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MATHEMATICS

ALGEBRA (बीजगणित)

सबसे सटीक, सबसे बेहतर



LIVE STREAM : 11:00 AM

BY - SHASHI SIR



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ALGEBRA (बीजगणित) (CLASS-04) [Algebraic Identity]

1. यदि $x + \frac{1}{x} = \frac{\sqrt{3}+1}{2}$ है, तो $x^4 + \frac{1}{x^4}$ का मान क्या है?

If $x + \frac{1}{x} = \frac{\sqrt{3}+1}{2}$ then find the value of $x^4 + \frac{1}{x^4}$

(a) $\frac{4\sqrt{3}-1}{4}$

(b) $\frac{4\sqrt{3}+1}{2}$

(c) $\frac{-4\sqrt{3}-1}{4}$

(d) $\frac{-4\sqrt{3}-1}{2}$

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

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

$$x^4 + \frac{1}{x^4} = (k^2 - 2)^2 - 2$$

$$\frac{-4\sqrt{3}-1}{4}$$

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

$$x^2 + \frac{1}{x^2} = \left[\frac{\sqrt{3}+1}{2} \right]^2 - 2 = \frac{4+2\sqrt{3}}{4} - 2$$

$$= \frac{4+2\sqrt{3}-8}{4}$$

$$= \frac{2\sqrt{3}-4}{4} = \frac{\sqrt{3}-2}{2}$$

$$x^4 + \frac{1}{x^4} = \left[\frac{\sqrt{3}-2}{2} \right]^2 - 2$$

$$= \frac{7-4\sqrt{3}-8}{4} = \frac{-1-4\sqrt{3}}{4}$$

2. यदि $x^2 - 3x + 1 = 0$ है तो $x^2 + x + \frac{1}{x} + \frac{1}{x^2} = ?$

If $x^2 - 3x + 1 = 0$ then $x^2 + x + \frac{1}{x} + \frac{1}{x^2} = ?$

- ✓ (a) 10
- (b) 2
- (c) 6
- (d) 8

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

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

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

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

$$3 + 7 = \textcircled{10}$$

3. यदि $x^2 + 4x - 4 = 0$ है तो $(x + 5)^3 + \frac{1}{(x + 5)^3} = ?$

If $x^2 + 4x - 4 = 0$ then $(x + 5)^3 + \frac{1}{(x + 5)^3} = ?$

(a) 234

(b) 198

(c) 216

(d) 110

$$x^2 = 4 - 4x$$

$$(x + 5) + \frac{1}{x + 5} = \frac{x^2 + 10x + 25 + 1}{x + 5}$$

$$= \frac{4 - 4x + 10x + 26}{x + 5} = \frac{6x + 30}{x + 5}$$

$$= 6(x + 5)$$

$$(x + 5)^3 + \frac{1}{(x + 5)^3} = 6^3 - 3 \times 6$$

$$= 216 - 18 = 198$$

4. यदि $x^2 + \frac{1}{x^2} = 83$ हो तो $x^3 - \frac{1}{x^3} = ?$

If $x^2 + \frac{1}{x^2} = 83$ then $x^3 - \frac{1}{x^3} = ?$

(a) 764

(b) 750

✓ (c) 756

(d) 760

$$x^2 + \frac{1}{x^2} = 83 \quad \begin{cases} x + \frac{1}{x} = \sqrt{85} \\ x - \frac{1}{x} = \sqrt{81} = 9 \end{cases}$$

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

$$\rightarrow x^3 - \frac{1}{x^3} = 9^3 + 3 \times 9$$

$$729 + 27 = \underline{756}$$

✓✓✓✓✓

5. यदि $m^4 + \frac{1}{m^4} = 119$ है, तो $m - \frac{1}{m} = ?$

If $m^4 + \frac{1}{m^4} = 119$ then $m - \frac{1}{m} = ?$

$x^4 \rightarrow x^2 \rightarrow x$

(a) ± 3

(b) 4

(c) ± 2

(d) ± 1

$$m^2 + \frac{1}{m^2} = \sqrt{119 + 2} = \sqrt{121} = 11$$

$$m - \frac{1}{m} = \sqrt{11 - 2} = \sqrt{9} = \pm 3$$

6. यदि $x^2 + \frac{1}{x^2+1} = 6$ है, तो $(x^2 + 1)^2 + \frac{1}{(x^2 + 1)^2}$ का मान ज्ञात करें।

