

# Maharashtra Board Solutions for Class 10-Maths (Part 1): Chapter 2- Quadratic Equations

**BOOK SOLUTIONS**  
**CLASS 10**

**CHAPTER 2**  
**QUADRASTIC EQUATIONS**

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## Postal Address

IndCareer.com, 52, Shilpa Nagar, Somalwada Nagpur - 440015  
Maharashtra, India

**WhatsApp:** +91 9561 204 888, **Website:** <https://www.indcareer.com>

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# Maharashtra Board Solutions for Class 10-Maths (Part 1): Chapter 2- Quadratic Equations

Class 10: Maths Chapter 2 solutions. Complete Class 10 Maths Chapter 2 Notes.

## Maharashtra Board Solutions for Class 10-Maths (Part 1): Chapter 2- Quadratic Equations

Maharashtra Board 10th Maths Chapter 2, Class 10 Maths Chapter 2 solutions

### Practice Set 2.1

#### Question 1.

Write any two quadratic equations.

**Solution:**

i.  $y^2 - 7y + 12 = 0$

ii.  $x^2 - 8 = 0$

#### Question 2.

Decide which of the following are quadratic

i.  $x^2 - 7y + 2 = 0$

ii.  $y^2 = 5y - 10$

iii.  $y^2 + 1y = 2$

iv.  $x + 1x = -2$

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v.  $(m + 2)(m - 5) = 0$

vi.  $m^3 + 3m^2 - 2 = 3m^3$

**Solution:**

i. The given equation is  $x^2 + 5x - 2 = 0$

Here,  $x$  is the only variable and maximum index of the variable is 2.

$a = 1$ ,  $b = 5$ ,  $c = -2$  are real numbers and  $a \neq 0$ .

$\therefore$  The given equation is a quadratic equation.

ii. The given equation is

$$y^2 = 5y - 10$$

$$\therefore y^2 - 5y + 10 = 0$$

Here,  $y$  is the only variable and maximum index of the variable is 2.

$a = 1$ ,  $b = -5$ ,  $c = 10$  are real numbers and  $a \neq 0$ .

$\therefore$  The given equation is a quadratic equation.

iii. The given equation is

$$y^2 + 1y = 2$$

$$\therefore y^3 + 1 = 2y \dots [\text{Multiplying both sides by } y]$$

$$\therefore y^3 - 2y + 1 = 0$$

Here,  $y$  is the only variable and maximum index of the variable is not 2.

$\therefore$  The given equation is not a quadratic equation.

iv. The given equation is

$$x + 1x = -2$$

$$\therefore x^2 + 1 = -2x \dots [\text{Multiplying both sides by } x]$$

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$$\therefore x^2 + 2x + 1 = 0$$

Here,  $x$  is the only variable and maximum index of the variable is 2.

$a = 1$ ,  $b = 2$ ,  $c = 1$  are real numbers and  $a \neq 0$ .

$\therefore$  The given equation is a quadratic equation.

v. The given equation is

$$(m + 2)(m - 5) = 0$$

$$\therefore m(m - 5) + 2(m - 5) = 0$$

$$\therefore m^2 - 5m + 2m - 10 = 0$$

$$\therefore m^2 - 3m - 10 = 0$$

Here,  $m$  is the only variable and maximum index of the variable is 2.

$a = 1$ ,  $b = -3$ ,  $c = -10$  are real numbers and  $a \neq 0$ .

$\therefore$  The given equation is a quadratic equation.

vi. The given equation is

$$m^3 + 3m^2 - 2 = 3m^3$$

$$\therefore 3m^3 - m^3 - 3m^2 + 2 = 0$$

$$\therefore 2m^3 - 3m^2 + 2 = 0$$

Here,  $m$  is the only variable and maximum

index of the variable is not 2.

$\therefore$  The given equation is not a quadratic equation.

