

Grouping: The expression will have four terms
(4 parts separated by + and -)

Factorize by pairing the four terms. 2 pair
Factorize each pair separately. Using the highest
common factor.

NOTE: The values in the brackets MUST be the
SAME.

Eg1) Factorize $x^2 - ax + 3x - 3a$

$$\underbrace{x^2 - ax}_{\text{①}} + \underbrace{3x - 3a}_{\text{②}}$$

$$\overset{\text{HCF}}{x}(x-a) + \overset{\text{HCF}}{3}(x-a)$$

Brackets are the
same.

$$\text{Ans } (x+3)(x-a)$$

Eg2) Factorize $3x^2 - 3xz + 4xy - 4yz$

$$\underbrace{3x^2 - 3xz}_{\text{①}} + \underbrace{4xy - 4yz}_{\text{②}}$$

$$3x(x-z) + 4y(x-z)$$

Brackets
are the
same.

$$\text{Ans} = (3x+4y)(x-z)$$



Section 2.2 Factorising by grouping terms

Example 1

Find the factors of

- (i) $2ab + 2ac + 3bx + 3cy$
- (ii) $3ax - bx - 3ay + by$

Example 2

Factorise $6x^2 + 2a - 3ax - 4x$

Exercise 2.2

Factorise fully each of the following:

1. $2a(x + y) + 3(x + y)$

$\downarrow \quad \downarrow$
Ans $(2a + 3)(x + y)$

2. $3x(2a - b) - 4(2a - b)$

$\downarrow \quad \downarrow$
 $(3x - 4)(2a - b)$

Factorise fully each of the following:

3. $3a(2b - c) - 4(2b - c)$

$$\begin{array}{c} \swarrow \quad \searrow \\ (3a-4)(2b-c) \end{array}$$

4. $2x(5y - z) + b(5y - z)$

$$\begin{array}{c} \swarrow \quad \searrow \\ (2x+b)(5y-z) \end{array}$$

Factorise fully each of the following:

5. $2a(x - 2y) - 1(x - 2y)$

$$\begin{array}{c} \swarrow \quad \searrow \\ (2a-1)(x-2y) \end{array}$$

6. $a^2 + ab + ac + bc$

$$\begin{array}{c} \underbrace{\quad} \quad \underbrace{\quad} \\ a(a+b) + c(a+b) \\ \swarrow \quad \searrow \\ (a+c)(a+b) \end{array}$$

Factorise fully each of the following:

7. $x^2 - ax + 3x - 3a$

$$\begin{array}{l} \underbrace{x^2 - ax}_{\text{red}} + \underbrace{3x - 3a}_{\text{green}} \\ x(x-a) + 3(x-a) \\ \downarrow \quad \downarrow \\ (x+3)(x-a) \end{array}$$

8. $ab + ac - 5b - 5c$

$$\begin{array}{l} \underbrace{ab + ac}_{\text{red}} - \underbrace{5b - 5c}_{\text{green}} \\ a(b+c) - 5(b+c) \\ \downarrow \quad \downarrow \\ (a+5)(b+c) \end{array}$$

Factorise fully each of the following:

9. $ab + 5b + 3a + 15$

10. $3x^2 - 3xz + 4xy - 4yz$

Factorise fully each of the following:

11. $2c^2 - 4cd + c - 2d$

$2c(c-2d) + 1(c-2d)$
 Brackets are the same

Ans $(2c+1)(c-2d)$

When there's no common factors in one pair

① 1 is always a factor

② you could rearrange the pairs.

12. $2ax - 6ay - 3x + 9y$

$2a(x-3y) - 3(x-3y)$

$(2a-3)(x-3y)$

C/W
Pg 24 Q 13-16

Factorise fully each of the following:

13. $2ac - 4ad + bc - 2bd$

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

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

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14. $3xy - 3xyz + 2z - 2z^2$

$3xy(1-z) + 2z(1-z)$

$(3xy+2z)(1-z)$

$\frac{1z^2}{2z}$

Factorise fully each of the following:

15. $8ax + 4ay - 6bx - 3by$

16. $6ax^2 + 9a - 8x^2 - 12$

Factorise fully each of the following:

17. $x(2y - z) - 2y + z$

18. $an - 5a - 5b + bn$

Factorise fully each of the following:

19. $2x^2y - 2xz - 3xy + 3z$

20. $7y^2 - 21by + 2ay - 6ab$

Factorise fully each of the following:

21. $4a^2b - 3b - 6a + 2ab^2$

22. $12a^2 - 8ab + 9ac - 6bc$

Factorise fully each of the following:

23. $10ab - 5ac - 2bd + cd$

24. $4x^2 + 3ay - 2ax - 6xy$

Factorise fully each of the following:

25. $6a^2 + 15xy - 10ay - 9ax$

26. $6xy + 12yz - 8xz - 9y^2$

Factorise fully each of the following:

27. $3abx^2 - 5axy - 3bxy + 5y^2$

28. $6a^2c - 6ab - 4bc + 9a^3$

Factorise fully each of the following:

29. $x^2 - x(2a - b) - 2ab$

30. $6x^2 - 3y(3x - 2a) - 4ax$

Answers

Exercise 2.2

1. $(2a + 3)(x + y)$
2. $(3x - 4)(2a - b)$
3. $(3a - 4)(2b - c)$
4. $(2x + b)(5y - z)$
5. $(2a - 1)(x - 2y)$
6. $(a + c)(a + b)$
7. $(x + 3)(x - a)$
8. $(a - 5)(b + c)$
9. $(a + 5)(b + 3)$
10. $(3x + 4y)(x - z)$
11. $(c - 2d)(2c + 1)$
12. $(2a - 3)(x - 3y)$
13. $(2a + b)(c - 2d)$
14. $(3xy + 2z)(1 - z)$
15. $(4a - 3b)(2x + y)$
16. $(3a - 4)(2x^2 + 3)$
17. $(2y - z)(x - 1)$
18. $(n - 5)(a + b)$
19. $(2x - 3)(xy - z)$
20. $(7y + 2a)(y - 3b)$
21. $(2a + b)(2ab - 3)$
22. $(3a - 2b)(4a + 3c)$
23. $(2b - c)(5a - d)$
24. $(2x - a)(2x - 3y)$
25. $(2a - 3x)(3a - 5y)$
26. $(3y - 4z)(2x - 3y)$
27. $(ax - y)(3bx - 5y)$
28. $(3a + 2c)(3a^2 - 2b)$
29. $(x - 2a)(x + b)$
30. $(2x - 3y)(3x - 2a)$

Answers

23. $(4ab + 5)(4ab - 5)$
24. $(3xy + 1)(3xy - 1)$
25. $(2ab + 7cd)(2ab - 7cd)$
26. $(11a + 8bc)(11a - 8bc)$
27. $(9hk + 5pq)(9hk - 5pq)$
28. (i) $3(x + 3y)(x - 3y)$ (ii) $3(2x + y)(2x - y)$
(iii) $3(3x + y)(3x - y)$ (iv) $5(3 + x)(3 - x)$
(v) $5(3k + 2)(3k - 2)$
(vi) $4(ax + 3y)(ax - 3y)$
29. $(a^2 + b^2)(a + b)(a - b)$
30. (i) 9200 (ii) 240 (iii) 88
31. $2(9x^2 - 4y^2); 2(3x + 2y)(3x - 2y)$
32. $(3x + y)(3x - y)$