## Exercise 5(A)

**Factorise by taking out the common factors:**

**1. 2(2x - 5y) (3x + 4y) - 6(2x - 5y) (x - y)**

**Solution:**

Identifying and taking (2x - 5y) common from both the terms, we have
= (2x - 5y) [2(3x + 4y) - 6(x - y)]
= (2x - 5y) (6x + 8y - 6x + 6y)
= (2x - 5y) (8y + 6y)
= (2x - 5y) (14y)
= (2x - 5y)14y

**2. $xy(3x^2 - 2y^2) - yz(2y^2 - 3x^2) + zx(15x^2 - 10y^2)$**

**Solution:**

We have, $xy(3x^2 - 2y^2) - yz(2y^2 - 3x^2) + zx(15x^2 - 10y^2)$
Changing signs to arrive at a common term
So,
$= xy(3x^2 - 2y^2) + yz(3x^2 - 2y^2) + zx(15x^2 - 10y^2)$
$= xy(3x^2 - 2y^2) + yz(3x^2 - 2y^2) + 5zx(3x^2 - 2y^2)$
$= (3x^2 - 2y^2)(xy + yz + 5zx)$

**3. $ab(a^2 + b^2 - c^2) - bc(c^2 - a^2 - b^2) + ca(a^2 + b^2 - c^2)$**

**Solution:**

We have, $ab(a^2 + b^2 - c^2) - bc(c^2 - a^2 - b^2) + ca(a^2 + b^2 - c^2)$
Changing signs to arrive at a common term
So,
$= ab(a^2 + b^2 - c^2) + bc(a^2 + b^2 - c^2) + ca(a^2 + b^2 - c^2)$
$= (a^2 + b^2 - c^2)(ab + bc + ca)$

**4. 2x(a - b) + 3y(5a - 5b) + 4z(2b - 2a)**

**Solution:**

We have, 2x(a - b) + 3y(5a - 5b) + 4z(2b - 2a)
Taking common factors, we get
= 2x(a - b) + 15y(a - b) - 8z(a - b)
= (a - b) (2x + 15y - 8z)

**Factorize by the grouping method:**

**5. $a^3 + a - 3a^2 - 3$**

**Solution:**

We have, $a^3 + a - 3a^2 – 3$
Grouping to arrive at a common term
$= a(a^2 + 1) - 3(a^2 + 1)$

Taking common, we get
= $(a^2 + 1)(a - 3)$

**6. $16(a + b)^2 - 4a - 4b$**
**Solution:**

We have, $16(a + b)^2 - 4a - 4b$
Grouping to arrive at a common term
= $16(a + b)^2 - 4(a + b)$
Taking common, we get
= $4(a + b)[4(a + b) - 1]$
= $4(a + b)(4a + 4b - 1)$

**7. Factorize by the grouping method:**
**$a^4 - 2a^3 - 4a + 8$**
**Solution:**

We have, $a^4 - 2a^3 - 4a + 8$
Grouping to arrive at a common term
= $a^3(a - 2) - 4(a - 2)$
Taking common, we get
= $(a^3 - 4)(a - 2)$

**8. $ab - 2b + a^2 - 2a$**
**Solution:**

We have, $ab - 2b + a^2 - 2a$
Grouping to arrive at a common term
= $b(a - 2) + a(a - 2)$
Taking common, we get
= $(b + a)(a - 2)$

**9. $ab(x^2 + 1) + x(a^2 + b^2)$**
**Solution:**

We have, $ab(x^2 + 1) + x(a^2 + b^2)$
On expanding,
= $abx^2 + ab + a^2x + b^2x$
Now, grouping to arrive at a common term
= $abx^2 + a^2x + b^2x + ab$
= $ax(bx + a) + b(bx + a)$
Taking common, we get
= $(ax + b)(bx + a)$

**10. $a^2 + b - ab - a$**
**Solution:**

We have, $a^2 + b - ab - a$
Grouping to arrive at a common term
$= a^2 – a + b – ab$
$= a(a - 1) – b(-1 + a)$
$= a(a - 1) – b(a - 1)$
Taking common, we get
$= (a – b) (a – 1)$

