{array}{r} p - q = 6 \\ r - q = 5 \\ \hline p - r = 1 \end{array}$$

$$= \frac{1}{2} [(p - q)^2 + (q - r)^2 + (r - p)^2]$$

$$= \frac{1}{2} [36 + 25 + 1] \\ = 31$$