

### Exercise 11.1

Factorise the following (1 to 8) polynomials:

1. (i)  $8xy^3 + 12x^2y^2$

(ii)  $15ax^3 - 9ax^2$

**Solution:**

(i)  $8xy^3 + 12x^2y^2 = 4xy^2(2y + 3x)$

(ii)  $15ax^3 - 9ax^2 = 3ax^2(5x - 3)$

2. (i)  $21py^2 - 56py$

(ii)  $4x^3 - 6x^2$

**Solution:**

(i)  $21py^2 - 56py = 7py(3y - 8)$

(ii)  $4x^3 - 6x^2 = 2x^2(2x - 3)$

3. (i)  $25abc^2 - 15a^2b^2c$

(ii)  $x^2yz + xy^2z + xyz^2$

**Solution:**

(i)  $25abc^2 - 15a^2b^2c = 5abc(5c - 3ab)$

(ii)  $x^2yz + xy^2z + xyz^2 = xyz(x + y + z)$

4. (i)  $8x^3 - 6x^2 + 10x$

(ii)  $14mn + 22m - 62p$

**Solution:**

(i)  $8x^3 - 6x^2 + 10x = 2x(4x^2 - 3x + 5)$

(ii)  $14mn + 22m - 62p = 2(7mn + 11m - 31p)$

5. (i)  $18p^2q^2 - 24pq^2 + 30p^2q$

(ii)  $27a^3b^3 - 18a^2b^3 + 75a^3b^2$

**Solution:**

(i)  $18p^2q^2 - 24pq^2 + 30p^2q$   
 $= 6pq(3pq - 4q + 5p)$

(ii)  $27a^3b^3 - 18a^2b^3 + 75a^3b^2$   
 $= 3a^2b^2(9ab - 6b + 25a)$

6. (i)  $15a(2p - 3p) - 106(2p - 3q)$

(ii)  $3a(x^2 + y^2) + 6b(x^2 + y^2)$

**Solution:**



**ML Aggarwal Solutions for Class 8 Maths**  
**Chapter 11: Factorisation**

$$\begin{aligned} \text{(i)} \quad & 15a(2p - 3q) - 10b(2p - 3q) \\ &= (2p - 3q)(15a - 10b) \\ &= (2p - 3q)(5)(3a - 2b) \\ &= 5(2p - 3q)(3a - 2b) \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & 3a(x^2 + y^2) + 66(x^2 + y^2) \\ &= (x^2 + y^2)(3a + 66) \\ &= (x^2 + y^2)(3)(a + 22) \\ &= 3(x^2 + y^2)(a + 22) \end{aligned}$$

**7. (i)  $6(x + 2y)^3 + 8(x + 2y)^2$**

**(ii)  $14(a - 3b)^3 - 21p(a - 3b)$**

**Solution:**

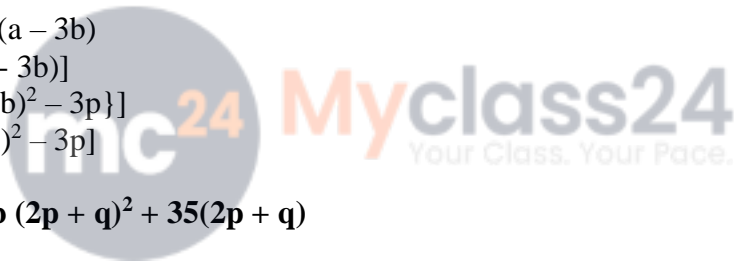
$$\begin{aligned} \text{(i)} \quad & 6(x + 2y)^3 + 8(x + 2y)^2 \\ &= (x + 2y)^2 [6(x + 2y) + 8] \\ &= (x + 2y)^2 [6x + 12y + 8] \\ &= (x + 2y)^2 (2)(3x + 6y + 4) \\ &= 2(x + 2y)^2 (3x + 6y + 4) \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & 14(a - 3b)^3 - 21p(a - 3b) \\ &= 7 [2(a - 3b)^3 - 3p(a - 3b)] \\ &= 7 [(a - 3b) \{2(a - 3b)^2 - 3p\}] \\ &= 7(a - 3b) [2(a - 3b)^2 - 3p] \end{aligned}$$

**8.  $10a(2p + q)^3 - 15b(2p + q)^2 + 35(2p + q)$**

**Solution:**

$$\begin{aligned} & 10a(2p + q)^3 - 15b(2p + q)^2 + 35(2p + q) \\ &= 5 [2a(2p + q)^3 - 3b(2p + q)^2 + 7(2p + q)] \\ &= 5(2p + q) [2a(2p + q)^2 - 3b(2p + q) + 7] \end{aligned}$$



## Exercise 11.2

Factorise the following (1 to 11) polynomials:

1. (i)  $x^2 + xy - x - y$   
(ii)  $y^2 - yz - 5y + 5z$

**Solution:**

$$\begin{aligned} \text{(i)} \quad & x^2 + xy - x - y \\ &= x(x + y) - 1(x + y) \\ &= (x + y)(x - 1) \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & y^2 - yz - 5y + 5z \\ &= y(y - z) - 5(y - z) \\ &= (y - z)(y - 5) \end{aligned}$$

