

RD SHARMA

Solutions

Class 8 Maths

Chapter 7

Ex 7.8

Resolve each of the following quadratic equation trinomials into factors:

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

Solution. The given expression is $2x^2 + 5x + 3$.

(Co-efficient of $x^2 = 2$, co-efficient of $x = 5$ and the constant term = 3)

We will split the co-efficient of x into two parts such that their sum is 5 and their product equals to the product of the co-efficient of x^2 and the constant term, i.e., $2 \times 3 = 6$.

Now,

$$2 + 3 = 5$$

And

$$2 \times 3 = 6$$

Replacing the middle term $5x$ by $2x + 3x$, we have:

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

$$= (2x^2 + 2x) + (3x + 3)$$

$$= 2x(x + 1) + 3(x + 1)$$

$$= (2x + 3)(x + 1)$$

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

Solution.

The given expression is $2x^2 - 3x - 2$.

(Co-efficient of $x^2 = 2$, co-efficient of $x = -3$ and the constant term = -2)

We will split the co-efficient of x into two parts such that their sum is -3 and their product equals to the product of the co-efficient of x^2 and the constant term, i.e., $2 \times (-2) = -4$

Now,

$$(-4) + 1 = -3$$

And

$$(-4) \times 1 = -4$$

Replacing the middle term $3x$ by $-4x + x$, we have:

$$2x^2 - 3x - 2 = 2x^2 - 4x + x - 2$$

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

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

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

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

Solution.

The given expression is $3x^2 + 10x + 3$.

(Co-efficient of $x^2 = 3$, co-efficient of $x = 10$ and the constant term = 3)

We will split the co-efficient of x into two parts such that their sum is 10 and their product equals to the product of the co-efficient of x^2 and the constant term, i.e., $3 \times 3 = 9$

Now,

$$9 + 1 = 10$$

And

$$9 \times 1 = 9$$

Replacing the middle term $10x$ by $9x + x$, we have:

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

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

Solution.

The given expression is $7x - 6 - 2x^2$.

(Co-efficient of $x^2 = -2$, co-efficient of $x = 7$ and the constant term = -6)

We will split the co-efficient of x into two parts such that their sum is 7 and their product equals to the product of the co-efficient of x^2 and the constant term, i.e., $(-2) \times (-6) = 12$

Now,

$$4 + 3 = 7$$

And

$$4 \times 3 = 12$$

Replacing the middle term $7x$ by $4x + 3x$, we have:

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

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

Solution.

The given expression is $7x^2 - 19x - 6$.

(Co-efficient of $x^2 = 7$, co-efficient of $x = -19$ and the constant term = -6)

We will split the co-efficient of x into two parts such that their sum is -19 and their product equals to the product of the co-efficient of x^2 and the constant term, i.e., $7 \times (-6) = -42$

Now,

$$(-21) + 2 = -19$$

And

$$(-21) \times 2 = -42$$

Replacing the middle term $-19x$ by $-21x + 2x$, we have:

$$\begin{aligned}
7x^2 - 19x - 6 &= 7x^2 - 21x + 2x - 6 \\
&= (7x^2 - 21x) + (2x - 6) \\
&= 7x(x - 3) + 2(x - 3) \\
&= (x - 3)(7x + 2)
\end{aligned}$$

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

Solution.

The given expression is $28 - 31x - 5x^2$.

(Co-efficient of $x^2 = -5$, co-efficient of $x = -31$ and the constant term = 28)

We will split the co-efficient of x into two parts such that their sum is -31 and their product equals to the product of the co-efficient of x^2 and the constant term, i.e., $(-5) \times (28) = -140$

Now,

$$(-35) + 4 = -31$$

And

$$(-35) \times 4 = -140$$

Replacing the middle term $-31x$ by $-35x + 4x$, we have:

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

$$= (-5x^2 - 35x) + (4x + 28)$$

$$= -5x(x + 7) + 4(x + 7)$$

$$= (4 - 5x)(x + 7)$$

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

Solution.

The given expression is $3 + 23y - 8y^2$.

(Co-efficient of $y^2 = -8$, co-efficient of $y = 23$ and the constant term = 3)

We will split the co-efficient of x into two parts such that their sum is 23 and their product equals to the product of the co-efficient of x^2 and the constant term, i.e., $(-8) \times 3 = -24$

Now,

$$(-1) + 24 = 23$$

And

$$(-1) \times 24 = -24$$

Replacing the middle term $23y$ by $-y + 24y$, we have:

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

$$= (-8y^2 - y) + (24y + 3)$$

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

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

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

Solution.

The given expression is $11x^2 - 54x + 63$.

(Co-efficient of $x^2 = 11$, co-efficient of $x = -54$ and the constant term = 63)

We will split the co-efficient of x into two parts such that their sum is -19 and their product equals to the product of the co-efficient of x^2 and the constant term, i.e., $11 \times 63 = 693$

Now,

$$(-33) + (-21) = -54$$

And

$$(-33) \times (-21) = 693$$

Replacing the middle term $-54x$ by $-33x - 21x$, we have:

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

$$= (11x^2 - 33x) + (-21x + 63)$$

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

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

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

Solution.

