6. Factorisation of Algebraic expressions

1. Simplify

(1) $\frac{a^2(a^2-b^2)}{a^2+2ab+b^2} \div \frac{a^3(a-b)}{a^2+ab}$

Solution :

$$\because \quad \frac{a^2(a^2-b^2)}{a^2+2ab+b^2} \div \frac{a^3(a-b)}{a^2+ab}$$

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

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

$\ldots\ldots \because [a^2 + 2ab + b^2 = (a+b)^2]$ and $[(a^2 - b^2) = (a+b)(a-b)]$

$= 1$

(2) $\frac{x^2-3x+2}{x^2+x-2} \div \frac{x^2-4}{x^2+6x+8}$

Solution :

$$\because \quad \frac{x^2-3x+2}{x^2+x-2} \div \frac{x^2-4}{x^2+6x+8}$$

$$= \frac{x^2-3x+2}{x^2+x-2} \times \frac{x^2+6x+8}{x^2-4} \ldots\ldots (I)$$

Factorise the given expressions

(i) $x^2 - 3x + 2$

$= x^2 - 2x - x + 2$

$= x(x - 2) - 1\,(x - 2)$

$= (x - 2)\,(x - 1)$

(ii) $x^2 + x - 2$

$= x^2 + 2x - x - 2$

$= x(x + 2) - 1(x + 2)$

$= (x + 2)(x - 1)$

(iii) $x^2 + 6x + 8$

$= x^2 + 4x + 2x + 8$

$= x(x + 4) + 2(x + 4)$

$= (x + 4)(x + 2)$

(iv) $x^2 - 4$

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

$= (x + 2)(x - 2)$

Put the factors in eq^n. (I)

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

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

$$\therefore \frac{x^2-3x+2}{x^2+x-2} \div \frac{x^2-4}{x^2+6x+8} = \frac{x+4}{x+2}$$

(3) $\left[\frac{m^2-mn}{mn-n^2} \times \frac{m^2+5mn+6n^2}{(m-n)^2}\right] \times \frac{m^2n+mn^2}{m^2+3mn+2n^2}$

Solution :

$$\because \left[\frac{m^2-mn}{mn-n^2} \times \frac{m^2+5mn+6n^2}{(m-n)^2}\right] \times \frac{m^2n+mn^2}{m^2+3mn+2n^2}$$

Factorise the given expressions

(i) $m^2 + 5mn + 6n^2$

$= m^2 + 3mn + 2mn + 6n^2$

$= m(m + 3n)+ 2n(m + 3n)$

$= (m + 3n)+ (m + 2n)$

(ii) $m^2 + 3mn + 2n^2$

$= m^2 + 2mn + 1mn+ 2n^2$

$= m(m + 2n)+ n(m + 2n)$

$= (m + 2n) + (m + n)$

Put the factors in given eq^n.

$$\left[\frac{m^2 - mn}{mn - n^2} \times \frac{m^2 + 5mn + 6n^2}{(m-n)^2}\right] \times \frac{m^2n + mn^2}{m^2 + 3mn - 2n^2}$$

$$= \left[\frac{m(m-n)}{n(m-n)} \times \frac{(m+3n)(m+2n)}{(m-n)^2}\right] \times \frac{mn\,(m+n)}{(m+2n)(m+n)}$$

$$= \frac{m}{n} \times \frac{mn\,(m+3n)}{(m-n)^2}$$

$$= \frac{m^2\,(m+3n)}{(m-n)^2}$$

$$\therefore \left[\frac{m^2 - mn}{mn - n^2} \times \frac{m^2 + 5mn + 6n^2}{(m-n)^2}\right] \times \frac{m^2n + mn^2}{m^2 + 3mn + 2n^2} = \frac{m^2\,(m+3n)}{(m-n)^2}$$