If $x^2 + \frac{1}{x^2+1} = 6$ then find the value of $(x^2 + 1)^2 + \frac{1}{(x^2 + 1)^2}$

(a) 27

(b) 23

☒ (c) 47

(d) 51

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

$$\frac{(x^2+1)^2 + 1}{(x^2+1)^2} = 7^2 - 2 = 47$$

7. यदि $x^4 + \frac{1}{x^4} = 119$ है और $x > 1$ है, तो $x^3 + \frac{1}{x^3} = ?$

If $x^4 + \frac{1}{x^4} = 119$ and $x > 1$ then $x^3 + \frac{1}{x^3} = ?$

(a) 36

(b) $16\sqrt{13}$

(c) 18

(d) $10\sqrt{13}$

$$x^2 + \frac{1}{x^2} = \sqrt{119} = 11$$

$$x + \frac{1}{x} = \sqrt{13}$$

$$x^3 + \frac{1}{x^3} = (\sqrt{13})^3 - 3\sqrt{13}$$

$$13\sqrt{13} - 3\sqrt{13} = 10\sqrt{13}$$

8. यदि $x^3 + \frac{1}{x^3} = 52$ हो तो $x + \frac{1}{x} = ?$

If $x^3 + \frac{1}{x^3}$ then $x + \frac{1}{x} = ?$

(a) 3

☒ (b) 4

(c) 5

(d) 6

$$x^3 + \frac{1}{x^3} = 52$$

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

? cube $\rightarrow \textcircled{64}$

—★ CONCEPT - 09 ★—

(i) If $x + \frac{1}{x} = \pm 2$ then $x = \pm 1$

$$x + \frac{1}{x} = 2 \rightarrow x = +1$$

$$x + \frac{1}{x} = -2 \rightarrow x = -1$$

(ii) If $x + \frac{1}{x} = \pm 1$ then $x^3 = \mp 1$

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

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

(iii) If $x + \frac{1}{x} = \pm\sqrt{3}$ then $x^3 + \frac{1}{x^3} = 0$, $x^6 = -1$, $x^2 + \frac{1}{x^2} = 1$

(iv) If $x + \frac{1}{x} = \pm\sqrt{2}$ then $x^2 + \frac{1}{x^2} = 0$ or $x^4 = -1$

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

$$x = -1$$

$$x^{17} + \frac{1}{x^{19}} = (-1)^{17} + \frac{1}{(-1)^{19}} = -2$$

9.

यदि $x + \frac{1}{x} = -2$ है तो $x^{17} + \frac{1}{x^{19}} = ?$

If $x + \frac{1}{x} = -2$ then $x^{17} + \frac{1}{x^{19}} = ?$

(a) 1

(b) 0

(c) 2

(d) -2

 $x + \frac{1}{x} = -2$ power

$$e + e = 2$$

$$e + \text{odd} = 0$$

$$\text{odd odd} = -2$$

$$\frac{a}{b} = 1$$

$$a = b$$

$$\frac{a}{b} + \frac{1}{\frac{a}{b}} = 2$$

$$a - b = a - a = 0$$

10. यदि $\frac{a}{b} + \frac{b}{a} = 2$ है, तो $a - b = ?$

If $\frac{a}{b} + \frac{b}{a} = 2$ then $a - b = ?$

(a) 2

(b) -1

☒ (c) 0

(d) 1

11. यदि $m + \frac{1}{m-2} = 4$ है, तो $m^2 + \frac{9}{m} = ?$

If $m + \frac{1}{m-2} = 4$ then $m^2 + \frac{9}{m} = ?$

(a) 12

(b) 9

(c) 14

(d) 10

$$\begin{aligned} m^2 + \frac{9}{m} &= 3^2 + \frac{9}{3} \\ &= 9 + 3 \\ &= 12 \end{aligned}$$

$$m + \frac{1}{m-2} = 4$$

$$(m-2) + \frac{1}{m-2} = 4 - 2 = 2$$

$$m-2 = 1$$

$$m = 3$$

12. यदि $\frac{x}{2} + \frac{18}{x} + 6 = 0$ है, तो $(x+7)^{2021} + (x+5)^{-2021}$ का मान बराबर है :