2. (i)  $5xy + 7y - 5y^2 - 7x$   
(ii)  $5p^2 - 8pq - 10p + 16q$

**Solution:**

$$\begin{aligned} \text{(i)} \quad & 5xy + 7y - 5y^2 - 7x \\ &= 5xy - 5y^2 + 7y - 7x \\ &= 5y(x - y) - 7(x - y) \\ &= (x - y)(5y - 7) \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & 5p^2 - 8pq - 10p + 16q \\ &= 5p^2 - 10p - 8pq + 16q \\ &= 5p(p - 2) - 8q(p - 2) \\ &= (p - 2)(5p - 8q) \\ &= (5p - 8q)(p - 2) \end{aligned}$$

3. (i)  $a^2b - ab^2 + 3a - 3b$   
(ii)  $x^3 - 3x^2 + x - 3$

**Solution:**

$$\begin{aligned} \text{(i)} \quad & a^2b - ab^2 + 3a - 3b \\ &= ab(a - b) + 3(a - b) = (a - b)(ab + 3) \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & x^3 - 3x^2 + x - 3 \\ &= x^2(x - 3) + 1(x - 3) \\ &= (x - 3)(x^2 + 1) \end{aligned}$$

4. (i)  $6xy^2 - 3xy - 10y + 5$   
(ii)  $3ax - 6ay - 8by + 4bx$

**Solution:**

$$\text{(i)} \quad 6xy^2 - 3xy - 10y + 5$$

# ML Aggarwal Solutions for Class 8 Maths

## Chapter 11: Factorisation

$$3xy(2y - 1) - 5(2y - 1) \\ = (2y - 1)(3xy - 5)$$

$$(ii) 3ax - 6ay - 8by + 4bx \\ = 3ax - 6ay + 4bx - 8by \\ = 3a(x - 2y) + 4b(x - 2y) \\ = (x - 2y)(3a + 4b)$$

**5. (i)  $x^2 + xy(1 + y) + y^3$**

**(ii)  $y^2 - xy(1 - x) - x^3$**

**Solution:**

$$(i) x^2 + xy(1 + y) + y^3 \\ = x^2 + xy + xy^2 + y^3 \\ = x(x + y) + y^2(x + y) \\ = (x + y)(x + y^2)$$

$$(ii) y^2 - xy(1 - x) - x^3 \\ = y^2 - xy + x^2y - x^3 \\ = y(y - x) + x^2(y - x) \\ = (y - x)(y + x^2)$$

**6. (i)  $ab^2 + (a - 1)b - 1$**

**(ii)  $2a - 4b - xa + 2bx$**

**Solution:**

$$(i) ab^2 + (a - 1)b - 1 \\ = ab^2 + ab - b - 1 \\ = ab(b + 1) - 1(b + 1) \\ = (b + 1)(ab - 1)$$

$$(ii) 2a - 4b - xa + 2bx \\ = 2(a - 2b) - x(a - 2b) \\ = (a - 2b)(2 - x)$$

**7. (i)  $5ph - 10qk + 2rph - 4qrk$**

**(ii)  $x^2 - x(a + 2b) + 2ab$**

**Solution:**

$$(i) 5ph - 10qk + 2rph - 4qrk \\ = 5(ph - 2qk) + 2r(ph - 2qk) \\ = (ph - 2qk)(5 + 2r)$$

$$(ii) x^2 - x(a + 2b) + 2ab \\ = x^2 - xa - 2bx + 2ab \\ = x(x - a) - 2b(x - a)$$



**ML Aggarwal Solutions for Class 8 Maths**  
**Chapter 11: Factorisation**

$$= (x - a)(x - 2b)$$

**8. (i)  $ab(x^2 + y^2) - xy(a^2 + b^2)$**

**(ii)  $(ax + by)^2 + (bx - ay)^2$**

**Solution:**

$$\begin{aligned} \text{(i) } & ab(x^2 + y^2) - xy(a^2 + b^2) \\ &= abx^2 + aby^2 - a^2xy - b^2xy \\ &= (abx^2 - b^2xy) + (aby^2 - a^2xy) \\ &= bx(ax - by) - ay(ax - by) \\ &= (ax - by)(bx - ay) \end{aligned}$$

$$\begin{aligned} \text{(ii) } & (ax + by)^2 + (bx - ay)^2 \\ &= (a^2x^2 + b^2y^2 + 2abxy) + (b^2x^2 + a^2y^2 - 2abxy) \\ &= a^2x^2 + b^2y^2 + 2abxy + b^2x^2 + a^2y^2 - 2abxy \\ &= a^2x^2 + b^2y^2 + b^2x^2 + a^2y^2 \\ &= a^2x^2 + a^2y^2 + b^2x^2 + b^2y^2 \\ &= a^2(x^2 + y^2) + b^2(x^2 + y^2) \\ &= (a^2 + b^2)(x^2 + y^2) \end{aligned}$$

**9. (i)  $a^3 + ab(1 - 2a) - 2b^2$**

**(ii)  $3x^2y - 3xy + 12x - 12$**

**Solution:**

$$\begin{aligned} \text{(i) } & a^3 + ab - 2a^2b - 2b^2 \\ &= a^3 + ab - 2a^2b - 2b^2 \\ &= a(a^2 + b) - 2b(a^2 + b) \\ &= (a^2 + b)(a - 2b) \end{aligned}$$

$$\begin{aligned} \text{(ii) } & 3x^2y - 3xy + 12x - 12 \\ &= 3(x^2y - xy + 4x - 4) \\ &= 3[xy(x - 1) + 4(x - 1)] \\ &= 3(x - 1)(xy + 4) \end{aligned}$$