(4) $\left[\frac{x^2 + x - 12}{x^2 - 5x + 6} \div \frac{x^2 - x - 20}{x^2 - 25}\right] \div \frac{x^2 + 2x - 15}{x - 2}$

Solution :

$$\because \left[\frac{x^2 + x - 12}{x^2 - 5x + 6} \div \frac{x^2 - x - 20}{x^2 - 25}\right] \div \frac{x^2 + 2x - 15}{x - 2}$$

Factorise the given expressions

(i) $x^2 + x - 12$

$= x^2 + 4x - 3x - 12$

$= x(x + 4) - 3\,(x + 4)$

$= (x + 4)\,(x - 3)$

(i) $x^2 - 5x + 6$

$= x^2 - 3x - 2x + 6$

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

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

(ii) $x^2 - x - 20$

$= x^2 - 5x + 4x - 20$

$= x(x - 5) + 4(x - 5)$

$= (x - 5)(x + 4)$

(iii) $x^2 - 25$

$= (x + 5)(x - 5)$

(iv) $x^2 + 2x - 15$

$= x^2 + 5x - 3x - 15$

$= x(x + 5) - 3(x + 5)$

$= (x + 5)(x - 3)$

Put the factors in eq^n.

$$\left[\frac{x^2+x-12}{x^2-5x+6} \div \frac{x^2-x-20}{x^2-25}\right] \div \frac{x^2+2x-15}{x-2}$$

$$= \left[\frac{(x+4)(x-3)}{(x-3)(x-2)} \div \frac{(x-5)(x+4)}{(x+5)(x-5)}\right] \div \frac{(x+5)(x-3)}{(x-2)}$$

$$= \left[\frac{(x+4)}{(x-2)} \div \frac{(x+4)}{(x+5)}\right] \div \frac{(x+5)(x-3)}{(x-2)}$$

$$= \left[\frac{(x+4)}{(x-2)} \times \frac{(x+5)}{(x+4)}\right] \times \frac{(x-2)}{(x+5)(x-3)}$$

$$= \frac{(x+5)}{(x-2)} \times \frac{(x-2)}{(x+5)(x-3)}$$

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

$$\therefore \left[\frac{x^2+x-12}{x^2-5x+6} \div \frac{x^2-x-20}{x^2-25}\right] \div \frac{x^2+2x-15}{x-2} = \frac{1}{x-3}$$

(5) $\dfrac{x\left(x^2-y^2\right)}{a^2+3ab+2b^2} \div \dfrac{x^2+xy}{a+2b}$

Solution :

$$\frac{x\left(x^2-y^2\right)}{a^2+3ab+2b^2} \div \frac{x^2+xy}{a+2b}$$

Factorise the given expressions

(i) $\left(x^2-y^2\right)$

$= (x + y)(x - y)$

(ii) $a^2 + 3ab + 2b^2$

$= a^2 + 2ab + ab + 2b^2$

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

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

Put the factors in given eqⁿ.

$$\frac{x(x^2 - y^2)}{a^2 + 3ab + 2b^2} \div \frac{x^2 + xy}{a + 2b}$$

$$= \frac{x(x+y)(x-y)}{(a+2b)(a+b)} \div \frac{x(x+y)}{(a+2b)}$$

$$= \frac{x(x+y)(x-y)}{(a+2b)(a+b)} \times \frac{(a+2b)}{x(x+y)}$$

$$= \frac{x-y}{a+b}$$

$$\therefore \frac{x(x^2 - y^2)}{a^2 + 3ab + 2b^2} \div \frac{x^2 + xy}{a + 2b} = \frac{x-y}{a+b}$$

