

Factorise the following (1 to 11) polynomials:

Question 1.

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

(ii) $z^2 + 10z + 24$

Solution:

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

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

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

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

(ii) $z^2 + 10z + 24$

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

$$= z(z + 6) + 4(z + 6)$$

$$= (z + 6)(z + 4)$$

Question 2.

(i) $y^2 - 7y + 12$

(ii) $m^2 - 23m + 42$

Solution:

(i) $y^2 - 7y + 12$

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

$$\{\because 12 = -3 \times (-4)$$

$$- 7 = -3 - 4\}$$

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

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

(ii) $m^2 - 23m + 42$

$$= m^2 - 2m - 21m + 42$$

$$\{\because 42 = -2 \times (-21)$$

$$- 23 = -2 - 21\}$$

$$= m(m - 2) - 21(m - 2)$$

$$= (m - 2)(m - 21)$$

Question 3.

(i) $y^2 - 5y - 24$,

(ii) $t^2 + 23t - 108$

Solution:

(i) $y^2 - 5y - 24$

$$= y^2 - 8y + 3y - 24$$

$$= y(y - 8) + 3(y - 8)$$

$$= (y - 8)(y + 3)$$

(ii) $t^2 + 23t - 108$

$$= t^2 + 27t - 4t - 108$$

$$= t(t + 27) - 4(t + 27)$$

$$= (t + 27)(t - 4)$$

Question 4.

(i) $3x^2 + 14x + 8$,

(ii) $3y^2 + 10y + 8$

Solution:

(i) $3x^2 + 14x + 8$

$$= 3x^2 + 12x + 2x + 8$$

$$= 3x(x + 4) + 2(x + 4)$$

$$= (x + 4)(3x + 2)$$

(ii) $3y^2 + 10y + 8$

$$= 3y^2 + 6y + 4y + 8$$

$$= 3y(y + 2) + 4(y + 2)$$

$$= (y + 2)(3y + 4)$$

Question 5.

(i) $14x^2 - 23x + 8$,

(ii) $12x^2 - x - 35$

Solution:

(i) $14x^2 - 23x + 8$

$$= 14x^2 - 16x - 7x + 8$$

$$= 2x(7x - 8) - 1(7x - 8)$$

$$= (7x - 8)(2x - 1)$$

(ii) $12x^2 - x - 35$

$$= 12x^2 - 21x + 20x - 35$$

$$= 3x(4x - 7) + 5(4x - 7)$$

$$= (4x - 7)(3x + 5)$$

Question 6.

(i) $6x^2 + 11x - 10$

(ii) $5 - 4x - 12x^2$

Solution:

$$\begin{aligned} \text{(i)} \quad & 6x^2 + 11x - 10 \\ &= 6x^2 + 15x - 4x - 10 \\ &= 3x(2x + 5) - 2(2x + 5) \\ &= (2x + 5)(3x - 2) \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & 5 - 4x - 12x^2 \\ &= 5 - 10x + 6x - 12x^2 \\ &= 5(1 - 2x) + 6x(1 - 2x) \\ &= (1 - 2x)(5 + 6x) \end{aligned}$$

Question 7.

$$\begin{aligned} \text{(i)} \quad & 1 - 18y - 63y^2, \\ \text{(ii)} \quad & 3x^2 - 5xy - 12y^2 \end{aligned}$$

Solution:

$$\begin{aligned} \text{(i)} \quad & 1 - 18y - 63y^2 \\ &= 1 - 21y + 3y - 63y^2 \\ &= 1(1 - 21y) + 3y(1 - 21y) \\ &= (1 - 21y)(1 + 3y) \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & 3x^2 - 5xy - 12y^2 \\ &= 3x^2 - 9xy + 4xy - 12y^2 \\ &= 3x(x - 3y) + 4y(x - 3y) \\ &= (x - 3y)(3x + 4y) \end{aligned}$$

Question 8.

$$\begin{aligned} \text{(i)} \quad & x^2 - 3xy - 40y^2 \\ \text{(ii)} \quad & 10p^2q^2 - 21pq + 9 \end{aligned}$$