**11. $(ax + by)^2 + (bx - ay)^2$**
**Solution:**

We have, $(ax + by)^2 + (bx - ay)^2$
On expanding,
$= a^2x^2 + b^2y^2 + 2abxy + b^2x^2 + a^2y^2 – 2abxy$
$= a^2x^2 + b^2y^2 + b^2x^2 + a^2y^2$
Rearranging terms, we get
$= a^2x^2 + b^2x^2 + a^2y^2 + b^2y^2$
Taking common, we get
$= x^2(a^2 + b^2) + y^2(a^2 + b^2)$
$= (x^2 + y^2) (a^2 + b^2)$



**12. $a^2x^2 + (ax^2 + 1)x + a$**
**Solution:**

We have, $a^2x^2 + (ax^2 + 1)x + a$
Regrouping the terms, we have
$= a^2x^2 + a + (ax^2 + 1)x$
$= a(ax^2 + 1) + x(ax^2 + 1)$
Taking common, we get
$= (ax^2 + 1) (a + x)$

**13. $(2a - b)^2 - 10a + 5b$**
**Solution:**

We have, $(2a - b)^2 - 10a + 5b$
Taking common,
$= (2a - b)^2 – 5(2a - b)$
Now,
$= (2a - b) [(2a - b) – 5]$
$= (2a – b) (2a – b – 5)$

**14. $a(a – 4) – a + 4$**
**Solution:**

We have, $a(a – 4) – a + 4$

By grouping, we get
= a(a - 4) -1(a - 4)
Now, taking the common term
= (a - 4) (a - 1)

**15. $y^2$ - (a + b) y + ab**
**Solution:**

We have, $y^2$ - (a + b) y + ab
On expanding,
= $y^2$ – ay – by + ab
= ($y^2$ – ay) – by + ab
Taking 'y' and 'b' common from the group, we get
= y(y - a) – b(y - a)
= (y – a) (y – b)

**16. $a^2$ + 1/$a^2$ – 2 – 3a + 3/a**
**Solution:**

We have, $a^2$ + 1/$a^2$ – 2 – 3a + 3/a
On grouping terms, we get
= ($a^2$ – 2 + 1/$a^2$) – 3a + 3/a
= [$a^2$ – (2 x a x 1/a) + 1/$a^2$] – 3(a – 1/a)
= (a – 1/a)$^2$ – 3(a – 1/a) {Since, $(x - y)^2 = x^2 – 2xy + y^2$}
Taking (a – 1/a) as common, we get
= (a – 1/a) [(a – 1/a) - 3]
= (a – 1/a) (a – 1/a - 3)

**17. $x^2$ + $y^2$ + x + y + 2xy**
**Solution:**

We have, $x^2$ + $y^2$ + x + y + 2xy
On rearranging terms, we get
= ($x^2$ + $y^2$ + 2xy) + (x + y) {Since, $(x + y)^2 = x^2 + 2xy + y^2$}
Now,
= $(x + y)^2$ + (x + y)
= (x + y)(x + y + 1)

**18. $a^2$ + 4$b^2$ - 3a + 6b - 4ab**
**Solution:**

We have, $a^2$ + 4$b^2$ - 3a + 6b - 4ab
On rearranging terms, we get
= $a^2$ + 4$b^2$ - 4ab - 3a + 6b
Now,
= $a^2$ + $(2b)^2$ - 2 × a × (2b) - 3(a - 2b) {Since, $(a - b)^2 = a^2 - 2ab + b^2$}

$= (a - 2b)^2 - 3(a - 2b)$
$= (a - 2b) [(a - 2b) - 3]$
$= (a - 2b) (a - 2b - 3)$

**19. $m (x - 3y)^2 + n (3y - x) + 5x - 15y$**
**Solution:**

We have, $m (x - 3y)^2 + n (3y - x) + 5x - 15y$
Now,
Taking (x - 3y) common from all the three terms, we get
$= m(x - 3y)^2 - n(x - 3y) + 5(x - 3y)$
$= (x - 3y) [m(x - 3y) - n + 5]$
$= (x - 3y) (mx - 3my - n + 5)$

**20. $x(6x - 5y) - 4(6x - 5y)^2$**
**Solution:**

We have, $x(6x - 5y) - 4(6x - 5y)^2$
Now,
Taking (6x - 5y) common from the three terms, we get
$= (6x - 5y) [x - 4(6x - 5y)]$
$= (6x - 5y) (x - 24x + 20y)$
$= (6x - 5y) (-23x + 20y)$
$= (6x - 5y) (20y - 23x)$