The given expression is $7x - 6x^2 + 20$.

(Co-efficient of $x^2 = -6$, co-efficient of $x = 7$ and the constant term = 20)

We will split the co-efficient of x into two parts such that their sum is -19 and their product equals to the product of the co-efficient of x^2 and the constant term, i.e., $(-6) \times 20 = -120$

Now,

$$(15) + (-8) = 7$$

And

$$(15) \times (-8) = -120$$

Replacing the middle term $7x$ by $15x - 8x$, we have:

$$7x - 6x^2 + 20 = -6x^2 + 15x - 8x + 20$$

$$= (-6x^2 + 15x) + (-8x + 20)$$

$$= 3x(-2x + 5) + 4(-2x + 5)$$

$$= (-2x + 5)(3x + 4)$$

Q-10. $3x^2 + 22x + 35$ **Solution.**

The given expression is $3x^2 + 22x + 35$.

(Co-efficient of $x^2 = 3$, co-efficient of $x = 22$ and the constant term = 35)

We will split the co-efficient of x into two parts such that their sum is -19 and their product equals to the product of the co-efficient of x^2 and the constant term, i.e., $3 \times 35 = 105$

Now,

$$(15) + (7) = 22$$

And

$$(15) \times (7) = 105$$

Replacing the middle term $22x$ by $15x + 7x$, we have:

$$3x^2 + 22x + 35 = 3x^2 + 15x + 7x + 35$$

$$= (3x^2 + 15x) + (7x + 35)$$

$$= 3x(x + 5) + 7(x + 5)$$

$$= (x + 5)(3x + 7)$$

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

The given expression is $12x^2 - 17xy + 6y^2$.

(Co-efficient of $x^2 = 12$, co-efficient of $x = -17y$ and the constant term = $6y^2$)

We will split the co-efficient of x into two parts such that their sum is -17y and their product equals to the product of the co-efficient of x^2 and the constant term, i.e., $12 \times 6y^2 = 72y^2$

Now,

$$(-9y) + (-8y) = -17y$$

And

$$(-9y) \times (-8y) = 72y^2$$

Replacing the middle term $-17xy$ by $-9xy - 8xy$, we have:

$$12x^2 - 17xy + 6y^2 = 12x^2 - 9xy - 8xy + 6y^2$$

$$= (12x^2 - 9xy) - (8xy + 6y^2)$$

$$= 3x(4x - 3y) - 2y(4x - 3y)$$

$$= (4x - 3y)(3x - 2y)$$

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

Solution. The given expression is $6x^2 - 5xy - 6y^2$.

(Co-efficient of $x^2 = 6$, co-efficient of $x = -5y$ and the constant term $= -6y^2$)

We will split the co-efficient of x into two parts such that their sum is $-5y$ and their product equals to the product of the co-efficient of x^2 and the constant term, i.e., $6 \times (-6y^2) = -36y^2$

Now,

$$(-9y) + (4y) = -5y$$

And

$$(-9y) \times (4y) = -36y^2$$

Replacing the middle term $-5xy$ by $-9xy + 4xy$, we have:

$$6x^2 - 5xy - 6y^2 = 6x^2 - 9xy + 4xy - 6y^2$$

$$= (6x^2 - 9xy) + (4xy - 6y^2)$$

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

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

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

Solution.

The given expression is $6x^2 - 13xy + 2y^2$.

(Co-efficient of $x^2 = 6$, co-efficient of $x = -13y$ and the constant term $= 2y^2$)

We will split the co-efficient of x into two parts such that their sum is $-13y$ and their product equals to the product of the co-efficient of x^2 and the constant term, i.e., $6 \times (2y^2) = 12y^2$

Now,

$$(-12y) + (-y) = -13y$$

And

$$(-12y) \times (-y) = 12y^2$$

Replacing the middle term $-13xy$ by $-12xy - xy$, we have:

$$6x^2 - 13xy + 2y^2 = 6x^2 - 12xy - xy + 2y^2$$

$$= (6x^2 - 12xy) - (xy - 2y^2)$$

$$= 6x(x - 2y) - y(x - 2y)$$

$$= (x - 2y)(6x - y)$$

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

Solution.

The given expression is $14x^2 + 11xy - 15y^2$.

(Co-efficient of $x^2 = 14$, co-efficient of $x = 11y$ and the constant term $= -15y^2$)

We will split the co-efficient of x into two parts such that their sum is $11y$ and their product equals to the product of the co-efficient of x^2 and the constant term, i.e., $14 \times (-15y^2) = -210y^2$

Now,

$$(21y) + (-10y) = 11y$$

And

$$(21y) \times (-10y) = -210y^2$$

Replacing the middle term $-11xy$ by $-10xy + 21xy$, we have:

$$14x^2 + 11xy - 15y^2 = 14x^2 - 10xy + 21xy - 15y^2$$

$$= (14x^2 - 10xy) + (21xy - 15y^2)$$

$$= 2x(7x - 5y) + 3y(7x - 5y)$$

$$= (7x - 5y)(2x + 3y)$$

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

Solution.