### Question 3.

**Write the following equations in the form  $ax^2 + bx + c = 0$ , then write the values of  $a$ ,  $b$ ,  $c$  for each equation.**

i.  $2y = 10 - y^2$

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ii.  $(x - 1)^2 = 2x + 3$

iii.  $x^2 + 5x = -(3 - x)$

iv.  $3m^2 = 2m^2 - 9$

v.  $P(3 + 6p) = -5$

vi.  $x^2 - 9 = 13$

**Solution:**

i.  $2y - 10 - y^2$

$$\therefore y^2 + 2y - 10 = 0$$

Comparing the above equation with

$$ay^2 + by + c = 0, \text{ we get}$$

$$a = 1, b = 2, c = -10$$

ii.  $(x - 1)^2 = 2x + 3$

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

$$x^2 - 2x + 1 - 2x - 3 = 0$$

$$\therefore x^2 - 4x - 2 = 0$$

Comparing the above equation with

$$ax^2 + bx + c = 0, \text{ we get}$$

$$a = 1, b = -4, c = -2$$

iii.  $x^2 + 5x = -(3 - x)$

$$\therefore x^2 + 5x = -3 + x$$

$$\therefore x^2 + 5x - x + 3 = 0$$

$$\therefore x^2 + 4x + 3 = 0$$

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Comparing the above equation with

$ax^2 + bx + c = 0$ , we get

$$a = 1, b = 4, c = 3$$

$$\text{iv. } 3m^2 = 2m^2 - 9$$

$$\therefore 3m^2 - 2m^2 + 9 = 0$$

$$\therefore m^2 + 9 = 0$$

$$\therefore m^2 + 0m + 9 = 0$$

Comparing the above equation with

$am^2 + bm + c = 0$ , we get

$$a = 1, b = 0, c = 9$$

$$\text{v. } p(3 + 6p) = -5$$

$$\therefore 3p + 6p^2 = -5$$

$$\therefore 6p^2 + 3p + 5 = 0$$

Comparing the above equation with

$ap^2 + bp + c = 0$ , we get

$$a = 6, b = 3, c = 5$$

$$\text{vi. } x^2 - 9 = 13$$

$$\therefore x^2 - 9 - 13 = 0$$

$$\therefore x^2 - 22 = 0$$

$$\therefore x^2 + 0x - 22 = 0$$

Comparing the above equation with

$ax^2 + bx + c = 0$ , we get

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$$a = 1, b = 0, c = -22$$

**Question 4.**

**Determine whether the values given against each of the quadratic equation are the roots of the equation.**

i.  $x^2 + 4x - 5 = 0$ ;  $x = 1, -1$

ii.  $2m^2 - 5m = 0$ ;  $m = 2, 52$

Solution:

i. The given equation is

$$x^2 + 4x - 5 = 0 \dots(i)$$

Putting  $x = 1$  in L.H.S. of equation (i), we get

$$\text{L.H.S.} = (1)^2 + 4(1) - 5 = 1 + 4 - 5 = 0$$

$$\therefore \text{L.H.S.} = \text{R.H.S.}$$

$\therefore x = 1$  is the root of the given quadratic equation.

Putting  $x = -1$  in L.H.S. of equation (i), we get

$$\text{L.H.S.} = (-1)^2 + 4(-1) - 5 = 1 - 4 - 5 = -8$$

$$\therefore \text{L.H.S.} \neq \text{R.H.S.}$$

$\therefore x = -1$  is not the root of the given quadratic equation.

ii. The given equation is

$$2m^2 - 5m = 0 \dots(i)$$

Putting  $m = 2$  in L.H.S. of equation (i), we get

$$\text{L.H.S.} = 2(2)^2 - 5(2) = 2(4) - 10 = 8 - 10 = -2$$

$$\therefore \text{L.H.S.} \neq \text{R.H.S.}$$

$\therefore m = 2$  is not the root of the given quadratic equation.

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Putting  $m = 52$  in L.H.S. of equation (i), we get

$$\begin{aligned}\text{L.H.S.} &= 2\left(\frac{5}{2}\right)^2 - 5\left(\frac{5}{2}\right) = 2\left(\frac{25}{4}\right) - \frac{25}{2} \\ &= \frac{25}{2} - \frac{25}{2} \\ &= 0\end{aligned}$$

$\therefore$  L.H.S. = R.H.S.