(6) $\frac{x + 2y}{3x + 3y} \times \frac{x + y}{2x + 4y}$

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$$\frac{x + 2y}{3x + 3y} \times \frac{x + y}{2x + 4y}$$

$$= \frac{x + 2y}{3(x + y)} \times \frac{x + y}{2(x + 2y)}$$

$$= \frac{1}{6}$$

$$\therefore \frac{x+2y}{3x+3y} \times \frac{x+y}{2x+4y} = \frac{1}{6}$$

(7) $\frac{6y^2+7y-3}{6y^2+11y+3}$

Solution :

$$\frac{6y^2+7y-3}{6y^2+11y+3}$$

$$= \frac{6y^2+9y-2y-3}{6y^2+9y+2y+3}$$

$$= \frac{3y\,(2y+3)-1\,(2y+3)}{3y\,(2y+3)+1\,(2y+3)}$$

$$= \frac{(2y+3)(3y-1)}{(2y+3)(3y+1)}$$

$$= \frac{3y-1}{3y+1}$$

$$\therefore \frac{6y^2+7y-3}{6y^2+11y+3} = \frac{3y-1}{3y+1}$$

(8) $\frac{a^3+8}{a^2-16} \times \frac{a^2-4a}{a^2-2a+4}$

Solution :

$$\frac{a^3+8}{a^2-16} \times \frac{a^2-4a}{a^2-2a+4}$$

$$= \frac{(a+2)(a^2-2a+4)}{(a+4)(a-4)} \times \frac{a(a-4)}{(a^2-2a+4)}$$

$$= \frac{a(a+2)}{a+4}$$

$$\therefore \frac{a^3+8}{a^2-16} \times \frac{a^2-4a}{a^2-2a+4} = \frac{a(a+2)}{a+4}$$

2. Factorise.

(1) $5x^2y^2 - 25xy - 180$

Solution :

$5x^2y^2 - 25xy - 180$; $5 \times (-180) = -900$

$a + b = -25$, $a \times b = -900$

$-45 \quad +20$

$= 5x^2y^2 - 45xy + 20xy - 180$

$= 5xy\,(xy - 9) + 20\,(xy - 9)$

$= (xy - 9)\,(5xy + 20)$

$= (xy - 9)\,5(xy + 4)$

$= 5\,(xy - 9)\,(xy + 4)$

$\therefore 5x^2y^2 - 25xy - 180 = 5\,(xy - 9)\,(xy + 4)$

(2) $12x^2 - 29xy + 14y^2$

Solution :

$12x^2 - 29xy + 14y^2$;

$12 \times 14 = 168$

$-21 \quad -8$

$a + b = -29, \quad a \times b = 168$

$= 12x^2 - 21xy - 8xy + 14y^2$

$= 3x\,(4x - 7y) - 2y\,(4x - 7y)$

$= (4x - 7y)\,(3x - 2y)$

$\therefore 12x^2 - 29xy + 14y^2 = (4x - 7y)\,(3x - 2y)$

(3) $24a^2 - 65ab - 21b^2$

Solution :

$24a^2 - 65ab - 21b^2$;

$24 \times (-21) = -504$

$-56 \quad +9$

$a + b = -65, \quad a \times b = -504$

$= 24a^2 - 56ab + 9ab - 21b^2$

$= 8a\,(3a - 7b) + 3b\,(3a - 7b)$

$= (8a + 3b)\,(3a - 7b)$

$\therefore 24a^2 - 65ab - 21b^2 = (8a + 3b)\,(3a - 7b)$

(4) $7y^2 + 25yz + 12z^2$

Solution :

$7y^2 + 25yz + 12z^2$;

$7 \times 12 = 84$

$+21 \quad +4$

$a + b = 25, a \times b = 84$

$= 7y^2 + 21yz + 4yz + 12z^2$

$= 7y\,(y + 3z) + 4z\,(y + 3z)$

$= (y + 3z)\,(7y + 4z)$

$\therefore 7y^2 + 25yz + 12z^2 = (y + 3z)(7y + 4z)$

3. Simplify

1. $(ab + cd)^3 - a^3b^3 - c^3d^3$

Solution :

$(ab + cd)^3 - a^3b^3 - c^3d^3$

$(a + b)^3 = a^3 + b^3 + 3a^2b + 3ab^2$ ….(Formula)