**10. (i)  $a^2b + ab^2 - abc - b^2c + axy + bxy$**

**(ii)  $ax^2 - bx^2 + ay^2 - by^2 + az^2 - bz^2$**

**Solution:**

$$\begin{aligned} \text{(i) } & a^2b + ab^2 - abc - b^2c + axy + bxy \\ &= ab(a + b) - bc(a + b) + xy(a + b) \\ &= (a + b)(ab - bc + xy) \end{aligned}$$

$$\begin{aligned} \text{(ii) } & ax^2 - bx^2 + ay^2 - by^2 + az^2 - bz^2 \\ &= x^2(a - b) + y^2(a - b) + z^2(a - b) \\ &= (a - b)(x^2 + y^2 + z^2) \end{aligned}$$



**ML Aggarwal Solutions for Class 8 Maths**  
**Chapter 11: Factorisation**

**11. (i)  $x - 1 - (x - 1)^2 + ax - a$**

**(ii)  $ax + a^2x + aby + by - (ax + by)^2$**

**Solution:**

$$\begin{aligned} \text{(i) } & x - 1 - (x - 1)^2 + ax - a \\ &= (x - 1) - (x - 1)^2 + a(x - 1) \\ &= (x - 1) [1 - (x - 1) + a] \\ &= (x - 1) (1 - x + 1 + a) \\ &= (x - 1) (2 - x + a) \end{aligned}$$

$$\begin{aligned} \text{(ii) } & ax + a^2x + aby + by - (ax + by)^2 \\ &= (ax + by) + (a^2x + aby) - (ax + by)^2 \\ &= (ax + by) + a(ax + by) - (ax + by)^2 \\ &= (ax + by) [1 + a - (ax + by)] \\ &= (ax + by) (1 + a - ax - by) \end{aligned}$$



### Exercise 11.3

1. Factorise the following expressions using algebraic identities:

(i)  $x^2 - 12x + 36$

(ii)  $36p^2 - 60pq + 25q^2$

(iii)  $9y^2 + 66xy + 121y^2$

(iv)  $a^4 + 6a^2b^2 + 9b^4$

(v)  $x^2 + 1/x^2 + 2$

(vi)  $x^2 + x + 1/4$

**Solution:**

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

(i)  $y^2 - 12x + 36$

$= (x)^2 - 2 \times x \times 6 + (6)^2$

$= (x - 6)^2$

(ii)  $36p^2 - 60pq + 25q^2$

$= (6p)^2 - 2 \times 6p \times 5q + (5q)^2$

$= (6p - 5q)^2$

(iii)  $9x^2 + 66xy + 121y^2$

$= (3x)^2 + 2 \times 3x \times 11y + (11y)^2$

$= (3x + 11y)^2$

(iv)  $a^4 + 6a^2b^2 + 9b^4$

$= (a^2)^2 + 2 \times a^2 \times 3b^2 + (3b^2)^2$

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

(v)  $x^2 + 1/x^2 + 2$

$= (x)^2 + 2 \times x \times 1/x + (1/x)^2$

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

(vi)  $x^2 + x + 1/4$

$= (x)^2 + 2 \times x \times 1/2 + (1/2)^2$

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

Factorise the following (2 to 13) expressions:

2. (i)  $4p^2 - 9$

(ii)  $4x^2 - 169y^2$

**Solution:**

(i)  $4p^2 - 9$

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

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

(ii)  $4x^2 - 169y^2$

**ML Aggarwal Solutions for Class 8 Maths**  
**Chapter 11: Factorisation**

$$= (2x)^2 - (13y)^2 \\ = (2x + 13y)(2x - 13y)$$

**3. (i)  $9x^2y^2 - 25$**

**(ii)  $16x^2 - 1/144$**

**Solution:**

$$(i) 9x^2y^2 - 25 \\ = (3xy)^2 - (5)^2 \\ = (3xy + 5)(3xy - 5)$$

$$(ii) 16x^2 - 1/144 \\ = (4x)^2 - (1/12)^2 \\ = (4x + 1/12)(4x - 1/12)$$

**4. (i)  $20x^2 - 45y^2$**

**(ii)  $9/16 - 25a^2b^2$**

**Solution:**

$$(i) 20x^2 - 45y^2 \\ = 5(4x^2 - 9y^2) \\ = 5[(2x)^2 - (3y)^2] \\ = 5(2x + 3y)(2x - 3y)$$

$$(ii) 9/16 - 25a^2b^2 \\ = (3/4)^2 - (5ab)^2 \\ = (3/4 + 5ab)(3/4 - 5ab)$$



**5. (i)  $(2a + 3b)^2 - 16c^2$**

**(ii)  $1 - (b - c)^2$**

**Solution:**

$$(i) (2a + 3b)^2 - 16c^2 \\ = (2a + 3b)^2 - (4c)^2 \\ = (2a + 3b + 4c)(2a + 3b - 4c)$$

$$(ii) 1 - (b - c)^2 \\ = (1)^2 - (b - c)^2 \\ = [1 + b - c][1 - (b - c)] \\ = (1 + b - c)(1 - b + c)$$