$\therefore$   $m = \frac{5}{2}$  is the root of the given quadratic equation.

#### Question 5.

Find  $k$  if  $x = 3$  is a root of equation  $kx^2 - 10x + 3 = 0$ .

**Solution:**

$x = 3$  is the root of the equation  $kx^2 - 10x + 3 = 0$ .

Putting  $x = 3$  in the given equation, we get

$$k(3)^2 - 10(3) + 3 = 0$$

$$\therefore 9k - 30 + 3 = 0$$

$$\therefore 9k - 27 = 0$$

$$\therefore 9k = 27$$

$$\therefore k = 279$$

$$\therefore k = 3$$

#### Question 6.

One of the roots of equation  $5m^2 + 2m + k = 0$  is  $-75$  Complete the following activity to find the value of 'k'.

**Solution:**

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$\frac{-7}{5}$  is a root of quadratic equation

$$5m^2 + 2m + k = 0.$$

∴ Put  $m = \frac{-7}{5}$  in the equation.

$$\therefore 5 \times \left(\frac{-7}{5}\right)^2 + 2 \times \frac{-7}{5} + k = 0$$

$$\therefore \frac{49}{5} + \frac{-14}{5} + k = 0$$

$$\therefore 7 + k = 0$$

$$\therefore k = -7$$

#### Question 1.

$x^2 + 3x - 5$ ,  $3x^2 - 5x$ ,  $5x^2$ ; Write the polynomials in the index form. Observe the coefficients and fill in the boxes. (Textbook p. no. 31)

**Answer:**

Index form of the given polynomials:

$$x^2 + 3x - 5, 3x^2 - 5x + 0, 5x^2 + 0x + 0$$

- Coefficients of  $x^2$  are [1], [3] and [5] respectively, and these coefficients are non zero.
- Coefficients of  $x$  are 3, [-5] and [0] respectively.
- Constant terms are [-5], [0] and [0] respectively.

Here, constant terms of second and third polynomial is zero.

#### Question 2.

Complete the following table (Textbook p. no. 31)

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| Quadratic Equation | General form       | a   | b   | c   |
|--------------------|--------------------|-----|-----|-----|
| $x^2 - 4 = 0$      | $x^2 + 0x - 4 = 0$ | 1   | 0   | -4  |
| $y^2 = 2y - 7$     | ...                | ... | ... | ... |
| $x^2 + 2x = 0$     | ...                | ... | ... | ... |

**Answer:**

| Quadratic Equation | General form       | a | b  | c  |
|--------------------|--------------------|---|----|----|
| $x^2 - 4 = 0$      | $x^2 + 0x - 4 = 0$ | 1 | 0  | -4 |
| $y^2 = 2y - 7$     | $y^2 - 2y + 7 = 0$ | 1 | -2 | 7  |
| $x^2 + 2x = 0$     | $x^2 + 2x + 0 = 0$ | 1 | 2  | 0  |

**Question 3.**

**Decide which of the following are quadratic equations? (Textbook pg. no. 31)**

- i.  $9y^2 + 5 = 0$
- ii.  $m^3 - 5m^2 + 4 = 0$
- iii.  $(l + 2)(l - 5) = 0$

**Solution:**

i. In the equation  $9y^2 + 5 = 0$ ,  $[y]$  is the only variable and maximum index of the variable is  $[2]$ .

∴ It [is] a quadratic equation.

ii. In the equation  $m^3 - 5m^2 + 4 = 0$ ,  $[m]$  is the only variable and maximum index of the variable is not 2.

∴ It [is not] a quadratic equation.

iii.  $(l + 2)(l - 5) = 0$

∴  $l(l - 5) + 2(l - 5) = 0$

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$$\therefore |^2 - 5| + 2| - 10 = 0$$

$$\therefore |^2 - 3| - 10 = 0.$$

In this equation [I] is the only variable and maximum index of the variable is [2]

$\therefore$  it [is] a quadratic equation.