$= [(ab)^3 + 3 \times (ab)^2 \times (cd) + 3 \times (ab) \times (cd)^2 + (cd)^3] - a^3b^3 - c^3d^3$

$= a^3b^3 + 3 \times a^2b^2 \times cd + 3 \times ab \times c^2d^2 + c^3d^3 - a^3b^3 - c^3d^3$

$= a^3b^3 + 3a^2b^2cd + 3abc^2d^2 + c^3d^3 - a^3b^3 - c^3d^3$

$= 3a^2b^2cd + 3abc^2d^2$

$\therefore (ab + cd)^3 - a^3b^3 - c^3d^3 = 3a^2b^2cd + 3abc^2d^2$

2. $(3x - 4y)^3 - (27x^3 - 64y^3)$

Solution :

$(3x - 4y)^3 - (27x^3 - 64y^3)$

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

$= [(3x)^3 - 3 \times (3x)^2 \times (4y) + 3 \times (3x) \times (4y)^2 - (4y)^3] - 27x^3 + 64y^3$

$= 27x^3 - 3 \times 9x^2 \times 4y + 9x \times 16y^2 - 64y^3 - 27x^3 + 64y^3$

$= 27x^3 - 108x^2y + 144xy^2 - 64y^3 - 27x^3 + 64y^3$

$= 144xy^2 - 108x^2y$

$= 36xy\,(4y - 3x)$

$\therefore (3x - 4y)^3 - (27x^3 - 64y^3) = 36xy\,(4y - 3x)$

3. $(x - 2y)^3 - (8y)^3$

Solution :

$(x - 2y)^3 - (8y)^3$

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

$= [x - 2y - 8y]\,[(x - 2y)^2 + (x - 2y)(8y) + (8y)^2]$

$= (x - 10y)[x^2 - 4xy + 4y^2 + 8xy - 16y^2 + 64y^2]$

$= (x - 10y)\ (x^2 + 4xy + 52y^2)$

$\therefore (x - 2y)^3 - (8y)^3 = (x - 10y)\ (x^2 + 4xy + 52y^2)$

4. $(5x + 4y)^3 - (5x - 4y)^3$

Solution :

$(5x + 4y)^3 - (5x - 4y)^3$

$a^3 - b^3 = (a - b)\ (a^2 + ab + b^2)$ ….(Formula)

$= [(5x + 4y) - (5x - 4y)]\ [(5x + 4y)^2 + (5x + 4y)\ (5x - 4y) + (5x - 4y)^2]$

$= 8y\ [25x^2 + 40xy + 16y^2 + 25x^2 - 16y^2 + 25x^2 - 40xy + 16y^2]$

$= 8y\ [25x^2 + 25x^2 + 25x^2 + 16y^2]$

$= 8y\ (75x^2 + 16y^2)$

$= 600x^2y + 128y^3$

$\therefore (5x + 4y)^3 - (5x - 4y)^3 = 600x^2y + 128y^3$

5. $(p + q)^3 - (p + 2q)^3$

Solution : $(p + q)^3 - (p + 2q)^3$

$a^3 - b^3 = (a - b)\ (a^2 + ab + b^2)$ ….(Formula)

$= [(p + q) - (p + 2q)] [(p + q)^2 + (p + q)(p + 2q) + (p + 2q)^2]$

$= (- q) [p^2 + 2pq + q^2 + p^2 + 2pq + pq + 2q^2 + p^2 + 4pq + 4q^2]$

$= (- q) [3p^2 + 2pq + 2pq + 4pq + pq + q^2 + 2q^2 + 4q^2]$

$= (- q) [3p^2 + 9pq + 7q^2]$

$= - 3p^2q - 9pq^2 - 7q^3$

$\therefore (p + q)^3 - (p + 2q)^3 = - 3p^2q - 9pq^2 - 7q^3$

6. $\frac{(m^2 - mn + n^2)}{(m + n)} \times \frac{(m^2 + 2mn + n^2)}{(m^3 + n^3)}$