**6. (i)  $9(x + y)^2 - x^2$**

**(ii)  $(2m + 3n)^2 - (3m + 2n)^2$**

**Solution:**

$$(i) 9(x + y)^2 - x^2$$

**ML Aggarwal Solutions for Class 8 Maths**  
**Chapter 11: Factorisation**

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

$$\begin{aligned} \text{(ii)} & (2m + 3n)^2 - (3m + 2n)^2 \\ &= (4m^2 + 9n^2 + 12mn) - (9m^2 + 4n^2 + 12mn) \\ &= 4m^2 + 9n^2 + 12mn - 9m^2 - 4n^2 - 12mn \\ &= 4m^2 + 9n^2 - 9m^2 - 4n^2 \\ &= -5m^2 + 5n^2 \\ &= 5(n^2 - m^2) \\ &= 5(m+n)(n-m) \end{aligned}$$

**7. (i)  $25(a+b)^2 - 16(a-b)^2$**

**(ii)  $9(3x+2)^2 - 4(2x-1)^2$**

**Solution:**

$$\begin{aligned} \text{(i)} & 25(a+b)^2 - 16(a-b)^2 \\ &= [5(a+b)]^2 - [4(a-b)]^2 \\ &= (5a+5b)^2 - (4a-4b)^2 \\ &= [(5a+5b) + (4a-4b)][(5a+5b) - (4a-4b)] \\ &= (5a+5b+4a-4b)(5a+5b-4a+4b) \\ &= (9a+b)(a+9b) \end{aligned}$$

$$\begin{aligned} \text{(ii)} & 9(3x+2)^2 - 4(2x-1)^2 \\ &= [3(3x+2)]^2 - [2(2x-1)]^2 \\ &= (9x+6)^2 - (4x-2)^2 \\ &= [(9x+6) + (4x-2)][(9x+6) - (4x-2)] \\ &= (9x+6+4x-2)(9x+6-4x+2) \\ &= (13x+4)(5x+8) \end{aligned}$$

**8. (i)  $x^3 - 25x$**

**(ii)  $63p^2q^2 - 7$**

**Solution:**

$$\begin{aligned} \text{(i)} & x^3 - 25x \\ &= x(x^2 - 25) = x[(x)^2 - (5)^2] \\ &= x(x+5)(x-5) \end{aligned}$$

$$\begin{aligned} \text{(ii)} & 63p^2q^2 - 7 \\ &= 7(9p^2q^2 - 1) \\ &= 7[(3pq)^2 - (1)^2] \\ &= 7(3pq+1)(3pq-1) \end{aligned}$$

**9. (i)  $32a^2b - 72b^3$**

**(ii)  $9(a+b)^3 - 25(a+b)$**

# ML Aggarwal Solutions for Class 8 Maths

## Chapter 11: Factorisation

**Solution:**

$$\begin{aligned} \text{(i)} \quad & 32a^2b - 72b^3 \\ & = 8b(4a^2 - 9b^2) \Rightarrow 8b[(2a)^2 - (3b)^2] \\ & = 8b(2a + 3b)(2a - 3b) \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & 9(a + b)^3 - 25(a + b) \\ & = (a + b)[9(a + b)^2 - 25] \\ & = (a + b)[\{3(a + b)\}^2 - (5)^2] \\ & = (a + 6)[(3a + 3b)^2 - (5)^2] \\ & = (a + b)[(3a + 3b + 5)(3a + 3b - 5)] \\ & = (a + b)(3a + 3b + 5)(3a + 3b - 5) \end{aligned}$$

**10. (i)  $x^2 - y^2 - 2y - 1$**

**(ii)  $p^2 - 4pq + 4q^2 - r^2$**

**Solution:**

$$\begin{aligned} \text{(i)} \quad & x^2 - y^2 - 2y - 1 \\ & = x^2 - (y^2 + 2y + 1) \\ & = (x)^2 - (y + 1)^2 \\ & = [x + (y + 1)][x - (y + 1)] \\ & = (x + y + 1)(x - y - 1) \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & p^2 - 4pq + 4q^2 - r^2 \\ & = (p)^2 - 2 \times p \times 2q + (2q)^2 - r^2 \quad [\because (a - b)^2 = a^2 - 2ab + b^2] \\ & = (p - 2q)^2 - (r)^2 \\ & = (p - 2q + r)(p - 2q - r) \quad [\because a^2 - b^2 = (a + b)(a - b)] \end{aligned}$$

**11. (i)  $9x^2 - y^2 + 4y - 4$**

**(ii)  $4a^2 - 4b^2 + 4a + 1$**

**Solution:**

$$\begin{aligned} \text{(i)} \quad & 9x^2 - y^2 + 4y - 4 \\ & = 9x^2 - (y^2 - 4y + 4) \\ & = 9x^2 - (y - 2)^2 \\ & = (3x)^2 - (y - 2)^2 \\ & = [3x + (y - 2)][3x - (y - 2)] \\ & = (3x + y - 2)(3x - y + 2) \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & 4a^2 - 4b^2 + 4a + 1 \\ & = (4a^2 + 4a + 1) - 4b^2 \\ & = (2a + 1)^2 - (2b)^2 \\ & = (2a + 2b + 1)(2a - 2b + 1) \end{aligned}$$

**12. (i)  $625 - p^4$**

**(ii)  $5y^5 - 405y$**

# ML Aggarwal Solutions for Class 8 Maths

## Chapter 11: Factorisation

**Solution:**

$$\begin{aligned} \text{(i) } & 625 - p^4 \\ &= (25)^2 - (p^2)^2 \\ &= (25 + p^2)(25 - p^2) \\ &= (25 + p^2)[(5)^2 - (p)^2] \\ &= (25 + p^2)(5 + p)(5 - p) \end{aligned}$$

$$\begin{aligned} \text{(ii) } & 5y^5 - 405y \\ &= 5y(y^4 - 81) \\ &= 5y[(y^2)^2 - (9)^2] \\ &= 5y(y^2 + 9)(y^2 - 9) \\ &= 5y(y^2 + 9)[(y)^2 - (3)^2] \\ &= 5y(y^2 + 9)(y + 3)(y - 3) \end{aligned}$$

