



Foundation Batch

MATHS

Algebra

(बीजगणित)

LIVE

16-12-2024 07:00PM



Formulae

$$↳ (a+b)^2 = a^2 + b^2 + 2ab$$

$$↳ (a-b)^2 = a^2 + b^2 - 2ab$$

$$↳ (a+b)^2 + (a-b)^2 = 2(a^2 + b^2)$$

$$↳ (a+b)^2 - (a-b)^2 = 4ab$$

$$↳ a^2 - b^2 = (a+b)(a-b)$$

$$↳ \underline{a^4 - b^4} = (a^2 + b^2)(a^2 - b^2) \\ (a+b)(a-b)(a^2 + b^2)$$

$$a^3 - b^3 = (a-b)^3 + 3ab(a-b)$$

$$(a-b)[(a-b)^2 + 3ab]$$

$$(a-b)[a^2 + b^2 - 2ab + 3ab]$$

$$\boxed{a^3 - b^3 = (a-b)[a^2 + b^2 + ab]}$$

↳

$$\underline{(a+b)^3} = a^3 + b^3 + 3a^2b + 3ab^2$$

$$a^3 + b^3 + \underline{3ab(a+b)}$$

$$\underline{(a-b)^3} = a^3 - b^3 - 3a^2b + 3ab^2$$

$$a^3 - b^3 - 3ab(a-b)$$

$$a^3 + b^3 = (a+b)^3 - 3ab(a+b)$$

$$(a+b)[(a+b)^2 - 3ab]$$

$$(a+b)[a^2 + b^2 + 2ab - 3ab]$$

$$\checkmark \boxed{a^3 + b^3 = (a+b)(a^2 + b^2 - ab)}$$



Important formula:

महत्वपूर्ण सूत्र

$$(1) (a + b)^2 = a^2 + 2ab + b^2 = (a - b)^2 + 4ab$$

$$(2) (a - b)^2 = a^2 - 2ab + b^2 = (a + b)^2 - 4ab$$

$$(3) (a + b)^2 + (a - b)^2 = 2(a^2 + b^2)$$

$$(4) (a + b)^2 - (a - b)^2 = 4ab$$

$$(5) (a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3 = a^3 + b^3 + 3ab(a + b)$$

$$(6) (a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3 = a^3 - b^3 - 3ab(a - b)$$

$$(7) (a + b)^3 + (a - b)^3 = 2(a^3 + 3ab^2) = 2a(a^2 + 3b^2)$$

$$(8) (a + b)^3 - (a - b)^3 = 6a^2b + 2b^3 = 2b(3a^2 + b^2)$$



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$$(9) a^2 - b^2 = (a - b)(a + b)$$

$$(10) a^3 + b^3 = (a + b)(a^2 - ab + b^2) = (a + b)^3 - 3ab(a + b)$$

$$(11) a^3 - b^3 = (a - b)(a^2 + ab + b^2) = (a - b)^3 + 3ab(a - b)$$

$$(12) a^4 - b^4 = (a^2 - b^2)(a^2 + b^2) = (a - b)(a + b)(a^2 + b^2) \\ = (a - b)(a^3 + a^2b + ab^2 + b^3)$$



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TYPE-I



1. Simplify the following expression.

निम्नलिखित व्यंजक को सरल कीजिए।

$$49a^2 + 70ab + 25b^2$$

(a) $(7a - 5b)^2$

(b) $(5a + 7b)^2$

(c) $(7a + 5b)^2$

(d) $(5a - 7b)^2$

$$\begin{aligned} & (7a)^2 + (5b)^2 + 2 \times 7a \times 5b \\ & = (7a + 5b)^2 \end{aligned}$$

(SSC Selection Post Phase XII 26/06/2024)

2. Find the constant term in expansion of $\left(5x^2 - \frac{1}{x}\right)^3$.

$\left(5x^2 - \frac{1}{x}\right)^3$ के विस्तार में अचर पद ज्ञात करें।

(a) 75

(b) 15

(c) -15

(d) 5

$$a^3 - b^3 - 3a^2b + 3ab^2$$

$$3 \times 5x^2 \times \frac{1}{x^2}$$

$$+ 15$$

(SSC CGL Pre 18/08/2022)

3. What is the value of $(a + b - c + d)^2 - (a - b + c - d)^2$.

$(a + b - c + d)^2 - (a - b + c - d)^2$ का मान है।

~~(a) $4a(b + d - c)$~~

~~(b) $2a(b + c - d)$~~

~~(c) $4a(b - d + c)$~~

~~(d) $2a(a + b - c)$~~

$$a^2 - b^2 = (a + b)(a - b)$$

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

$$2a(2b - 2c + 2d)$$

$$4a(b - c + d)$$

(SSC CGL Pre 03/03/2020)