If $\frac{x}{2} + \frac{18}{x} + 6 = 0$ then the value of $(x+7)^{2021} + (x+5)^{-2021}$

(a) 0

(b) 1

(c) 2

(d) -1

$$\frac{1}{3} \left[\frac{x}{2} + \frac{18}{x} \right] = -\frac{6}{3} \quad \left| \quad \frac{x}{6} = -1 \quad \left| \quad (x+7)^{2021} + \frac{1}{(x+5)^{2021}} \right. \right.$$

$$\frac{x}{6} + \frac{6}{x} = -2 \quad \left| \quad x = -6 \quad \left| \quad \begin{array}{l} (+)^{2021} \\ (-)^{2021} \end{array} + \frac{1}{(-)^{2021}} = 0 \right. \right.$$

13. यदि $x^2 + y^2 + \frac{1}{x^2} + \frac{1}{y^2} + 4 = 0$ है, तो $2x^2 + y^2$ = ?

If $x^2 + y^2 + \frac{1}{x^2} + \frac{1}{y^2} + 4 = 0$ then $2x^2 + y^2 = ?$

(a) 2

(b) 4

(c) -2

(d) -4

~~(a)~~ -3

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

$$x^2 = -1$$

$$y^2 = -1$$

$$2x^2 + y^2 = 2(-1) - 1 = -2 - 1 = -3$$

$$a + \frac{1}{a} = \sqrt{3}$$

$$a^3 + \frac{1}{a^3} = (\sqrt{3})^3 - 3 \times \sqrt{3}$$

$$= 3\sqrt{3} - 3\sqrt{3} = 0$$

14. यदि $\left(a + \frac{1}{a}\right)^2 = 3$ है, तो $a^3 + \frac{1}{a^3} = ?$

If $\left(a + \frac{1}{a}\right)^2 = 3$ then $a^3 + \frac{1}{a^3} = ?$

(a) $2\sqrt{3}$

(b) 2

(c) $3\sqrt{3}$

☒ (d) 0

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

∴

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

$$\left(x + \frac{1}{x}\right)^4 = (\sqrt{3})^4 = 9$$

15. x एक वास्तविक संख्या है, यदि $x + \frac{1}{x} \neq$

0 और $x^3 + \frac{1}{x^3} = 0$ तो $\left(x + \frac{1}{x}\right)^4 = ?$

x is a real number, If $x + \frac{1}{x} \neq 0$ and

$x^3 + \frac{1}{x^3} = 0$ then $\left(x + \frac{1}{x}\right)^4 = ?$

(a) 4

✓ (b) 9

(c) 16

(d) 2

$$x + \frac{1}{x} = \sqrt{3}, \quad x^6 + 1 = 0$$

$$x^6 = -1$$

$$x^{95} + x^{89} + x^{54} + x^{24} + x^6 + 1$$

$$x^{89}(x^6 + 1) + (x^6)^9 + (x^6)^4 + 0$$

$$0 + (-1)^9 + (-1)^4 + 0$$

$$0 + \cancel{-1} + \cancel{1} + 0 = 0$$

16. यदि $\left(x + \frac{1}{x}\right)^2 = 3$ है, तो $x^{95} + x^{89} + x^{54} + x^{24} + x^6 + 1$

If $\left(x + \frac{1}{x}\right)^2 = 3$ then $x^{95} + x^{89} + x^{54} + x^{24} + x^6 + 1 = ?$

(a) $\frac{1}{\sqrt{3}}$

(b) $\sqrt{3}$

(c) 1

(d) 0

17. यदि $x + \frac{1}{x} + \sqrt{3} = 0$ है, तो $x^{17} + \frac{1}{x^{17}}$ का मान ?

If $x + \frac{1}{x} + \sqrt{3} = 0$ then the value of $x^{17} + \frac{1}{x^{17}}$?