The given expression is $6a^2 + 17ab - 3b^2$.

(Co-efficient of $a^2 = 6$, co-efficient of $a = 17b$ and the constant term $= -3b^2$)

We will split the co-efficient of x into two parts such that their sum is $17b$ and their product equals to the product of the co-efficient of a^2 and the constant term, i.e., $6 \times (-3b^2) = -18b^2$

Now,

$$(18b) + (-b) = 17b$$

And

$$(18b) \times (-b) = -18b^2$$

Replacing the middle term $17ab$ by $-ab + 18ab$, we have:

$$6a^2 + 17ab - 3b^2 = 6a^2 - ab + 18ab - 3b^2$$

$$= (6a^2 - ab) + (18ab - 3b^2)$$

$$= a(6a - b) + 3b(6a - b)$$

$$= (a + 3b)(6a - b)$$

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

Solution.

The given expression is $36a^2 + 12abc - 15b^2c^2$.

(Co-efficient of $a^2 = 36$, co-efficient of $a = 12bc$ and the constant term $= -15b^2c^2$)

We will split the co-efficient of x into two parts such that their sum is $12bc$ and their product equals to the product of the co-efficient of a^2 and the constant term, i.e., $36 \times (-15b^2c^2) = -540b^2c^2$

Now,

$$(-18bc) + 30bc = 12bc$$

And

$$(-18bc) \times (30bc) = -540b^2c^2$$

Replacing the middle term $12abc$ by $-18abc + 30abc$, we have:

$$36a^2 + 12abc - 15b^2c^2 = 36a^2 - 18abc + 30abc - 15b^2c^2$$

$$= (36a^2 - 18abc) + (30abc - 15b^2c^2)$$

$$= 18a(2a - bc) + 15bc(2a - bc)$$

$$= 3(6a + 5bc)(2a - bc)$$

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

Solution.

The given expression is $15x^2 - 16xyz - 15y^2z^2$.

(Co-efficient of $x^2 = 15$, co-efficient of $x = -16yz$ and the constant term $= -15y^2z^2$)

We will split the co-efficient of x into two parts such that their sum is $-16yz$ and their product equals to the product of the co-efficient of x^2 and the constant term, i.e., $15 \times (-15y^2z^2) = -225y^2z^2$

Now,

$$(-25yz) + 9yz = -16yz$$

And

$$(-25yz) \times (9yz) = -225y^2z^2$$

Replacing the middle term $-16xyz$ by $-25xyz + 9xyz$, we have:

$$15x^2 - 16xyz - 15y^2z^2 = 15x^2 - 25xyz + 9xyz - 15y^2z^2$$

$$= (15x^2 - 25xyz) + (9xyz - 15y^2z^2)$$

$$= 5x(3x - 5yz) + 3yz(3x - 5yz)$$

$$= (3x - 5yz)(5x + 3yz)$$

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

Solution.

The given expression is $a^2 - 5a + 6$.

Assuming $a = x - 2y$, we have:

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

(Co-efficient of $a^2 = 1$, co-efficient of $a = -5$ and the constant term $= 6$)

Now, we will split the co-efficient of a into two parts such that their sum is -5 and their product equals to the product of the co-efficient of a^2 and the constant term, i.e., $1 \times 6 = 6$.

Clearly,

$$(-2) + (-3) = -5$$

And,

$$(-2) \times (-3) = 6$$

Replacing the middle term $-5a$ by $-2a - 3a$, we have:

$$a^2 - 5a + 6 = a^2 - 2a - 3a + 6$$

$$= (a^2 - 2a) - (3a - 6)$$

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

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

Replacing a by $(x - 2y)$, we get:

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

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

Solution.

Assuming $x = 2a - b$, we have:

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

The given expression becomes $x^2 + 2x - 8$

(Co-efficient of $x^2 = 1$ and that of $x = 2$; constant term $= -8$)

Now, we will split the co-efficient of x into two parts such that their sum is 2 and their product equals the product of the co-efficient of x^2 and the constant term, i.e., $1 \times (-8) = -8$

Clearly,

$$(-2) + 4 = 2$$

And,

$$(-2) \times 4 = -8$$

Replacing the middle term $2x$ by $-2x + 4x$, we get:

$$x^2 + 2x - 8 = x^2 - 2x + 4x - 8$$

$$= (x^2 - 2x) + (4x - 8)$$

$$= x(x - 2) + 4(x - 2)$$

$$= (x - 2)(x + 4)$$

Replacing x by $2a - b$, we get:

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