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

Ex:

$$(c = -c)$$

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

$$(b = -b)$$

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

4. What is the value of $a^2 + b^2 + c^2 - 2ab - 2bc + 2c$

$a^2 + b^2 + c^2 - 2ab - 2bc + \underline{2ca}$ का मान क्या है।

~~(a)~~ $(a - \cancel{b} + c)^2$

~~(b)~~ $(a - \cancel{b} + 2c)^2$

~~(c)~~ $(\underline{2a} - b + \cancel{c})^2$

~~(d)~~ $(\underline{a} - 2b + \cancel{c})^2$

$$(a - b + c)^2$$

$$c=0 \quad (a-b)^2$$

(SSC CGL Pre 12/12/2022)

$$\underline{\underline{b=0}} \quad (a+c)^2$$



5. Simplify the following expression

दिए गए व्यंजक को सरल कीजिए।

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

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

(a) $\frac{a+b+c}{a-b-c}$

(b) $\frac{a-b+c}{a+b-c}$

(c) $\frac{a-b-c}{a+b-c}$

(d) $\frac{a-b-c}{a-b+c}$

$$\frac{a^2 - [b^2 + c^2 + 2bc]}{a^2 + b^2 + 2ab - c^2}$$

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

(SSC CPO Pre 03/10/2023)

$$\left(\frac{a-b-c}{a+b-c} \right)$$



5. Simplify the following expression

दिए गए व्यंजक को सरल कीजिए।

$$\frac{a^2 - \cancel{b^2} - 2\cancel{b}c - c^2}{a^2 + \cancel{b^2} + 2\cancel{a}b - c^2}$$

$$c=0$$

$$\frac{a^2 - \cancel{b^2} - 2\cancel{b}c - c^2}{a^2 + \cancel{b^2} + 2\cancel{a}b - c^2}$$

(a) $\frac{a+b+c}{a-b-c}$

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

(b) $\frac{a-b+c}{a+b-c}$

(c) $\frac{a-b-c}{a+b-c}$

(d) $\frac{a-b-c}{a-b+c}$

$$\frac{a-b}{a+b}$$

$$b=0$$

$$\frac{a^2 - c^2}{a^2 - c^2} = 1$$

(SSC CPO Pre 03/10/2023)

6. $(4a + 3b + 2c)^2$ विस्तार कीजिए/Expand.

(a) $16a^2 + 9b^2 + 4c^2 - 24ab - 12bc - 16ca$

(b) $16a^2 + 9b^2 + 4c^2 + 24ab + 12bc + 16ca$

(c) $4a^2 + 3b^2 + 2c^2 + 24ab + 12bc + 16ca$

(d) $16a^2 - 9b^2 + 4c^2 - 24ab + 12bc - 16ca$

$16a^2 + 9b^2 + 4c^2 + 24ab + 12bc + 16ac$

(SSC CGL Pre 09/03/2020)

7. Simplify the given expression.

दिए गए व्यंजक को सरल कीजिए।

$$(x + \cancel{y})^3 - (x - \cancel{y})^3 - 6\cancel{y}(\cancel{x^2} - y^2).$$

(a) y^3

(b) $8y^3$

(c) x^3

(d) $8x^3$

$x=0$

$$y^3 - (-y)^3 - 6y(-y^2)$$

$$y^3 + y^3 + 6y^3$$

$$= 8y^3$$

(SSC CPO Pre 10/11/2022)

7. Simplify the given expression.

दिए गए व्यंजक को सरल कीजिए।

$$(x + y)^3 - (x - y)^3 - 6y(x^2 - y^2).$$

(a) y^3

(b) $8y^3$

(c) x^3

(d) $8x^3$

$$\begin{aligned} & x^3 + y^3 + 3x^2y + 3xy^2 - [x^3 - y^3 - 3x^2y + 3xy^2] - 6yx^2 + 6y^3 \\ & \cancel{x^3} + \cancel{y^3} + \cancel{3x^2y} + \cancel{3xy^2} - \cancel{x^3} + \cancel{y^3} + \cancel{3x^2y} - \cancel{3xy^2} - 6yx^2 + 6y^3 \end{aligned}$$

$$2y^3 + 6y^3 + \cancel{6x^2y} - \cancel{6x^2y}$$

(SSC CPO Pre 10/11/2022)

