Solution 19:

Exercise 5(B)

Solution 1:

$$a^2 + 10a + 24 = a^2 + 6a + 4a + 24$$
$$= a(a+6) + 4(a+6)$$
$$= (a+6)(a+4)$$

Solution 2:

$$a^2 - 3a - 40 = a^2 - 8a + 5a - 40$$
$$= a(a-8) + 5(a-8)$$
$$= (a-8)(a+5)$$

Solution 3:

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

Solution 4:

$$x^2 - 3ax - 88a^2 = x^2 - 11ax + 8ax - 88a^2$$
$$= x(x-11a) + 8a(x-11a)$$
$$= (x+8a)(x-11a)$$

Solution 5:

$$6a^2 - a - 15 = 6a^2 - 10a + 9a - 15$$
$$= 2a(3a - 5) + 3(3a - 5)$$
$$= (2a + 3)(3a - 5)$$

Solution 6:

$$24a^3 + 37a^2 - 5a = a(24a^2 + 37a - 5)$$
$$= a(24a^2 + 40a - 3a - 5)$$
$$= a \times [8a(3a + 5) - 1(3a + 5)]$$
$$= a[(8a - 1)(3a + 5)]$$
$$= a(8a - 1)(3a + 5)$$

Solution 7:

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

Solution 8:

$$a^2b^2 + 8ab - 9 = a^2b^2 + 9ab - ab - 9$$
$$= ab(ab + 9) - 1(ab + 9)$$
$$= (ab + 9)(ab - 1)$$

Solution 9:

$$3 - a(4 + 7a) = 3 - 4a - 7a^2$$
$$= 3 - 7a + 3a - 7a^2$$
$$= 1(3 - 7a) + a(3 - 7a)$$
$$= (3 - 7a)(a + 1)$$

Solution 10:

$(2a+b)^2-6a-3b-4=(2a+b)^2-3(2a+b)-4$

Assume that 2a+b=x

Therefore,

$(2a+b)^2-6a-3b-4=x^2-3x-4$

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

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

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

$=(2a+b+1)(2a+b-4)$

[resubstitute the value of x]

Solution 11:

Assume that a + b = x;

$1-2(a+b)-3(a+b)^2=1-2x-3x^2$

$=1-3x+x-3x^2$

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

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

$=(1-3(a+b))(1+(a+b))$

$=(1-3a-3b)(1+a+b)$

Solution 12:

$3a^2-1-2a=3a^2-2a-1$

$=3a^2-3a+a-1$

$=3a(a-1)+1(a-1)$

$=(3a+1)(a-1)$

Solution 13:

$x^2+3x+2+ax+2a=x^2+2x+x+2+ax+2a$

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

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

Solution 14:

Assume that $3x - 2y = a$

Therefore,

$$
\begin{aligned}
(3x-2y)^2 + 3(3x-2y) - 10 &= a^2 + 3a - 10 \\
&= a^2 + 5a - 2a - 10 \\
&= a(a+5) - 2(a+5) \\
&= (a+5)(a-2) \\
&= (3x-2y+5)(3x-2y-2)
\end{aligned}
$$

Solution 15:

$$5-(3a^2-2a)(6-3a^2+2a) = 5-(3a^2-2a)\left[6-(3a^2-2a)\right]$$

Assume that $3a^2 - 2a = x$

Therefore,

$$
\begin{aligned}
5-(3a^2-2a)(6-3a^2+2a) &= 5 - x(6-x) \\
&= 5 - 6x + x^2 \\
&= 5 - 5x - x + x^2 \\
&= 5(1-x) - x(1-x) \\
&= (5-x)(1-x) \\
&= (x-5)(x-1) \\
&= (3a^2-2a-5)(3a^2-2a-1) \\
&= (3a^2-5a+3a-5)(3a^2-3a+a-1) \\
&= \left(a(3a-5)+1(3a-5)\right)\left(3a(a-1)+1(a-1)\right) \\
&= (3a-5)(a+1)(3a+1)(a-1)
\end{aligned}
$$

(i) Given expression: $x^2 - 3x - 54$

Comparing with $ax^2 + bx + c$, we get $a = 1$, $b = -3$ and $c = -54$

$\therefore b^2 - 4ac = (-3)^2 - 4(1)(-54) = 9 + 216 = 225$, which is a perfect square.

$\therefore x^2 - 3x - 54$ is factorisable.

$$\begin{aligned} \text{Now, } x^2 - 3x - 54 &= x^2 - 9x + 6x - 54 \\ &= x(x-9) + 6(x-9) \\ &= (x-9)(x+6) \end{aligned}$$

(ii) Given expression: $2x^2 - 7x - 15$

Comparing with $ax^2 + bx + c$, we get $a = 2$, $b = -7$ and $c = -15$

$\therefore b^2 - 4ac = (-7)^2 - 4(2)(-15) = 49 + 120 = 169$, which is a perfect square.

$\therefore 2x^2 - 7x - 15$ is factorisable.

$$\begin{aligned} \text{Now, } 2x^2 - 7x - 15 &= 2x^2 - 10x + 3x - 15 \\ &= 2x(x-5) + 3(x-5) \\ &= (2x+3)(x-5) \end{aligned}$$

(iii) Given expression: $2x^2 + 2x - 75$

Comparing with $ax^2 + bx + c$, we get $a = 2$, $b = 2$ and $c = -75$

$\therefore b^2 - 4ac = (2)^2 - 4(2)(-75) = 4 + 600 = 604$, which is not a perfect square.

$\therefore 2x^2 + 2x - 75$ is not factorisable.

(iv) Given expression: $3x^2 + 4x - 10$

Comparing with $ax^2 + bx + c$, we get $a = 3$, $b = 4$ and $c = -10$

$\therefore b^2 - 4ac = (4)^2 - 4(3)(-10) = 16 + 120 = 136$, which is not a perfect square.

$\therefore 3x^2 + 4x - 10$ is not factorisable.

(v) Given expression: $x(2x - 1) - 1$

Now, $x(2x-1) - 1 = 2x^2 - x - 1$

Comparing with $ax^2 + bx + c$, we get $a = 2$, $b = -1$ and $c = -1$

$\therefore b^2 - 4ac = (-1)^2 - 4(2)(-1) = 1 + 8 = 9$, which is a perfect square.

$\therefore 2x^2 - x - 1$ is factorisable.

$$\begin{aligned} \text{Now, } 2x^2 - x - 1 &= 2x^2 - 2x + x - 1 \\ &= 2x(x-1) + 1(x-1) \\ &= (2x+1)(x-1) \end{aligned}$$