#### Question 4.

If  $x = 5$  is a root of equation  $kx^2 - 14x - 5 = 0$ , then find the value of  $k$  by completing the following activity. (Textbook pg, no. 33)

**Solution:**

One of the roots of equation  $kx^2 - 14x - 5 = 0$  is  $\boxed{5}$ .

$\therefore$  Put  $x = \boxed{5}$  in the given equation.

$$\therefore k\boxed{5}^2 - 14\boxed{(5)} - 5 = 0$$

$$\therefore 25k - 70 - 5 = 0$$

$$\therefore 25k - \boxed{75} = 0$$

$$\therefore 25k = \boxed{75}$$

$$\therefore k = \frac{\boxed{75}}{\boxed{25}} = 3$$

#### Practice Set 2.2

##### Question 1.

Solve the following quadratic equations by factorisation.

i.  $x^2 - 15x + 54 = 0$

ii.  $x^2 + x - 20 = 0$

iii.  $2y^2 + 27y + 13 = 0$

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iv.  $5m^2 = 22m + 15$

v.  $2x^2 - 2x + 12 = 0$

vi.  $6x - 2x = 1$

vii.  $\sqrt{2}x^2 + 7x + 5\sqrt{2} = 0$  to solve this quadratic equation by factorisation complete the following activity

viii.  $3x^2 - 2\sqrt{6}x + 2 = 0$

ix.  $2m(m - 24) = 50$

x.  $252 = 9$

xi.  $7m^2 = 21m$

xii.  $m^2 - 11 = 0$

**Solution:**

$$\begin{aligned} \text{i. } & x^2 - 15x + 54 = 0 \\ \therefore & x^2 - 9x - 6x + 54 = 0 \\ \therefore & x(x - 9) - 6(x - 9) = 0 \\ \therefore & (x - 9)(x - 6) = 0 \end{aligned}$$

$$\begin{array}{c} 54 \\ \swarrow \quad \searrow \\ -9 \quad -6 \\ -9 \times -6 = +54 \\ -9 - 6 = -15 \end{array}$$

By using the property, if the product of two numbers is zero, then at least one of them is zero, we get

$$\therefore x - 9 = 0 \text{ or } x - 6 = 0$$

$$\therefore x = 9 \text{ or } x = 6$$

$\therefore$  The roots of the given quadratic equation are 9 and 6.

$$\begin{aligned} \text{ii. } & x^2 + x - 20 = 0 \\ \therefore & x^2 + 5x - 4x - 20 = 0 \\ \therefore & x(x + 5) - 4(x + 5) = 0 \\ \therefore & (x + 5)(x - 4) = 0 \end{aligned}$$

$$\begin{array}{c} -20 \\ \swarrow \quad \searrow \\ 5 \quad -4 \\ 5 \times -4 = -20 \\ 5 - 4 = 1 \end{array}$$

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By using the property, if the product of two numbers is zero, then at least one of them is zero, we get

$$\therefore x + 5 = 0 \text{ or } x - 4 = 0$$

$$\therefore x = -5 \text{ or } x = 4$$

$\therefore$  The roots of the given quadratic equation are -5 and 4.

|              |                              |                                                                      |
|--------------|------------------------------|----------------------------------------------------------------------|
| iii.         | $2y^2 + 27y + 13 = 0$        | $2 \times 13 = 26$                                                   |
| $\therefore$ | $2y^2 + 26y + y + 13 = 0$    | $\begin{array}{c} 26 \quad 1 \\ \diagup \quad \diagdown \end{array}$ |
| $\therefore$ | $2y(y + 13) + 1(y + 13) = 0$ | $26 \times 1 = 26$                                                   |
| $\therefore$ | $(y + 13)(2y + 1) = 0$       | $26 + 1 = 27$                                                        |