$$= 8y^3$$

8. Simplify the given expression.

दिए गए व्यंजक को सरल कीजिए।

$$(2a - b - 3c)(4a^2 + b^2 + 9c^2 + 2ab + 6ac - 3bc)$$

~~(a) $-8a^3 + b^3 + 27c^3$~~

~~(b) $8a^3 - b^3 - 27c^3 - 18abc$~~

~~(c) $8a^3 + b^3 + 27c^3$~~

~~(d) $8a^3 - b^3 - 27c^3 + 18abc$~~

$$8a^3 - b^3$$

(SSC CPO Pre 10/11/2022)

$$\begin{array}{r} -6abc \\ -6abc \\ -6abc \\ \hline -18abc \end{array}$$

8. Simplify the given expression.

दिए गए व्यंजक को सरल कीजिए।

$$(2a - b - 3c)(4a^2 + b^2 + 9c^2 + 2ab + 6ac - 3bc)$$

~~(a) $-8a^3 + b^3 + 27c^3$~~

~~(b) $8a^3 - b^3 - 27c^3 - 18abc$~~

~~(c) $8a^3 + b^3 + 27c^3$~~

~~(d) $8a^3 - b^3 - 27c^3 + 18abc$~~

$a = b = c = 1$ $(2-1-3)(4+1+9+2+6-3)$

(SSC CPO Pre 10/11/2022)

$-2(19) = -38$

$-8+1+27$
 $8-1-27-18$
 $8-46$
 $= -38$

$8-1-27+18$

$a(b^2 - c^2) + bc(b - c)$ $ab(a - b) + bc(b - c) + ca(c - a)$ निम्नलिखित
किसके बराबर है?

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

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

(SSC CGL Pre 13/11/2019)



TYPE-II

10. If $x + y = 10$ and $xy = 12$, then find the value of $x^2 - xy + y^2$.

यदि $x + y = 10$ और $xy = 12$ हो, तो $x^2 - xy + y^2$ का मान ज्ञात करें।

$$(x+y)^2 = x^2 + y^2 + 2xy$$

(a) 82

(b) 74

(c) 64

(d) 78

$$100 - 2 \times 12$$

$$76 = x^2 + y^2$$

$$76 - 12$$

$$= 64$$

(SSC Selection Post Phase XII 21/06/2024)

11. If $x + y = 12$ and $xy = 6$, then the value of $\frac{x}{y} + \frac{y}{x}$

will be equal to which of the following?

यदि $x + y = 12$ और $xy = 6$ है, तो $\frac{x}{y} + \frac{y}{x}$ का मान निम्न में से

किसके बराबर होगा?

(a) 26

(b) 18

(c) 24

(d) 22

$$(x+y)^2 = x^2 + y^2 + 2xy$$

$$144 - 2 \times 6 = x^2 + y^2$$

$$132 = x^2 + y^2$$

$$\frac{x^2 + y^2}{xy}$$

$$\frac{132}{6}$$

$$22$$

(SSC Selection Post Phase XII 24/06/2024)

12. If $a - b = 3$, and $a^3 - b^3 = 117$ then find $(a + b)$

यदि $a - b = 3$, तथा $a^3 - b^3 = 117$ तो $(a + b)$ ज्ञात कीजिए

(a) 3

(b) 5

(c) 7

(d) 9

$$\begin{array}{r} 5^3 - 2^3 \\ 125 - 8 \\ 117 \end{array}$$

$$\underline{\underline{S - 2 = 3}}$$

$$\begin{array}{c} S + 2 \\ 7 \end{array}$$

12. If $a - b = 3$, and $a^3 - b^3 = 117$ then find $(a + b)$

यदि $a - b = 3$, तथा $a^3 - b^3 = 117$ तो $(a + b)$ ज्ञात कीजिए

(a) 3

(b) 5

✓ (c) 7

(d) 9

$$a^3 - b^3 = (a - b)(a^2 + b^2 + ab)$$

$$117 = 3(a^2 + b^2 + ab)$$

39

$$(a + b)^2 = 29 + 2 \times 10$$

49

$$(a + b) = \sqrt{49}$$

7

$$(a - b)^2 = a^2 + b^2 - 2ab$$

$$9 = \underbrace{a^2 + b^2 + ab}_{39} - 3ab$$

$$3ab = 30$$

$$ab = 10$$
 ✓

$$a^2 + b^2 + 10 = 39$$

$$a^2 + b^2 = 29$$

4.11

13. If $5x + 3y = 15$ and $2xy = 6$, then the value of $5x - 3y$ is :

यदि $5x + 3y = 15$ और $2xy = 6$, तब $5x - 3y$ का मान है:

(a) $3\sqrt{2}$

(b) $3\sqrt{4}$

(c) $3\sqrt{5}$

(d) $3\sqrt{3}$

(SSC CHSL Pre 02/08/2023)