Solution:

$$\begin{aligned} \text{(i)} \quad & x^2 - 3xy - 40y^2 \\ &= x^2 - 8xy + 5xy - 40y^2 \\ &= x(x - 8y) + 5y(x - 8y) \\ &= (x - 8y)(x + 5y) \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & 10p^2q^2 - 21pq + 9 \\ &= 10p^2q^2 - 15pq - 6pq + 9 \\ &= 5pq(2pq - 3) - 3(2pq - 3) \\ &= (2pq - 3)(5pq - 3) \end{aligned}$$

Question 9.

$$\begin{aligned} \text{(i)} \quad & 2a^2b^2 + ab - 45 \\ \text{(ii)} \quad & x(12x + 7) - 10 \end{aligned}$$

Solution:

$$\begin{aligned} \text{(i)} \quad & 2a^2b^2 + ab - 45 \\ & 2a^2b^2 + 10ab - 9ab - 45 \\ &= 2ab(ab + 5) - 9(ab + 5) \\ &= (ab + 5)(2ab - 9) \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & x(12x + 7) - 10 \\ &= 12x^2 + 7x - 10 \\ &= 12x^2 + 15x - 8x - 10 \\ &= 3x(4x + 5) - 2(4x + 5) \\ &= (4x + 5)(3x - 2) \end{aligned}$$

Question 10.

$$\begin{aligned} \text{(i)} \quad & (a + b)^2 - 11(a + b) - 42 \\ \text{(ii)} \quad & 8 + 6(p + q) - 5(p + q) \end{aligned}$$

Solution:

(i) $(a + b)^2 - 11(a + b) - 42$

Let $(a + b) = x$, then

$$x^2 - 11x - 42$$

$$x^2 - 14x + 3x - 42 \{ \because -42 = -14 \times 3$$

$$-11 = -14 + 3 \}$$

$$x(x - 14) + 3(x - 14)$$

$$(x - 14)(x + 3)$$

Substituting the value of

$$x = (a + b - 14)(a + b + 3)$$

(ii) $8 + 6(p + q) - 5(p + q)^2$

Let $p + q = x$, then

$$8 + 6x - 5x^2 = -5x^2 + 6x + 8$$

$$= -(5x^2 - 6x - 8)$$

$$= [5x^2 - 10x + 4x - 8]$$

$$\{ \because 5 \times (-8) = 40$$

$$\therefore -40 = -10 \times 4$$

$$-6 = -10 + 4 \}$$

$$= (x - 2)(5x + 4)$$

Substituting the value of x , then

$$= -(p + q - 2)(5p + 5q + 4)$$

$$= (4 + 5p + 5q)(-p - q + 2)$$

$$= (4 + 5p + 5q)(2 - p - q)$$

Question 11.

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

(ii) $7 + 10(2x - 3y) - 8(2x - 3y)^2$

Solution:

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

Let $x - 2y = z$

Then, $(x - 2y)^2 - 6(x - 2y) + 5$

$$= z^2 - 6z + 5$$

$$\therefore z^2 - 6z + 5 = z^2 - 5z - z + 5$$

$$= z(z - 5) - 1(z - 5)$$

$$= (z - 5)(z - 1)$$

Substituting $z = x - 2y$, we get,

$$= [(x - 2y) - 5] [(x - 2y) - 1]$$

$$= (x - 2y - 5)(x - 2y - 1)$$

(ii) $7 + 10(2x - 3y) - 8(2x - 3y)^2$

Let $2x - 3y = z$

Then, $7 + 10(2x - 3y) - 8(2x - 3y)^2$

$$= 7 + 10z - 8z^2$$

$$\therefore 7 + 10z - 8z^2 = 7 + 14z - 4z - 8z^2$$

$$= 7(1 + 2z) - 4z(1 + 2z)$$

$$= (1 + 2z)(7 - 4z)$$

Substituting $z = 2x - 3y$, we get,

$$= [(1 + 2(2x - 3y))][7 - 4(2x - 3y)]$$

$$= (1 + 4x - 6y)(7 - 8x + 12y)$$