

## Exercise 2.10

**Factorize:**

**Q.1**  $3a(x + y) - 7b(x + y)$

Sol:  $= (x + y)(3a - 7b)$

**Q.2**  $ax + ay - x^2 - xy$

Sol:  $= (ax + ay) - (x^2 + xy)$

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

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

**Q.3**  $a^3 + a - 3a^2 - 3$

Sol:  $= (a^3 + a) - (3a^2 + 3)$

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

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

**Q.4**  $x^3 + y - xy - x$

Sol:  $= x^3 - x - xy + y$  (writing in order)

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

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

$$= (x - 1)[x(x + 1) - y]$$

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

**Q.5**  $3ax + 6ay - 8bx - 4bx$

Sol:  $= 3ax - 4bx + 6ay - 8by$  (writing in order)

$$= x(3a - 4b) + 2y(3a - 4b)$$

$$= (3a - 4b)(x + 2y)$$

**Q.6**  $2a^2 - bc - 2ab + ac$

Sol:  $= 2a^2 + ac - 2ab - bc$  (writing in order)

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

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

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

**Q.7**  $a(a - b + c) - bc$

Sol:  $= a^2 - ab + ca - bc$

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

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

**Q.8**  $8 - 4a - 2a^3 + a^4$

$$\begin{aligned}\text{Sol: } &= 4(2 - a) - a^3(2 - a) \\ &= (2 - a)(4 - a^3) \\ &= (4 - a^3)(2 - a)\end{aligned}$$

**Q.9**  $16x^2 - 24xa + 9a^2$

$$\begin{aligned}\text{Sol: } &= 16x^2 - 12xa - 12xa + 9a^2 \\ &= 4x(4x - 3a) - 3a(4x - 3a) \\ &= (4x - 3a)(4x - 3a) \\ &= (4x - 3a)^2\end{aligned}$$

**Q.10**  $1 - 14x + 49x^2$

$$\begin{aligned}\text{Sol: } &= (1)^2 - 2(1)(7x) + (7x)^2 \\ &= (1 - 7x)^2\end{aligned}$$

**Q.11**  $20x^2 + 5 - 20x$

$$\begin{aligned}\text{Sol: } &= 20x^2 - 20x + 5 \\ &= 5[4x^2 - 4x + 1] \\ &= 5[(2x)^2 - 2(2x)(1) + (1)^2] \\ &= 5(2x - 1)^2\end{aligned}$$

**Q.12**  $2a^3b + 2ab^3 - 4a^2b^2$

$$\begin{aligned}\text{Sol: } &= 2ab[a^2 + b^2 - 2ab] \\ &= 2ab[a^2 - 2ab + b^2] \\ &= 2ab[(a)^2 - 2(a)(b) + (b)^2] \\ &= 2ab(a - b)^2\end{aligned}$$

**Q.13**  $x^2 + x + \frac{1}{4}$

$$\begin{aligned}\text{Sol: } &= (x)^2 + 2(x)\left(\frac{1}{2}\right) + \left(\frac{1}{2}\right)^2 \\ &= \left(x + \frac{1}{2}\right)^2\end{aligned}$$

**Q.14**  $x^2 + \frac{1}{x^2} - 2$

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

**Q.15**  $5x^3 - 30x^2 + 45x$

Sol:  $= 5x[x^2 - 6x + 9]$   
 $= 5x[(x)^2 - 2(x)(3) + (3)^2]$   
 $= 5x(x - 3)^2$

**Q.16**  $a^2 + b^2 + 2ab + 2bc + 2ac$

Sol:  $= (a^2 + 2ab + b^2) + 2ac + 2bc$   
 $= [(a)^2 + 2(a)(b) + (b)^2] + 2c(a + b)$   
 $= (a + b)^2 + 2c(a + b)$   
 $= (a + b)[(a + b) + 2c]$   
 $= (a + b)(a + b + 2c)$

### Exercise 2.2

*Resolve into factors.*

**Q.1**  $x^2 + 2xy + y^2 - a^2$

Sol:  $= (x^2 + 2xy + y^2) - a^2$   
 $= [(x)^2 + 2(x)(y) + (y)^2] - (a)^2$   
 $= (x + y)^2 - (a)^2$   
 $= (x + y + a)(x + y - a)$

**Q.2**  $4a^2 - 4ab + b^2 - 9c^2$

Sol:  $= (4a^2 - 4ab + b^2) - 9c^2$   
 $= [(2a)^2 - 2(2a)(b) + (b)^2] - (3c)^2$