

EXERCISE 7.8

Resolve each of the following quadratic trinomials into factors:

1. $2x^2 + 5x + 3$

Solution:

We have,

$$2x^2 + 5x + 3$$

The coefficient of x^2 is 2

The coefficient of x is 5

Constant term is 3

We shall split up the center term i.e., 5 into two parts such that their sum $p+q$ is 5 and product $pq = 2 \times 3$ is 6

So, we express the middle term $5x$ as $2x + 3x$

$$\begin{aligned} 2x^2 + 5x + 3 &= 2x^2 + 2x + 3x + 3 \\ &= 2x(x + 1) + 3(x + 1) \\ &= (2x + 3)(x + 1) \end{aligned}$$

2. $2x^2 - 3x - 2$

Solution:

We have,

$$2x^2 - 3x - 2$$

The coefficient of x^2 is 2

The coefficient of x is -3

Constant term is -2

So, we express the middle term $-3x$ as $-4x + x$

$$\begin{aligned} 2x^2 - 3x - 2 &= 2x^2 - 4x + x - 2 \\ &= 2x(x - 2) + 1(x - 2) \\ &= (x - 2)(2x + 1) \end{aligned}$$

3. $3x^2 + 10x + 3$

Solution:

We have,

$$3x^2 + 10x + 3$$

The coefficient of x^2 is 3

The coefficient of x is 10

Constant term is 3

So, we express the middle term $10x$ as $9x + x$

$$\begin{aligned} 3x^2 + 10x + 3 &= 3x^2 + 9x + x + 3 \\ &= 3x(x + 3) + 1(x + 3) \end{aligned}$$



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

4. $7x - 6 - 2x^2$

Solution:

We have,

$$7x - 6 - 2x^2$$
$$- 2x^2 + 7x - 6$$
$$2x^2 - 7x + 6$$

The coefficient of x^2 is 2

The coefficient of x is -7

Constant term is 6

So, we express the middle term $-7x$ as $-4x - 3x$

$$2x^2 - 7x + 6 = 2x^2 - 4x - 3x + 6$$
$$= 2x(x - 2) - 3(x - 2)$$
$$= (x - 2)(2x - 3)$$

5. $7x^2 - 19x - 6$

Solution:

We have,

$$7x^2 - 19x - 6$$

The coefficient of x^2 is 7

The coefficient of x is -19

Constant term is -6

So, we express the middle term $-19x$ as $2x - 21x$

$$7x^2 - 19x - 6 = 7x^2 + 2x - 21x - 6$$
$$= x(7x + 2) - 3(7x + 2)$$
$$= (7x + 2)(x - 3)$$

6. $28 - 31x - 5x^2$

Solution:

We have,

$$28 - 31x - 5x^2$$
$$- 5x^2 - 31x + 28$$
$$5x^2 + 31x - 28$$

The coefficient of x^2 is 5

The coefficient of x is 31

Constant term is -28

So, we express the middle term $31x$ as $-4x + 35x$

$$5x^2 + 31x - 28 = 5x^2 - 4x + 35x - 28$$

$$\begin{aligned} &= x(5x - 4) + 7(5x - 4) \\ &= (x + 7)(5x - 4) \end{aligned}$$

7. $3 + 23y - 8y^2$

Solution:

We have,

$$3 + 23y - 8y^2$$

$$- 8y^2 + 23y + 3$$

$$8y^2 - 23y - 3$$

The coefficient of y^2 is 8

The coefficient of y is -23

Constant term is -3

So, we express the middle term -23y as -24y + y

$$8y^2 - 23y - 3 = 8y^2 - 24y + y - 3$$

$$= 8y(y - 3) + 1(y - 3)$$

$$= (8y + 1)(y - 3)$$

8. $11x^2 - 54x + 63$

Solution:

We have,

$$11x^2 - 54x + 63$$

The coefficient of x^2 is 11

The coefficient of x is -54

Constant term is 63

So, we express the middle term -54x as -33x - 21x

$$11x^2 - 54x + 63 = 11x^2 - 33x - 21x + 63$$

$$= 11x(x - 3) - 21(x - 3)$$

$$= (11x - 21)(x - 3)$$

9. $7x - 6x^2 + 20$

Solution:

We have,

$$7x - 6x^2 + 20$$

$$- 6x^2 + 7x + 20$$

$$6x^2 - 7x - 20$$

The coefficient of x^2 is 6

The coefficient of x is -7

Constant term is -20

So, we express the middle term -7x as -15x + 8x

$$\begin{aligned} 6x^2 - 7x - 20 &= 6x^2 - 15x + 8x - 20 \\ &= 3x(2x - 5) + 4(2x - 5) \\ &= (3x + 4)(2x - 5) \end{aligned}$$

10. $3x^2 + 22x + 35$

Solution:

We have,

$$3x^2 + 22x + 35$$

The coefficient of x^2 is 3

The coefficient of x is 22

Constant term is 35

So, we express the middle term $22x$ as $15x + 7x$

$$\begin{aligned} 3x^2 + 22x + 35 &= 3x^2 + 15x + 7x + 35 \\ &= 3x(x + 5) + 7(x + 5) \\ &= (3x + 7)(x + 5) \end{aligned}$$

11. $12x^2 - 17xy + 6y^2$

Solution:

We have,

$$12x^2 - 17xy + 6y^2$$

The coefficient of x^2 is 12

The coefficient of x is $-17y$

Constant term is $6y^2$

So, we express the middle term $-17xy$ as $-9xy - 8xy$

$$\begin{aligned} 12x^2 - 17xy + 6y^2 &= 12x^2 - 9xy - 8xy + 6y^2 \\ &= 3x(4x - 3y) - 2y(4x - 3y) \\ &= (3x - 2y)(4x - 3y) \end{aligned}$$

12. $6x^2 - 5xy - 6y^2$

Solution:

We have,

$$6x^2 - 5xy - 6y^2$$

The coefficient of x^2 is 6

The coefficient of x is $-5y$

Constant term is $-6y^2$

So, we express the middle term $-5xy$ as $4xy - 9xy$

$$\begin{aligned} 6x^2 - 5xy - 6y^2 &= 6x^2 + 4xy - 9xy - 6y^2 \\ &= 2x(3x + 2y) - 3y(3x + 2y) \\ &= (2x - 3y)(3x + 2y) \end{aligned}$$

13. $6x^2 - 13xy + 2y^2$

Solution:

We have,

$$6x^2 - 13xy + 2y^2$$

The coefficient of x^2 is 6

The coefficient of x is $-13y$

Constant term is $2y^2$

So, we express the middle term $-13xy$ as $-12xy - xy$

$$\begin{aligned} 6x^2 - 13xy + 2y^2 &= 6x^2 - 12xy - xy + 2y^2 \\ &= 6x(x - 2y) - y(x - 2y) \\ &= (6x - y)(x - 2y) \end{aligned}$$

14. $14x^2 + 11xy - 15y^2$

Solution:

We have,

$$14x^2 + 11xy - 15y^2$$

The coefficient of x^2 is 14

The coefficient of x is $11y$

Constant term is $-15y^2$

So, we express the middle term $11xy$ as $21xy - 10xy$

$$\begin{aligned} 14x^2 + 11xy - 15y^2 &= 14x^2 + 21xy - 10xy - 15y^2 \\ &= 2x(7x - 5y) + 3y(7x - 5y) \\ &= (2x + 3y)(7x - 5y) \end{aligned}$$

15. $6a^2 + 17ab - 3b^2$

Solution:

We have,

$$6a^2 + 17ab - 3b^2$$

The coefficient of a^2 is 6

The coefficient of a is $17b$

Constant term is $-3b^2$

So, we express the middle term $17ab$ as $18ab - ab$

$$\begin{aligned} 6a^2 + 17ab - 3b^2 &= 6a^2 + 18ab - ab - 3b^2 \\ &= 6a(a + 3b) - b(a + 3b) \\ &= (6a - b)(a + 3b) \end{aligned}$$

16. $36a^2 + 12abc - 15b^2c^2$

Solution:

We have,

$$36a^2 + 12abc - 15b^2c^2$$

The coefficient of a^2 is 36

The coefficient of a is $12bc$

Constant term is $-15b^2c^2$

So, we express the middle term $12abc$ as $30abc - 18abc$

$$\begin{aligned} 36a^2 - 12abc - 15b^2c^2 &= 36a^2 + 30abc - 18abc - 15b^2c^2 \\ &= 6a(6a + 5bc) - 3bc(6a + 5bc) \\ &= (6a + 5bc)(6a - 3bc) \\ &= (6a + 5bc)3(2a - bc) \end{aligned}$$

17. $15x^2 - 16xyz - 15y^2z^2$

Solution:

We have,

$$15x^2 - 16xyz - 15y^2z^2$$

The coefficient of x^2 is 15

The coefficient of x is $-16yz$

Constant term is $-15y^2z^2$

So, we express the middle term $-16xyz$ as $-25xyz + 9xyz$

$$\begin{aligned} 15x^2 - 16xyz - 15y^2z^2 &= 15x^2 - 25yzx + 9yzx - 15y^2z^2 \\ &= 5x(3x - 5yz) + 3yz(3x - 5yz) \\ &= (5x + 3yz)(3x - 5yz) \end{aligned}$$

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

Solution:

We have,

$$(x - 2y)^2 - 5(x - 2y) + 6$$

The coefficient of $(x-2y)^2$ is 1

The coefficient of $(x-2y)$ is -5

Constant term is 6

So, we express the middle term $-5(x - 2y)$ as $-2(x - 2y) - 3(x - 2y)$

$$\begin{aligned} (x - 2y)^2 - 5(x - 2y) + 6 &= (x - 2y)^2 - 2(x - 2y) - 3(x - 2y) + 6 \\ &= (x - 2y - 2)(x - 2y - 3) \end{aligned}$$

19. $(2a - b)^2 + 2(2a - b) - 8$

Solution:

We have,

$$(2a - b)^2 + 2(2a - b) - 8$$

The coefficient of $(2a-b)^2$ is 1

The coefficient of $(2a-b)$ is 2

Constant term is -8

So, we express the middle term $2(2a-b)$ as $4(2a-b) - 2(2a-b)$

$$\begin{aligned}(2a-b)^2 + 2(2a-b) - 8 &= (2a-b)^2 + 4(2a-b) - 2(2a-b) - 8 \\ &= (2a-b)(2a-b+4) - 2(2a-b+4) \\ &= (2a-b+4)(2a-b-2)\end{aligned}$$



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