Solution :

$= \frac{(m^2 - mn + n^2)}{(m + n)} \times \frac{(m^2 + 2mn + n^2)}{(m^3 + n^3)}$

$= \frac{m^2 - mn + n^2}{m + n} \times \frac{(m + n)^2}{(m + n)(m^2 - mn + n^2)}$

$= 1$

$\therefore \frac{(m^2 - mn + n^2)}{(m + n)} \times \frac{(m^2 + 2mn + n^2)}{(m^3 + n^3)} = 1$

7. $\frac{8p^3-27q^3}{4p^2-9q^2} \times \frac{1}{(4p^2+6pq+9q^2)}$

Solution :

$= \frac{8p^3-27q^3}{4p^2-9q^2} \times \frac{1}{(4p^2+6pq+9q^2)}$

$= \frac{(2p-3q)(4p^2+6pq+9q^2)}{(2p+3q)(2p-3q)} \times \frac{1}{4p^2+6pq+9q^2}$

$= \frac{1}{2p+3q}$

$\therefore \frac{8p^3-27q^3}{4p^2-9q^2} \times \frac{1}{(4p^2+6pq+9q^2)} = \frac{1}{2p+3q}$

8. $\frac{3a^2-3ab}{ab-b^2} \times \frac{ab^2+b^3}{9a^2-9b^2}$

Solution :

$\frac{3a^2-3ab}{ab-b^2} \times \frac{ab^2+b^3}{9a^2-9b^2}$

$= \frac{3a(a-b)}{b(a-b)} \times \frac{b^2(a+b)}{9(a^2-b^2)}$

$= \frac{3a(a-b)}{b(a-b)} \times \frac{b^2(a+b)}{9(a+b)(a-b)}$

$= \frac{3a}{b} \times \frac{b^2}{9(a-b)}$

$= \frac{ab}{3(a-b)}$

$$\therefore \frac{3a^2 - 3ab}{ab - b^2} \times \frac{ab^2 + b^3}{9a^2 - 9b^2} = \frac{ab}{3(a - b)}$$

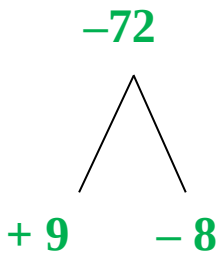
4. Factorise.

1. $a^2 + a - 72$

Solution :

$a^2 + a - 72$

$a + b = +1, \quad a \times b = -72$



$= a^2 + 9a - 8a - 72$

$= a(a + 9) - 8(a + 9)$

$= (a + 9)(a - 8)$

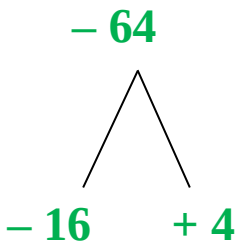
$\therefore a^2 + a - 72 = (a + 9)(a - 8)$

2. $x^2 - 12x - 64$

Solution :

$x^2 - 12x - 64$

$a + b = -12, \; a \times b = -64$



$= x^2 - 16x + 4x - 64$

$= x(x - 16)) + 4(x - 16)$

$= (x - 16)\,(x + 4)$

$\therefore x^2 - 12x - 64 = (x - 16)\,(x + 4)$

3. $y^3 - 216$

Solution :

$y^3 - 216$

$a^3 - b^3 = (a - b)\,(a^2 + ab + b^2)$ ….(Formula)

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

$= (y - 6) + (y^2 + y \times 6 + 6^2)$

$= (y - 6)\,(y^2 + 6y + 36)$

$\therefore y^3 - 216 = (y - 6)\,(y^2 + 6y + 36)$

4. $125x^3 + 343y^3$

Solution :

$125x^3 + 343y^3$

$a^3 + b^3 = (a + b)\,(a^2 - ab + b^2)$ ….(Formula)

