Chapter 5. Factorisation

Exercise 5(A)

Solution 1:

$3a^2 - 9ab = 3a \times a - 3a \times 3b$
$= 3a(a - 3b)$

Solution 2:

[Taking $(x + y)$ common from both terms]

$= (x + y)[2(x + y)^2 - 6]$

$= 2(x + y)[(x + y)^2 - 3]$

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

Solution 3:

Taking $(2x - 3y)$ common from both terms

$= (2x - 3y)[x^3 - x^2 (2x - 3y)]$

$= x^2(2x - 3y)[x - (2x - 3y)]$

$= x^2(2x - 3y)[x - 2x + 3y]$

$= x^2(2x - 3y)[-x + 3y]$

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

Solution 4:

Taking $(2x - 5y)$ common from both terms

$= (2x - 5y)[2(3x + 4y) - 6(x - y)]$

$= (2x - 5y)(6x + 8y - 6x + 6y)$

$= (2x - 5y)(8y + 6y)$

$= (2x - 5y)(14y)$

$= (2x - 5y)14y$

Solution 5:

$a^3 + a - 3a^2 - 3 = a(a^2 + 1) - 3(a^2 + 1)$
$= (a^2 + 1)(a - 3).$

Solution 6:

$16(a+b)^2 - 4a - 4b = 16(a+b)^2 - 4(a+b)$
$= 4(a+b)[4(a+b) - 1]$
$= 4(a+b)(4a+4b-1)$

Solution 7:

$$a^4 - 2a^3 - 4a + 8 = a^3(a-2) - 4(a-2)$$
$$= (a^3 - 4)(a-2)$$

Solution 8:

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

Solution 9:

$$ab(x^2+1) + x(a^2+b^2) = abx^2 + ab + a^2x + b^2x$$
$$= ax(bx+a) + b(bx+a)$$
$$= (ax+b)(bx+a)$$

Solution 10:

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

Solution 11:

$$(ax+by)^2 + (bx-ay)^2 = a^2x^2 + b^2y^2 + 2axby + b^2x^2 + a^2y^2 - 2bxay$$
$$= a^2x^2 + b^2y^2 + b^2x^2 + a^2y^2$$
$$= x^2(a^2+b^2) + y^2(a^2+b^2)$$
$$= (x^2+y^2)(a^2+b^2)$$

Solution 12:

$$a^2x^2 + (ax^2+1)x + a = a^2x^2 + a + (ax^2+1)x$$
$$= a(ax^2+1) + x(ax^2+1)$$
$$= (a+x)(ax^2+1)$$

Solution 13:

$$(2a-b)^2 - 10a + 5b = (2a-b)^2 - 5(2a-b)$$
$$= (2a-b)(2a-b-5)$$

Solution 14:

$$a(a-4) - a + 4 = a(a-4) - 1(a-4)$$
$$= (a-4)(a-1)$$

Solution 15:

$$y^2 - (a+b)y + ab = y^2 - ay - by + ab$$
$$= y(y-a) - b(y-a)$$
$$= (y-a)(y-b)$$

Solution 16:

$$a^2 + \frac{1}{a^2} - 2 - 3a + \frac{3}{a} = \left(a - \frac{1}{a}\right)^2 - 3\left(a - \frac{1}{a}\right)$$
$$= \left(a - \frac{1}{a}\right)\left[\left(a - \frac{1}{a}\right) - 3\right]$$
$$= \left(a - \frac{1}{a}\right)\left[a - \frac{1}{a} - 3\right]$$

Solution 17:

$= (x^2 + y^2 + 2xy) + (x + y)$

[As $(x + y)^2 = x^2 + 2xy + y^2$]

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

$=(x + y)(x + y + 1)$

Solution 18:

$= a^2 + 4b^2 - 4ab - 3a + 6b$

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

[As $(a - b)^2 = a^2 - 2ab + b^2$]

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

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

$=(a - 2b)(a - 2b - 3)$

Solution 19:

$= m(x - 3y)^2 - n(x - 3y) + 5(x - 3y)$

[Taking (x - 3y) common from all the three terms]

$=(x - 3y)[m(x - 3y) - n + 5]$

$=(x - 3y)(mx - 3my - n + 5)$

Solution 20:

$=(6x - 5y)[x - 4(6x - 5y)]$

[Taking (6x - 5y) common from the three terms]

$= (6x - 5y)(x - 24x + 20y)$

$= (6x - 5y)(-23x + 20y)$

$= (6x - 5y)(20y - 23x)$