

## Solutions for Class 9 Maths Chapter 5 Factorization of Algebraic Expressions

### Exercise 5.2

Factorize each of the following expressions:

**Question 1:  $p^3 + 27$**

**Solution:**

$$p^3 + 27$$

$$= p^3 + 3^3$$

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

$$= (p + 3)(p^2 - 3p - 9)$$

$$\text{Therefore, } p^3 + 27 = (p + 3)(p^2 - 3p - 9)$$

**Question 2:  $y^3 + 125$**

**Solution:**

$$y^3 + 125$$

$$= y^3 + 5^3$$

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

$$= (y+5)(y^2 - 5y + 5^2)$$

$$= (y + 5)(y^2 - 5y + 25)$$

$$\text{Therefore, } y^3 + 125 = (y + 5)(y^2 - 5y + 25)$$

**Question 3:  $1 - 27a^3$**

**Solution:**

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

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

$$= (1 - 3a)(1^2 + 1 \times 3a + (3a)^2)$$

$$= (1 - 3a)(1 + 3a + 9a^2)$$

$$\text{Therefore, } 1 - 27a^3 = (1 - 3a)(1 + 3a + 9a^2)$$

**Question 4:  $8x^3y^3 + 27a^3$**

**Solution:**

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$$8x^3y^3 + 27a^3$$

$$= (2xy)^3 + (3a)^3$$

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

$$= (2xy + 3a)((2xy)^2 - 2xy \times 3a + (3a)^2)$$

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

**Question 5:  $64a^3 - b^3$**

**Solution:**

$$64a^3 - b^3$$

$$= (4a)^3 - b^3$$

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

$$= (4a - b)((4a)^2 + 4a \times b + b^2)$$

$$= (4a - b)(16a^2 + 4ab + b^2)$$

**Question 6:  $x^3 / 216 - 8y^3$**

**Solution:**

$$x^3 / 216 - 8y^3$$

$$= \left(\frac{x}{6}\right)^3 - (2y)^3$$

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

$$= \left(\frac{x}{6} - 2y\right) \left(\left(\frac{x}{6}\right)^2 + \frac{x}{6} \times 2y + (2y)^2\right)$$

$$= \left(\frac{x}{6} - 2y\right) \left(\frac{x^2}{36} + \frac{xy}{3} + 4y^2\right)$$

$$\therefore \frac{x^3}{216} - 8y^3 = \left(\frac{x}{6} - 2y\right) \left(\frac{x^2}{36} + \frac{xy}{3} + 4y^2\right)$$

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**Question 7:  $10x^4 y - 10xy^4$**

**Solution:**

$$10x^4 y - 10xy^4$$

$$= 10xy(x^3 - y^3)$$

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

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

$$\text{Therefore, } 10x^4 y - 10xy^4 = 10xy (x-y)(x^2 + xy + y^2)$$

**Question 8:  $54x^6 y + 2x^3 y^4$**

**Solution:**

$$54x^6 y + 2x^3 y^4$$

$$= 2x^3 y(27x^3 + y^3)$$

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

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

$$= 2x^3 y \{(3x+y) ((3x)^2 - 3xy + y^2)\}$$

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

**Question 9:  $32a^3 + 108b^3$**

**Solution:**

$$32a^3 + 108b^3$$

$$= 4(8a^3 + 27b^3)$$

$$= 4((2a)^3 + (3b)^3)$$

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

$$= 4[(2a+3b)((2a)^2 - 2a \times 3b + (3b)^2)]$$

$$= 4(2a+3b)(4a^2 - 6ab + 9b^2)$$

## Solutions for Class 9 Maths Chapter 5 Factorization of Algebraic Expressions

**Question 10:**  $(a-2b)^3 - 512b^3$

**Solution:**

$$(a-2b)^3 - 512b^3$$

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

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

$$= (a - 2b - 8b) \{(a-2b)^2 + (a-2b)8b + (8b)^2\}$$

$$= (a - 10b)(a^2 + 4b^2 - 4ab + 8ab - 16b^2 + 64b^2)$$

$$= (a-10b)(a^2 + 52b^2 + 4ab)$$

**Question 11:**  $(a+b)^3 - 8(a-b)^3$

**Solution:**

$$(a+b)^3 - 8(a-b)^3$$

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

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

$$[\text{using } p^3 - q^3 = (p - q)(p^2 + pq + q^2)]$$

$$\text{Here } p = a+b \text{ and } q = 2a-2b$$

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

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

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

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

$$= (3b-a)(3a^2+2ab-b^2+4a^2+4b^2-8ab)$$

$$= (3b-a)(3a^2+4a^2-b^2+4b^2-8ab+2ab)$$

$$= (3b-a)(7a^2+3b^2-6ab)$$

## Solutions for Class 9 Maths Chapter 5 Factorization of Algebraic Expressions

**Question 12:**  $(x+2)^3 + (x-2)^3$

**Solution:**

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

$$[\text{using } p^3 + q^3 = (p + q)(p^2 - pq + q^2)]$$

$$\text{Here } p = x + 2 \text{ and } q = x - 2$$

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

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

$$[ \text{Using : } (a+b)(a-b) = a^2 - b^2 ]$$

$$= 2x(2x^2 + 8 - (x^2 - 2^2))$$

$$= 2x(2x^2 + 8 - x^2 + 4)$$

$$= 2x(x^2 + 12)$$