$= (5x)^3 + (7y)^3$

$= (5x + 7y) + (25x^2 - (5x) \times (7y) + 49y^2)$

$= (5x + 7y)\,(25x^2 - 35xy + 49y^2)$

$\therefore 125x^3 + 343y^3 = (5x + 7y)(25x^2 - 35xy + 49y^2)$

5. $54x^3 - 16y^3$

Solution :

$54x^3 - 16y^3$

$= 2(27x^3 - 8y^3)$

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

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

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

$= 2(3x - 2y)(9x^2 + 6xy + 4y^2)$

$\therefore 54x^3 - 16y^3 = 2(3x - 2y)(9x^2 + 6xy + 4y^2)$

6. $64x^3 + \frac{27}{512x^3}$

Solution :

$64x^3 + \frac{27}{512x^3}$

$= (4x)^3 + \left(\frac{3}{8x}\right)^3$

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

$$= \left(4x + \frac{3}{8x}\right)\left[(4x)^2 - (4x) \times \left(\frac{3}{8x}\right) + \left(\frac{3}{8x}\right)^2\right]$$

$$= \left(4x + \frac{3}{8x}\right)\left(16x^2 - \frac{3}{2} + \frac{9}{64x^2}\right)$$

$$\therefore 64x^3 + \frac{27}{512x^3} = \left(4x + \frac{3}{8x}\right)\left(16x^2 - \frac{3}{2} + \frac{9}{64x^2}\right)$$

7. $32a^3 - \frac{108}{b^3}$

Solution :

$$32a^3 - \frac{108}{b^3}$$

$$= 4\left[8a^3 - \frac{27}{b^3}\right] \quad \text{.....(taking common factor 4)}$$

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

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

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

$$= 4\left[\left(2a - \frac{3}{b}\right)\left(4a^2 + \frac{6a}{b} + \frac{9}{b^2}\right)\right]$$

$$\therefore 32a^3 - \frac{108}{b^3} = 4\left[\left(2a - \frac{3}{b}\right)\left(4a^2 + \frac{6a}{b} + \frac{9}{b^2}\right)\right]$$

8. $1 + \frac{y^3}{729}$

Solution :

$1 + \frac{y^3}{729}$

$= (1)^3 + \left(\frac{y}{9}\right)^3$

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

$= \left(1 + \frac{y}{9}\right)\left[(1)^2 - (1)\left(\frac{y}{9}\right) + \left(\frac{y}{9}\right)^2\right]$

$= \left(1 + \frac{y}{9}\right)\left(1 - \frac{y}{9} + \frac{y^2}{81}\right)$

$\therefore 1 + \frac{y^3}{729} = \left(1 + \frac{y}{9}\right)\left(1 - \frac{y}{9} + \frac{y^2}{81}\right)$

5. Complete the following activity.

$M^2 - 33M + 230$

$= M^2 - \square M - \square M + 230$

$= M(M - \square) - \square(M - 23)$

$= (M - \square)(M - \square)$

Solution :

$M^2 - 33M + 230$

$= M^2 - \boxed{23}\,M - \boxed{10}\,M + 230$

$= M\,(M - \boxed{23}) - \boxed{10}(M - 23)$

$= (M - \boxed{23})(M - \boxed{10})$

6. Complete the following activity.

$512 + P^3$

$= \square + P^3$

$= (\square + P\ )[\square - \square \times (P) + P^2]$

$= (\square + P\ )(\square - \square\, P + P^2)$

Solution :

$512 + P^3$

$= \boxed{(8)^3} + P^3$

$= (\boxed{8} + P)\left[\boxed{(8)^2} - \boxed{8} \times (P) + P^2\right]$

$= (\boxed{8} + P)(\boxed{64} - \boxed{8}\,P + P^2)$

7. Complete the following activity.

$N^3 - (N - 2)^3$

$= [N - (\square)][N^2 + N \times \square + \square]$

$= \square[N^2 + N^2 - \square + \square - 4N + \square]$

$= \square(3N^2 - \square + \square)$

Solution :

