

Exercise-3.6

① Factorise the following:

(i) $x^2 + 10x + 24$

(ii) $z^2 + 4z - 12$

(iii) $p^2 - 6p - 16$

(iv) $t^2 + 72 - 17t$

(v) $y^2 - 16y - 80$

(vi) $a^2 + 10a - 600$

⇒ (i) $x^2 + 10x + 24$

$$= x^2 + (6+4)x + 24$$

$$= x^2 + 6x + 4x + 24$$

$$= x(x+6) + 4(x+6)$$

$$= (x+6)(x+4)$$

(ii) $z^2 + 4z - 12$

$$= z^2 + 6z - 2z - 12$$

$$= z(z+6) - 2(z+6)$$

$$= (z+6)(z-2)$$

(iii) $p^2 - 6p - 16$

$$= p^2 - 8p + 2p - 16$$

$$= p(p-8) + 2(p-8)$$

$$= (p-8)(p+2)$$

(iv) $t^2 + 72 - 17t$

$$= t^2 - 17t + 72$$

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

$$= t(t-9) - 8(t-9)$$

$$= (t-9)(t-8)$$

(v) $y^2 - 16y - 80$

$$= y^2 - (20-4)y - 80$$

$$= y^2 - 20y + 4y - 80$$

$$= y(y-20) + 4(y-20)$$

$$= (y-20)(y+4)$$

(vi) $a^2 + 10a - 600$

$$= a^2 + (30-20)a - 600$$

$$= a^2 + 30a - 20a - 600$$

$$= a(a+30) - 20(a+30)$$

$$= (a+30)(a-20)$$

② Factorise the following:-

(i) $2a^2 + 9a + 10$

(ii) $5x^2 - 29xy - 42y^2$

(iii) $9 - 18x + 8x^2$

(iv) $6x^2 + 6xy + 8y^2$

(v) $12x^2 + 36xy + 27y^2$

(vi) $(a+b)^2 + 9(a+b) + 18$

⇒ (i) $2a^2 + 9a + 10$

$$= 2a^2 + 5a + 4a + 10$$

$$= a(2a+5) + 2(2a+5)$$

$$= (2a+5)(a+2)$$

(ii) $5x^2 - 29xy - 42y^2$

$$= 5x^2 - 35xy + 6xy - 42y^2$$

$$= 5x(x-7y) + 6y(x-7y)$$

$$= (5x-7y)(5x+6y)$$

$$= (x-7y)(5x+6y)$$

$$\begin{aligned}
 \text{(iii)} \quad & 9 - 18x + 8x^2 \\
 & = \cancel{9 - 9x - 8x + 8x^2} \\
 & = 9 - 12x - 6x + 8x^2 \\
 & = 8x^2 - 6x - 12x + 9 \\
 & = 2x(4x - 3) - 3(4x - 3) \\
 & = (4x - 3)(2x - 3) \\
 & = (2x - 3)(4x - 3)
 \end{aligned}$$

$$\begin{aligned}
 \text{(iv)} \quad & 6x^2 + 16xy + 8y^2 \\
 & = 6x^2 + 12xy + 4xy + 8y^2 \\
 & = 6x(x + 2y) + 4y(x + 2y) \\
 & = (x + 2y)(6x + 4y) \\
 & = 2(3x + 2y)(x + 2y)
 \end{aligned}$$

$$\begin{aligned}
 \text{(v)} \quad & 12x^2 + 36x^2y + 27y^2x^2 \\
 & = 3x^2(4 + 12y + 9y^2) \\
 & = 3x^2(9y^2 + 12y + 4) \\
 & = \cancel{3x^2(9y^2 + 12y + 4)} \\
 & = 3x^2\{(3y)^2 + 2 \cdot 3y \cdot 2 + (2)^2\} \\
 & = 3x^2(3y + 2)^2
 \end{aligned}$$

$$\begin{aligned}
 \text{(vi)} \quad & (a+b)^2 + 9(a+b) + 18 \\
 & = (a+b)^2 + 6(a+b) + 3(a+b) + 18 \\
 & = (a+b)(a+b+6) + 3((a+b)+6) \\
 & = (a+b+6)(a+b+3)
 \end{aligned}$$

③ Factorise the following!

(i) $(p-q)^2 - 6(p-q) - 16$ (ii) $m^2 + 2mn - 24n^2$

(iii) $\sqrt{5}a^2 + 2a - 3\sqrt{5}$ (iv) $a^4 - 3a^2 + 2$ (v) $8m^3 - 2m^2n - 15mn^2$

(vi) $\frac{1}{x^2} + \frac{1}{y^2} + \frac{2}{xy}$

$$\begin{aligned}
 \Rightarrow \text{(i)} \quad & (p-q)^2 - 6(p-q) - 16 \\
 & = (p-q)^2 - 8(p-q) + 2(p-q) - 16 \\
 & = (p-q)\{(p-q) - 8\} + 2\{(p-q) - 8\} \\
 & = (p-q-8)(p-q+2)
 \end{aligned}$$

$$\begin{aligned}
 \text{(ii)} \quad & m^2 + 2mn - 24n^2 \\
 & = m^2 + 6mn - 4mn - 24n^2 \\
 & = m(m+6n) - 4n(m+6n) \\
 & = (m+6n)(m-4n)
 \end{aligned}$$