**13. (i)  $x^4 - y^4 + x^2 - y^2$**

**(ii)  $64a^2 - 9b^2 + 42bc - 49c^2$**

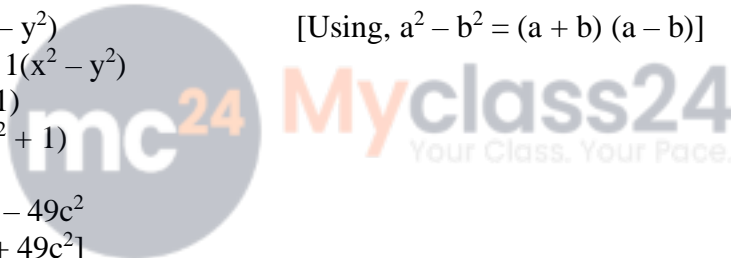
**Solution:**

$$\begin{aligned} \text{(i) } & x^4 - y^4 + x^2 - y^2 \\ &= [(x^2)^2 - (y^2)^2] + (x^2 - y^2) \\ &= (x^2 + y^2)(x^2 - y^2) + 1(x^2 - y^2) \\ &= (x^2 - y^2)(x^2 + y^2 + 1) \\ &= (x + y)(x - y)(x^2 + y^2 + 1) \end{aligned}$$

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

$$\begin{aligned} \text{(ii) } & 64a^2 - 9b^2 + 42bc - 49c^2 \\ &= 64a^2 - [9b^2 - 42bc + 49c^2] \\ &= (8a)^2 - [(3b)^2 - 2 \times 3b \times 7c + (7c)^2] \\ &= (8a)^2 - (3b - 7c)^2 \\ &= (8a + 3b - 7c)(8a - 3b + 7c) \end{aligned}$$

[ $\because a^2 + b^2 - 2ab = (a - b)^2$  and  $a^2 - b^2 = (a + b)(a - b)$ ]



### Exercise 11.4

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

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

**Solution:**

$$\begin{aligned} \text{(i) } & x^2 + 3x + 2 \\ &= x^2 + 2x + x + 2 \\ &= x(x + 2) + 1(x + 2) \\ &= (x + 2)(x + 1) \end{aligned}$$

$$\begin{aligned} \text{(ii) } & z^2 + 10z + 24 \\ &= z^2 + 6z + 4z + 24 \\ &= z(z + 6) + 4(z + 6) \\ &= (z + 6)(z + 4) \end{aligned}$$

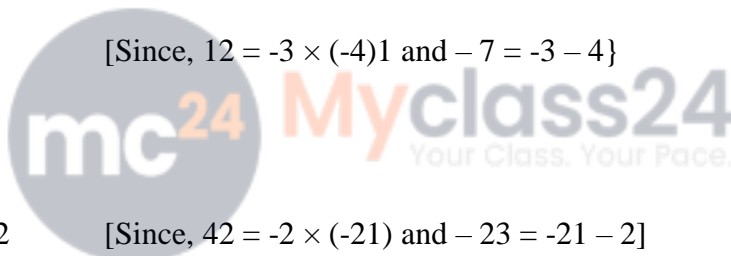
2. (i)  $y^2 - 7y + 12$

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

**Solution:**

$$\begin{aligned} \text{(i) } & y^2 - 7y + 12 \\ &= y^2 - 3y - 4y + 12 \\ &= y(y - 3) - 4(y - 3) \\ &= (y - 3)(y - 4) \end{aligned}$$

[Since,  $12 = -3 \times (-4)$  and  $-7 = -3 - 4$ ]



$$\begin{aligned} \text{(ii) } & m^2 - 23m + 42 \\ &= m^2 - 2m - 21m + 42 \\ &= m(m - 2) - 21(m - 2) \\ &= (m - 2)(m - 21) \end{aligned}$$

[Since,  $42 = -2 \times (-21)$  and  $-23 = -2 - 21$ ]

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

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

**Solution:**

$$\begin{aligned} \text{(i) } & y^2 - 5y - 24 \\ &= y^2 - 8y + 3y - 24 \\ &= y(y - 8) + 3(y - 8) \\ &= (y - 8)(y + 3) \end{aligned}$$

$$\begin{aligned} \text{(ii) } & t^2 + 23t - 108 \\ &= t^2 + 27t - 4t - 108 \\ &= t(t + 27) - 4(t + 27) \\ &= (t + 27)(t - 4) \end{aligned}$$

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

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

# ML Aggarwal Solutions for Class 8 Maths

## Chapter 11: Factorisation

**Solution:**

$$\begin{aligned} \text{(i)} \quad & 3x^2 + 14x + 8 \\ &= 3x^2 + 12x + 2x + 8 \\ &= 3x(x + 4) + 2(x + 4) \\ &= (x + 4)(3x + 2) \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & 3y^2 + 10y + 8 \\ &= 3y^2 + 6y + 4y + 8 \\ &= 3y(y + 2) + 4(y + 2) \\ &= (y + 2)(3y + 4) \end{aligned}$$