(a) $-\sqrt{3}$

✓ (b) $\sqrt{3}$

(c) 1

(d) $\frac{1}{\sqrt{3}}$

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

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

$$-3\sqrt{3} + 3\sqrt{3} = 0$$

$$x^6 = -1$$

$$x^6 + 1 = 0$$

$$x^{17} + \frac{1}{x^{17}}$$

$$x^{18} \times x^{-1} + \frac{1}{x^{18} \times x^{-1}}$$

$$x^{18} \left(x + \frac{1}{x} \right)$$

$$\textcircled{-1} x - \sqrt{3} = \textcircled{\sqrt{3}}$$

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

$$\begin{array}{r} x \\ = \\ -1 \end{array} \quad \begin{array}{r} \frac{1}{x} \\ = \\ -1 \end{array}$$

$$x^2 + \frac{1}{x^2} = 0$$

18. यदि $x + \frac{1}{x} + 2 = 0$ है। तो $x^2 + \frac{1}{x^3} = ?$

If $x + \frac{1}{x} + 2 = 0$ then $x^2 + \frac{1}{x^3} = ?$

(a) -2

(b) 2

(c) -1

~~(d) 0~~

19. यदि $x + \frac{1}{x} + 2 = 0$ है। तो $x^2 + \frac{1}{x^3} = ?$

If $x + \frac{1}{x} + 2 = 0$ then $x^2 + \frac{1}{x^3} = ?$

(a) -2

(b) 2

(c) -1

✓ (d) 0

Concept-10

If $a^2 + b^2 + c^2 + \dots + z^2 = 0$ then $\underline{a} = \underline{b} = \underline{c} = \dots z = 0$ (here $a, b, c, \dots z \in \mathbb{R}$)

If $(x_1 - k_1)^2 + (x_2 - k_2)^2 + (x_3 - k_3)^2 = 0$ then $\boxed{x_1 = K_1}, \boxed{x_2 = K_2}, \boxed{x_3 = K_3}$

$$(x_1 - k_1)^2 = 0$$

$$\underline{x_1 = k_1}$$

20. If $(a - 3)^2 + (b - 4)^2 + (c - 9)^2 = 0$
then the value of $\sqrt{a + b + c}$ is

अगर $(a - 3)^2 + (b - 4)^2 + (c - 9)^2 = 0$
है तो $\sqrt{a + b + c}$ का मान ?

(a) -5

☒ (b) 4

☒ (c) ± 4

(d) -4

$$(a-3)^2 = 0 \quad \sqrt{3+4+9} = \sqrt{16}$$

$$a = 3$$

$$b = 4$$

$$c = 9$$

$$= 4$$

21. यदि $x^2 + y^2 - 4x - 4y + 8 = 0$ हो तो $x - y$ पता करें?

If $x^2 + y^2 - 4x - 4y + 8 = 0$ then the value of $x - y$

(a) 4

(b) -4

☒ (c) 0

(d) 8

$$x^2 + y^2 - 4x - 4y + 4 + 4 = 0$$

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

$$x = 2$$

$$y = 2$$

$$x - y$$

$$2 - 2 = 0$$

22. If $a^2 + b^2 + c^2 = 2(a + 2b + 3c) - 14$, then the value of $4a-3b+5c$ is

$a^2 + b^2 + c^2 = 2(a + 2b + 3c) - 14$, तो $4a-3b+5c$ का मान:

(a) 12

✓ (b) 13

(c) 15

(d) None

$$4a - 3b + 5c$$

$$4 \times 1 - 3 \times 2 + 5 \times 3$$

$$4 - 6 + 15 = 13$$

$$a^2 + b^2 + c^2 - 2a - 4b - 6c + 14 = 0$$

$$(a-1)^2 + (b-2)^2 + (c-3)^2 = 0$$

$$\begin{aligned} a &= 1 \\ b &= 2 \\ c &= 3 \end{aligned}$$

23. If $a^2 + b^2 + c^2 + 96 = 8(a + b - 2c)$, then $\sqrt{ab - bc + ca}$ is equal

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) $3\sqrt{3}$

$$a = 4$$

$$b = 4$$

$$c = -8$$

$$\sqrt{16 + 32 - 32} = 4$$

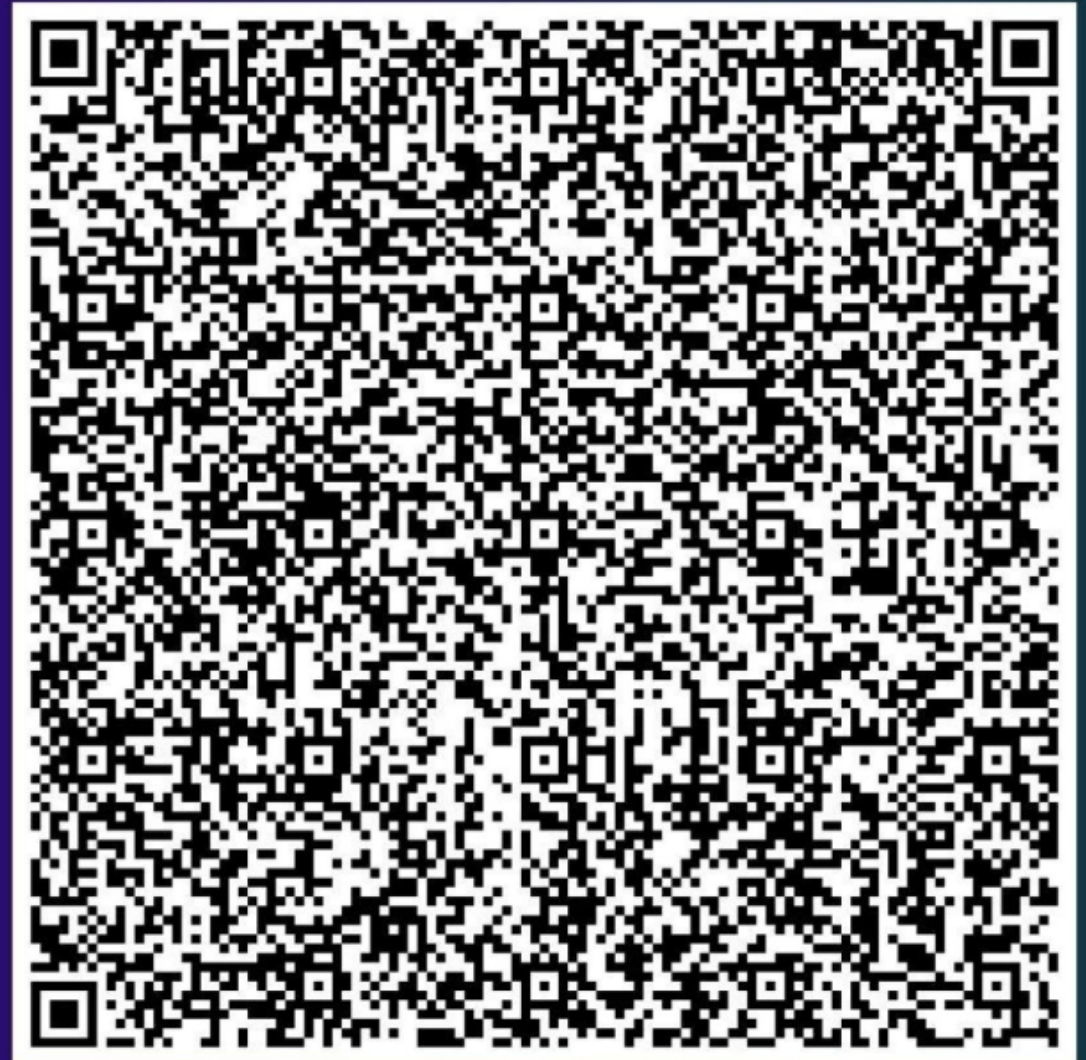
24. If $9a^2 + 16b^2 + c^2 + 25 = 24(a + b)$, then $(3a + 4b + 5c) = ?$
यदि $9a^2 + 16b^2 + c^2 + 25 = 24(a + b)$, है तो $(3a + 4b + 5c) = ?$

- (a) 9
- (b) 6
- (c) 7
- (d) 10

H.W

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