

Exercise 5.1**Q. 1: Factorize**

- (i) $2abc - 4abx + 2abd = 2ab(c - 2x + d)$
- (ii) $9xy - 12x^2y + 18y^2 = 3y(3x - 4x^2 + 6y)$
- (iii) $-3x^2y - 3x + 9xy^2 = -3x(xy + 1 - 3y^2)$
- (iv) $5ab^2c^3 - 10a^2b^3c - 20a^3bc^2 = 5abc(bc^2 - 2ab^2 - 4a^2c)$
- (v) $3x^3y(x - 3y) - 7x^2y^2(x - 3y) = x^2y(x - 3y)(3x - 7y)$
- (vi) $2xy^3(x^2 + 5) + 8xy^2(x^2 + 5) = 2xy^2(x^2 + 5)(y + 4)$

Q. 2:

- (i) $5ax - 3ay - 5bx + 3by = a(5x - 3y) - b(5x - 3y)$
 $= (5x - 3y)(a - b)$
- (ii) $3xy + 2y - 12x - 8 = y(3x + 2) - 4(3x + 2)$
 $= (3x + 2)(y - 4)$
- (iii) $x^3 + 3xy^2 - 2x^2y - 6y^3 = x(x^2 + 3y^2) - 2y(x^2 + 3y^2)$
 $= (x^2 + 3y^2)(x - 2y)$
- (iv) $(x^2 - y^2)z + (y^2 - z^2)x = x^2z - y^2z + xy^2 - xz^2$
 $= x^2z - xz^2 + xy^2 - y^2z$
 $= xz(x - z) + y^2(x - z)$
 $= (x - z)(xz + y^2)$

Q. 3:

- (i) $144a^2 + 24a + 1 = (12a)^2 + 2(12a)(1) + (1)^2$
 $= (12a + 1)^2$
- (ii) $\frac{a^2}{b^2} - 2 + \frac{b^2}{a^2} = \left(\frac{a}{b}\right)^2 - 2\left(\frac{a}{b}\right)\left(\frac{b}{a}\right) + \left(\frac{b}{a}\right)^2$
 $= \left(\frac{a}{b} - \frac{b}{a}\right)^2$
- (iii) $(x + y)^2 - 14z(x + y) + 49z^2 = (x + y)^2 - 2(x + y)(7z) + (7z)^2$
 $= (x + y - 7z)^2$
- (iv) $12x^2 - 36x + 27 = 3[4x^2 - 12x + 9]$
 $= 3[(2x)^2 - 2(3x)(3) + (3)^2]$
 $= 3(2x - 3)^2$

Q. 4:

- (i) $3x^2 - 75y^2 = 3[x^2 - 25y^2]$
 $= 3[(x)^2 - (5y)^2]$
 $= 3(x - 5y)(x + 5y)$
- (ii) $x(x - 1) - y(y - 1) = x^2 - x - y^2 + y$
 $= x^2 - y^2 - x + y$
 $= (x - y)(x + y) - 1(x - y)$
 $= (x - y)(x + y - 1)$
- (iii) $128am^2 - 242an^2 = 2a[64m^2 - 121n^2]$
 $= 2a[(8m)^2 - (11n)^2]$

$$(iv) \quad 3x - 243x^3$$

$$\begin{aligned} &= 2a(8m - 11n)(8m + 11n) \\ &= 3x[1 - 81x^2] \\ &= 3x[(1)^2 - (9x)^2] \\ &= 3x(1 - 9x)(1 + 9x) \end{aligned}$$

Q. 5:

$$(i) \quad x^2 - y^2 - 6y - 9$$

$$\begin{aligned} &= x^2 - (y^2 + 6y + 9) \\ &= x^2 - ((y)^2 + 2(y)(3) + (3)^2) \\ &= x^2 - (y + 3)^2 \\ &= (x - (y + 3))(x + (y + 3)) \\ &= (x - y - 3)(x + y + 3) \end{aligned}$$

$$(ii) \quad x^2 - a^2 + 2a - 1$$

$$\begin{aligned} &= x^2 - (a^2 - 2a + 1) \\ &= x^2 - ((a)^2 - 2(a)(1) + (1)^2) \\ &= x^2 - (a - 1)^2 \end{aligned}$$

$$(iii) \quad 4x^2 - y^2 - 2y - 1$$

$$\begin{aligned} &= (x - (a - 1))(x + (a - 1)) \\ &= (x - a + 1)(x + a - 1) \\ &= (2x)^2 - (y^2 + 2y + 1) \\ &= (2x)^2 - ((y)^2 + 2(y)(1) + (1)^2) \\ &= (2x)^2 - (y + 1)^2 \\ &= (2x - (y + 1))(2x + (y + 1)) \\ &= (2x - y - 1)(2x + y + 1) \end{aligned}$$

$$(iv) \quad x^2 - y^2 - 4x - 2y + 3$$

$$\begin{aligned} &= x^2 - y^2 - 4x - 2y + 4 - 1 \\ &= x^2 - 4x + 4 - y^2 - 2y - 1 \\ &= (x^2 - 4x + 4) - (y^2 + 2y + 1) \\ &= ((x)^2 - 2(x)(2) + (2)^2) - ((y)^2 + 2(y)(1) + (1)^2) \\ &= (x - 2)^2 - (y + 1)^2 \\ &= (x - 2 - (y + 1))(x - 2 + (y + 1)) \\ &= (x - 2 - y - 1)(x - 2 + y + 1) \\ &= (x - y - 3)(x + y - 1) \end{aligned}$$

$$(v) \quad 25x^2 - 10x + 1 - 36z^2$$

$$\begin{aligned} &= (25x^2 - 10x + 1) - (6z)^2 \\ &= ((5x)^2 - 2(5x)(1) + (1)^2) - (6z)^2 \\ &= (5x - 1)^2 - (6z)^2 \\ &= (5x - 1 - 6z)(5x - 1 + 6z) \end{aligned}$$

$$(vi) \quad x^2 - y^2 - 4xz + 4z^2$$

$$\begin{aligned} &= x^2 - 4xz + 4z^2 - y^2 \\ &= (x^2 - 4xz + 4z^2) - (y)^2 \\ &= ((x)^2 - 2(x)(2z) + (2z)^2) - (y)^2 \\ &= (x - 2z)^2 - (y)^2 \\ &= (x - 2z - y)(x - 2z + y) \\ &= (x - y - 2z)(x + y - 2z) \end{aligned}$$