$N^3 - (N - 2)^3$

$= [N - (\boxed{(N - 2)})][N^2 + N \times \boxed{(N - 2)} + \boxed{(N - 2)^2}]$

$= \boxed{2}[N^2 + N^2 - \boxed{2N} + \boxed{N^2} - 4N + \boxed{4}]$

$= \boxed{2}(3N^2 - \boxed{6N} + \boxed{4})$

8. Write the following expressions true or false.

(1) $64x^3 - 27y^3 = (4x - 3y)(16x^2 - 12xy + 27y^3)$

Ans : False

Explanation :

$64x^3 - 27y^3$

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

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

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

$= (4x - 3y)(16x^2 + 12xy + 9y^2)$

(2) $128x^3 + 250y^3 = 2(4x + 5y)(16x^2 - 20xy + 25y^2)$

Ans : True

Explanation :

$128x^3 + 250y^3$

$= 2(64x^3 + 125y^3)$ ……..(taking common factor 2)

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

$=2[(4x)^3 + (5y)^3]$

$= 2(4x + 5y)[(4x)^2 - (4x) \times (5y) + (5y)^2]$

$= 2(4x + 5y)(16x^2 - 20xy + 25y^2)$

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

Ans : False

Explanation :

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

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

$=\left(x + \frac{1}{x}\right)\left[(x)^2 - (x) \times \left(\frac{1}{x}\right) + \left(\frac{1}{x}\right)^2\right]$

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

(4) $1 - a^3 = (1 - a)(1 + a + a^2)$

Ans : True

Explanation :

$1 - a^3$

$=(1)^3 - (a)^3$

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

$= (1 - a)[(1)^2 + (1) \times (a) + (a)^2]$

$= (1 - a)(1 + a + a^2)$

(5) $27x^3 - 8y^3 = (3x - 2y)(9x^2 + 6xy + 4y^2)$

Ans : True

Explanation :

$27x^3 - 8y^3$

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

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

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

$= (3x - 2y)(9x^2 + 6xy + 4y^2)$

9. Match the following.

1.

Group ‘ A’ Polynomial	Group ‘B’ Factors of polynomial
(1) $x^2 + 7x - 18$	(a) $(x - 9)(x + 2)$
(2) $x^2 + 3x - 18$	(b) $(x + 9)(x - 2)$
(3) $x^2 - 7x - 18$	(c) $(x - 6)(x - 3)$
(4) $x^2 - 9x + 18$	(d) $(x + 6)(x - 3)$

Ans :

Group ‘ A’ Polynomial	Group ‘B’ Factors of polynomial
(1) $x^2 + 7x – 18$	(b) $(x + 9)(x - 2)$
(2) $x^2 + 3x – 18$	(d) $(x + 6)(x - 3)$
(3) $x^2 - 7x – 18$	(a) $(x – 9)(x + 2)$
(4) $x^2 - 9x + 18$	(c) $(x – 6)(x - 3)$

2.

Group ‘ A’	Group ‘B’
(1) $a^3 + b^3$	(a) trinomial
(2) $a^2 - b^2$	(b) $(a + b)(a^2 - ab + b^2)$
(3) $a^3 – b^3$	(c) $(a - b)(a^2 + ab + b^2)$
(4) $ax^2+bx + c$	(d) $(a + b)(a - b)$

Ans :

Group ‘ A’	Group ‘B’
(1) $a^3 + b^3$	(b) $(a + b)(a^2 - ab + b^2)$
(2) $a^2 - b^2$	(d) $(a + b)(a - b)$
(3) $a^3 – b^3$	(c) $(a - b)(a^2 + ab + b^2)$
(4) $ax^2 + bx + c$	(a) trinomial

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