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

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

**Solution:**

$$\begin{aligned} \text{(i)} \quad & 14x^2 - 23x + 8 \\ &= 14x^2 - 16x - 7x + 8 \\ &= 2x(7x - 8) - 1(7x - 8) \\ &= (7x - 8)(2x - 1) \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & 12x^2 - x - 35 \\ &= 12x^2 - 21x + 20x - 35 \\ &= 3x(4x - 7) + 5(4x - 7) \\ &= (4x - 7)(3x + 5) \end{aligned}$$

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

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

**Solution:**

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

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

**7. (i)  $1 - 18y - 63y^2$ ,**

**(ii)  $3x^2 - 5xy - 12y^2$**

**Solution:**

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

**ML Aggarwal Solutions for Class 8 Maths**  
**Chapter 11: Factorisation**

$$= 1(1 - 21y) + 3y(1 - 21y) \\ = (1 - 21y)(1 + 3y)$$

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

**8. (i)  $x^2 - 3xy - 40y^2$**

**(ii)  $10p^2q^2 - 21pq + 9$**

**Solution:**

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

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

**9. (i)  $2a^2b^2 + ab - 45$**

**(ii)  $x(12x + 7) - 10$**

**Solution:**

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

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

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

**(ii)  $8 + 6(p + q) - 5(p + q)$**

**Solution:**

$$\text{(i) } (a + b)^2 - 11(a + b) - 42$$

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

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

$$= x^2 - 14x + 3x - 42$$

$$[\because -42 = -14 \times 3 \text{ and } -11 = -14 + 3]$$



# ML Aggarwal Solutions for Class 8 Maths

## Chapter 11: Factorisation

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

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

Substituting the value of  $x$  we get,

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

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

Let  $p + q = x$ , then we have

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

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

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

$$= 5x^2 - 10x + 4x - 8 \quad [\because 5 \times (-8) = 40 \Rightarrow -40 = -10 \times 4 \text{ and } -6 = -10 + 4]$$

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

Substituting the value of  $x$ , then

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

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

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

$$11. (i) (x - 2y)^2 - 6(x - 2y) + 5$$

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

**Solution:**

$$(i) \text{ Let } x - 2y = z$$

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

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

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

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

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

Now, on 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,  $7 + 10(2x - 3y) - 8(2x - 3y)^2$  becomes

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

$$= 7 + 14z - 4z - 8z^2$$

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

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

Now, on substituting  $z = 2x - 3y$ , we get

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

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



### Exercise 11.5

Work out the following divisions:

(i)  $(35x + 28) \div (5x + 4)$

(ii)  $7p^2q^2(9r - 27) \div 63pq(r - 3)$

**Solution:**

(i)  $(35x + 28) \div (5x + 4)$

$$\frac{7(5x+4)}{(5x+4)} = 7$$

(ii)  $7p^2q^2(9r - 27) \div 63pq(r - 3)$

$$\frac{7p^2q^2 \times 9(r-3)}{63pq(r-3)}$$

$$= p^{2-1} q^{2-1} \times 9 = 9pq$$

**2. Divide as directed:**

(i)  $6(2x + 7) (5x - 3) \div 3(5x - 3)$

(ii)  $33pq (p + 3) (2q - 5) \div 11p (2q - 5)$

**Solution:**

(i)  $6(2x + 7) (5x - 3) \div 3(5x - 3)$

$$\frac{6(2x+7)(5x-3)}{3(5x-3)}$$

$$= 2(2x + 7)$$

(ii)  $33pq (p + 3) (2q - 5) \div 11p (2q - 5)$

$$\frac{33pq(p+3)(2q-5)}{11p(2q-5)}$$

$$= 3q(p + 3)$$

**3. Factorise the expression and divide them as directed:**

(i)  $(7x^2 - 63x) \div 7(x - 3)$

(ii)  $(3p^2 + 17p + 10) \div (p + 5)$

(iii)  $10xy(14y^2 + 43y - 21) \div 5x(7y - 3)$

(iv)  $12pqr(6p^2 - 13pq + 6q^2) \div 6pq(2p - 3q)$

**Solution:**

(i)  $(7x^2 - 63x) \div 7(x - 3)$

**ML Aggarwal Solutions for Class 8 Maths**  
**Chapter 11: Factorisation**

$$\begin{aligned}
 &= \frac{7x(x^2 - 9)}{7(x-3)} \\
 &= \frac{7x[(x)^2 - (3)^2]}{7(x-3)} \\
 &= \frac{7x(x+3)(x-3)}{7(x-3)} \\
 &= x(x+3)
 \end{aligned}$$

$$\begin{aligned}
 \text{(ii) } &(3p^2 + 17p + 10) \div (p + 5) \\
 &= (3p^2 + 17p + 10) / (p + 5) \\
 &= \frac{3p^2 + 2p + 15p + 10}{p + 5} \quad \left\{ \begin{array}{l} \because 3 \times 10 = 30 \\ \because 30 = 2 \times 15 \\ 17 = 2 + 15 \end{array} \right\} \\
 &= \frac{p(3p+2) + 5(3p+2)}{p+5} \\
 &= \frac{(3p+2)(p+5)}{(p+5)} \\
 &= 3p + 2
 \end{aligned}$$

$$\begin{aligned}
 \text{(iii) } &10xy(14y^2 + 43y - 21) \div 5x(7y - 3) \\
 &= \frac{10xy[14y^2 + 49y - 6y - 21]}{5x(7y - 3)} \quad \left\{ \begin{array}{l} \because -21 \times 14 = -294 \\ \because -294 = 49 \times (-6) \\ 43 = 49 - 6 \end{array} \right\} \\
 &= \frac{10xy[7y(2y+7) - 3(2y+7)]}{5x(7y - 3)} \\
 &= \frac{10xy(2y+7)(7y-3)}{5x(7y-3)} \\
 &= 2xy(2y+7)
 \end{aligned}$$

