

बीजीय सर्वसमिकाएँ

Algebraic Identity

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

Ex:- $(98)^2 = (90+8)^2$

$$= (90)^2 + 2 \times 90 \times 8 + 8^2$$

$$= 8100 + 1440 + 64$$

$$= 9604$$

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

Ex:- $(98)^2 = (100-2)^2$

$$= (100)^2 - 2 \times 100 \times 2 + 2^2$$

$$= 10000 - 400 + 4$$

$$= 10004 - 400$$

$$= 9604$$

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

Ex:-

$$4^2 - 3^2 = (4+3)(4-3)$$

$$= 7 \times 1$$

$$= 7$$

$$4.) (x+a)(x+b) = x^2 + (a+b)x + ab$$

Ex:- (i) $(x-3)(x+5) = x^2 + (-3+5)x + (-3) \times 5$
 $= x^2 + (2)x - 15$
 $= x^2 + 2x - 15$

(ii) $(5x+2)(5x-3) = (5x)^2 + [2+(-3)] \times 5x + 2 \times (-3)$
 $= 25x^2 + (2-3) \times 5x - 6$
 $= 25x^2 + (-1) \times 5x - 6$
 $= 25x^2 - 5x - 6$

(iii) $105 \times 106 = (100+5)(100+6)$
 $= (100)^2 + (5+6) \times 100 + 5 \times 6$
 $= 10000 + 1100 + 30$
 $= 11130$

(iv) $97 \times 98 = (100-3)(100-2)$
 $= (100)^2 + [-3+(-2)] \times 100 + (-3) \times (-2)$
 $= 10000 + (-3-2) \times 100 + 6$
 $= 10000 + (-5) \times 100 + 6$
 $= 10000 - 500 + 6$
 $= 10006 - 500 = 9506$

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

(34)

$$\text{Ex:- } (3a+4b)^3 = (3a)^3 + (4b)^3 + 3 \times 3a \times 4b (3a+4b)$$

$$= 27a^3 + 64b^3 + 36ab(3a+4b)$$

$$= 27a^3 + 64b^3 + 108a^2b + 144ab^2$$

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

$$\text{Ex:- } \textcircled{1} (4a-3b)^3 = (4a)^3 - (3b)^3 - 3 \times 4a \times 3b (4a-3b)$$

$$= 64a^3 - 27b^3 - 36ab(4a-3b)$$

$$= 64a^3 - 27b^3 - 144a^2b + 108ab^2$$



$$\textcircled{11} (98)^3 = (100-2)^3$$

$$= (100)^3 - 2^3 - 3 \times 100 \times 2 (100-2)$$

$$= 1000000 - 8 - 600 \times 98$$

$$= 1000000 - 8 - 58800$$

$$= 1000000 - 58808$$

$$= 941192$$

$$(7) (a+b+c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$$

$$\text{Ex: } (2x-y+z)^2 = [2x+(-y)+z]^2$$

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

$$= 4x^2 + y^2 + z^2 - 4xy - 2yz + 4zx$$

* पूर्ण वर्ग के रूप वाले व्यंजक का गुणनखंड निकालें:-

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

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

$$\text{Ex: } (i) 9x^2 - 24x + 16$$

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

$$= (3x-4)^2$$

$$= (3x-4)(3x-4)$$

$$(ii) 3x^2 - 4\sqrt{3}x + 4$$

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

$$= (\sqrt{3}x-2)^2$$

$$= (\sqrt{3}x-2)(\sqrt{3}x-2)$$

$$(3) \quad a^2 + b^2 + c^2 + 2ab + 2bc + 2ca = (a+b+c)^2 = (a+b+c)(a+b+c)$$

Ex: ① $4a^2 + b^2 + 4ab + 8a + 4b + 4$

$$= (2a)^2 + (b)^2 + 2^2 + 2 \times 2a \cdot b + 2 \times b \times 2 + 2 \times 2 \times 2a$$

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

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

(ii) $4x^2 + 9y^2 + z^2 - 12xy - 4xz + 6yz$

$$= 4x^2 + 9y^2 + z^2 - 12xy + 6yz - 4xz$$

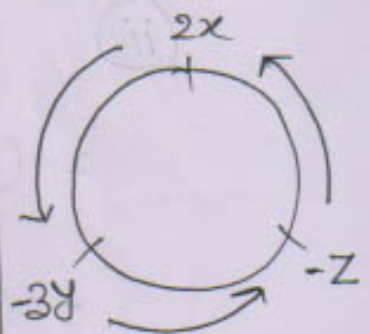
$$= (2x)^2 + (-3y)^2 + (-z)^2 + 2 \times 2x \times (-3y) + 2 \times (-3y) \times (-z) + 2 \times (-z) \times 2x$$

$$= [2x + (-3y) + (-z)]^2$$

$$= (2x - 3y - z)^2$$

$$= (2x - 3y - z)(2x - 3y - z)$$

Rough



$$4) a^3 + b^3 + 3ab(a+b) = (a+b)^3$$

Ex- (i) $8x^3 + y^3 + 12x^2y + 6xy^2$

$$= (2x)^3 + (y)^3 + 6xy(2x+y)$$

$$= (2x)^3 + (y)^3 + 3 \times 2x \times y(2x+y)$$

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

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

(ii) $8x^3 + 27y^3 + 36x^2y + 54xy^2$

$$= (2x)^3 + (3y)^3 + 18xy(2x+3y)$$

$$= (2x)^3 + (3y)^3 + 3 \times 2x \times 3y(2x+3y)$$

$$= (2x+3y)^3 \left[a^3 + b^3 + 3ab(a+b) = (a+b)^3 \right]$$

$$= (2x+3y)(2x+3y)(2x+3y)$$