$$\begin{aligned}
 \text{(iv) } &12pqr(6p^2 - 13pq + 6q^2) \div 6pq(2p - 3q) \\
 &= \frac{12pqr[6p^2 - 9pq - 4pq + 6q^2]}{6pq(2p - 3q)} \quad \left\{ \begin{array}{l} \because 6 \times 6 = 36 \\ \because 36 = -9 \times (-4) \\ -13 = -9 - 4 \end{array} \right\} \\
 &= \frac{12pqr[3p(2p-3q) - 2q(2p-3q)]}{6pq(2p-3q)} \\
 &= \frac{12pqr(2p-3q)(3p-2q)}{6pq(2p-3q)} \\
 &= 2r(3p-2q)
 \end{aligned}$$

## Check Your Progress

1. Find the HCF of the given polynomials:

(i)  $14pq, 28p^2q^2$

(ii)  $8abc, 24ab^2, 12a^2b$

**Solution:**

(i)  $14pq, 28p^2q^2$

HCF of 14, 28 = 14

HCF of  $14pq, 28p^2q^2 = 14pq$

(ii)  $8abc, 24ab^2, 12a^2b$

HCF of 8, 24, 12 = 4

HCF of  $8abc, 24ab^2, 12a^2b = 4ab$

2. Factorise the following:

(i)  $10x^2 - 18x^3 + 14x^4$

(ii)  $5x^2y + 10xyz + 15xy^2$

(iii)  $p^2x^2 + c^2x^2 - ac^2 - ap^2$

(iv)  $15(x + y)^2 - 5x - 5y$

(v)  $(ax + by)^2 + (ay - bx)^2$

(vi)  $ax + by + cx + bx + cy + ay$

(vii)  $49x^2 - 70xy + 25y^2$

(viii)  $4a^2 + 12ab + 9b^2$

(ix)  $49p^2 - 36q^2$

(x)  $100x^3 - 25xy^2$

(xi)  $x^2 - 2xy + y^2 - z^2$

(xii)  $x^8 - y^8$

(xiii)  $12x^3 - 14x^2 - 10x$

(xiv)  $p^2 - 10p + 21$

(xv)  $2x^2 - x - 6$

(xvi)  $6x^2 - 5xy - 6y^2$

(xvii)  $x^2 + 2xy - 99y^2$

**Solution:**

(i)  $10x^2 - 18x^3 + 14x^4$

HCF of 10, 18, 14 = 2

So,  $10x^2 - 18x^3 + 14x^4$

$= 2x^2(5 - 9x + 7x^2)$

(ii)  $5x^2y + 10xyz + 15xy^2$

HCF of 5, 10, 15 = 5

So,  $5x^2y + 10xyz + 15xy^2$

$= 5xy(x + 2z + 3y)$

(iii)  $p^2x^2 + c^2x^2 - ac^2 - ap$



# ML Aggarwal Solutions for Class 8 Maths

## Chapter 11: Factorisation

$$\begin{aligned} &= p^2x^2 - ap^2 + c^2x^2 - ac^2 \\ &= p^2(x^2 - a) + c^2(x^2 - a) \\ &= (x^2 - a)(p^2 + c^2) \end{aligned}$$

$$\begin{aligned} \text{(iv)} \quad &15(x + y)^2 - 5x - 5y \\ &= 15(x + y)^2 - 5(x + y) \\ &= 5(x + y) [3(x + y) - 1] \\ &= 5(x + y) (3x + 3y - 1) \end{aligned}$$

$$\begin{aligned} \text{(v)} \quad &(ax + by)^2 + (ay - bx)^2 \\ \text{On expanding, we have} \\ &= a^2x^2 + b^2y^2 + 2abxy + a^2y^2 + b^2x^2 - 2abxy \\ &= a^2x^2 + a^2y^2 + b^2x^2 + b^2y^2 \\ &= a^2(x^2 + y^2) + b^2(x^2 + y^2) \\ &= (x^2 + y^2)(a^2 + b^2) \end{aligned}$$

$$\begin{aligned} \text{(vi)} \quad &ax + by + cx + bx + cy + ay \\ &= ax + bx + cx + ay + by + cy \quad [\text{On grouping the like variables}] \\ &= x(a + b + c) + y(a + b + c) \\ &= (a + b + c)(x + y) \end{aligned}$$

$$\begin{aligned} \text{(vii)} \quad &49x^2 - 70xy + 25y^2 \\ &= (7x)^2 - 2 \times 7x \times 5y + (5y)^2 \quad [\because (a - b)^2 = a^2 - 2ab + b^2] \\ &= (7x - 5y)^2 \end{aligned}$$

$$\begin{aligned} \text{(viii)} \quad &4a^2 + 12ab + 9b^2 \\ &= (2a)^2 + 2 \times 2a \times 3b + (3b)^2 \quad [\because (a + b)^2 = a^2 + 2ab + b^2] \\ &= (2a + 3b)^2 \end{aligned}$$

$$\begin{aligned} \text{(ix)} \quad &49p^2 - 36q^2 \\ &= (7p)^2 - (6q)^2 \\ &= (7p + 6q)(7p - 6q) \quad [\because a^2 - b^2 = (a + b)(a - b)] \end{aligned}$$

$$\begin{aligned} \text{(x)} \quad &100x^3 - 25xy^2 \\ &= 25x(x^2 - y^2) = 25x\{(x)^2 - (y)^2\} \\ &= 25x(x + y)(x - y) \end{aligned}$$

$$\begin{aligned} \text{(xi)} \quad &x^2 - 2xy + y^2 - z^2 \\ &= (x - y)^2 - (z)^2 \quad [\because a^2 - 2ab + b^2 = (a - b)^2 \text{ and } a^2 - b^2 = (a + b)(a - b)] \\ &= (x - y + z)(x - y - z) \end{aligned}$$

$$\begin{aligned} \text{(xii)} \quad &x^8 - y^8 \\ &= (x^4)^2 - (y^4)^2 \quad [\because a^2 - b^2 = (a + b)(a - b)] \\ &= (x^4 + y^4)(x^4 - y^4) \\ &= (x^4 + y^4)[(x^2)^2 - (y^2)^2] \\ &= (x^4 + y^4)(x^2 + y^2)(x^2 - y^2) \end{aligned}$$

# ML Aggarwal Solutions for Class 8 Maths

## Chapter 11: Factorisation

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

$$(xiii) 12x^3 - 14x^2 - 10x$$

$$= 2x(6x^2 - 7x - 5)$$

$$[\text{Now, as } 6 \times (-5) = -30 \Rightarrow -30 = -10 \times 3 \text{ and } -7 = -10 + 3]$$

$$= 2x(6x^2 + 3x - 10x - 5)$$

$$= 2x\{3x(2x + 1) - 5(2x + 1)\}$$

$$= 2x(2x + 1)(3x - 5)$$

$$(xiv) p^2 - 10p + 21$$

$$= p^2 - 3p - 7p + 21$$

$$[\text{Now, as } 21 = -3 \times (-7) \text{ and } -10 = -3 - 7]$$

$$= p(p - 3) - 7(p - 3)$$

$$= (p - 3)(p - 7)$$

$$(xv) 2x^2 - x - 6$$

$$= 2x^2 - 4x + 3x - 6$$

$$[\text{Now, as } -6 \times 2 = -12 \Rightarrow -12 = -4 \times 3 \text{ and } -1 = -4 + 3]$$

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

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

$$(xvi) 6x^2 - 5xy - 6y^2$$

$$= 6x^2 - 9xy + 4xy - 6y^2$$

$$[\text{Now, as } 6 \times (-6) = -36 \Rightarrow -36 = -9 \times 4 \text{ and } -5 = -9 + 4]$$

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

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

$$(xvii) x^2 + 2xy - 99y^2$$

$$= x^2 + 11xy - 9xy - 99y^2$$

$$[\text{Now, as } -99 = -11 \times 9 \text{ and } -2 = -11 + 9]$$

$$= x(x + 11y) - 9y(x + 11y)$$

$$= (x + 11y)(x - 9y)$$

### 3. Divide as directed:

$$(i) 15(y + 3)(y^2 - 16) \div 5(y^2 - y - 12)$$

$$(ii) (3x^3 - 6x^2 - 24x) \div (x - 4)(x + 2)$$

$$(iii) (x^4 - 81) \div (x^3 + 3x^2 + 9x + 27)$$

**Solution:**

$$(i) 15(y + 3)(y^2 - 16) \div 5(y^2 - y - 12)$$

$$y^2 - 16 = (y)^2 - (4)^2$$

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

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

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

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

Now,

$$\frac{15(y+3)(y^2-16)}{5(y^2-y-12)}$$

$$= \frac{15 \times (y+3)(y+4)(y-4)}{5(y-4)(y+3)}$$

ML Aggarwal Solutions for Class 8 Maths  
Chapter 11: Factorisation

$$= 3(y + 4)$$

$$\begin{aligned} \text{(ii) } (3x^3 - 6x^2 - 24x) \div (x - 4)(x + 2) \\ 3x^3 - 6x^2 - 24x &= 3x(x^2 - 2x - 8) \\ &= 3x\{x^2 - 4x + 2x - 8\} \\ &= 3x\{x(x - 4) + 2(x - 4)\} \\ &= 3x(x - 4)(x + 2) \end{aligned}$$

Now,

$$\begin{aligned} \frac{3x^3 - 6x^2 - 24x}{(x - 4)(x + 2)} \\ &= \frac{3x(x - 4)(x + 2)}{(x - 4)(x + 2)} \\ &= 3x \end{aligned}$$

$$\begin{aligned} \text{(iii) } (x^4 - 81) \div (x^3 + 3x^2 + 9x + 27) \\ x^4 - 81 &= (x^2)^2 - (9)^2 = (x^2 + 9)(x^2 - 9) \\ &= (x^2 + 9)[(x)^2 - (3)^2] \\ &= (x^2 + 9)(x + 3)(x - 3) \end{aligned}$$

And,

$$\begin{aligned} x^3 + 3x^2 + 9x + 27 &= (x)^2 + (x + 3) + 9(x + 3) \\ &= (x^2 + 9)(x + 3) \end{aligned}$$

Now,

$$\begin{aligned} \frac{x^4 - 81}{x^3 + 3x^2 + 9x + 27} \\ &= \frac{(x^2 + 9)(x + 3)(x - 3)}{(x^2 + 9)(x + 3)} \end{aligned}$$

$$= (x - 3)$$