By using the property, if the product of two numbers is zero, then at least one of them is zero, we get

$$\therefore y + 13 = 0 \text{ or } 2y + 1 = 0$$

$$\therefore y = -13 \text{ or } 2y = -1$$

$$\therefore y = -13 \text{ or } y = -\frac{1}{2}$$

$\therefore$  The roots of the given quadratic equation are -13 and  $-\frac{1}{2}$

|              |                            |                                                                        |
|--------------|----------------------------|------------------------------------------------------------------------|
| iv.          | $5m^2 = 22m + 15$          | $5 \times -15 = -75$                                                   |
| $\therefore$ | $5m^2 - 22m - 15 = 0$      | $\begin{array}{c} -25 \quad +3 \\ \diagup \quad \diagdown \end{array}$ |
| $\therefore$ | $5m^2 - 25m + 3m - 15 = 0$ | $-25 + 3 = -22$                                                        |
| $\therefore$ | $5m(m - 5) + 3(m - 5) = 0$ | $-25 \times 3 = -75$                                                   |
| $\therefore$ | $(m - 5)(5m + 3) = 0$      |                                                                        |

By using the property, if the product of two numbers is zero, then at least one of them is zero, we get

$$\therefore m - 5 = 0 \text{ or } 5m + 3 = 0$$

$$\therefore m = 5 \text{ or } 5m = -3$$

$$\therefore m = 5 \text{ or } m = -\frac{3}{5}$$

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∴ The roots of the given quadratic equation are 5 and – 35

$$\text{v. } 2x^2 - 2x + \frac{1}{2} = 0$$

$$\therefore 4x^2 - 4x + 1 = 0$$

...[Multiplying both sides by 2]

$$\therefore 4x^2 - 2x - 2x + 1 = 0$$

$$\therefore 2x(2x - 1) - 1(2x - 1) = 0$$

$$\therefore (2x - 1)(2x - 1) = 0$$

By using the property, if the product of two numbers is zero, then at least one of them is zero, we get

$$\therefore 2x - 1 = 0 \text{ or } 2x - 1 = 0$$

$$\therefore 2x = 1 \text{ or } 2x = 1$$

$$\therefore x = \frac{1}{2} \text{ or } x = \frac{1}{2}$$

∴ The roots of the given quadratic equation are  $\frac{1}{2}$  and  $\frac{1}{2}$ .

$$\begin{array}{r} 4 \\ \swarrow \quad \searrow \\ -2, -2 \\ -2 - 2 = -4 \\ -2 \times -2 = 4 \end{array}$$

$$\text{vi. } 6x - \frac{2}{x} = 1$$

$$\therefore 6x^2 - 2 = x \quad \dots[\text{Multiplying both sides by } x]$$

$$\therefore 6x^2 - x - 2 = 0$$

$$\therefore 6x^2 - 4x + 3x - 2 = 0$$

$$\therefore 2x(3x - 2) + 1(3x - 2) = 0$$

$$\therefore (3x - 2)(2x + 1) = 0$$

$$\begin{array}{r} 6 \times -2 = -12 \\ \swarrow \quad \searrow \\ -4, +3 \\ -4 + 3 = -1 \\ -4 \times 3 = -12 \end{array}$$

By using the property, if the product of two numbers is zero, then at least one of them is zero, we get

$$\therefore 3x - 2 = 0 \text{ or } 2x + 1 = 0$$

$$\therefore 3x = 2 \text{ or } 2x = -1$$

$$\therefore x = \frac{2}{3} \text{ or } 2x = -1$$

∴ The roots of the given quadratic equation are  $\frac{2}{3}$  and  $-\frac{1}{2}$ .

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$$\begin{aligned}
 \text{vii. } & \sqrt{2}x^2 + 7x + 5\sqrt{2} = 0 \\
 \therefore & \sqrt{2}x^2 + \boxed{5x} + \boxed{2x} + 5\sqrt{2} = 0 \\
 \therefore & x(\sqrt{2}x + 5) + \sqrt{2}(\sqrt{2}x + 5) = 0 \\
 \therefore & (\sqrt{2}x + 5)(x + \sqrt{2}) = 0
 \end{aligned}
 \quad
 \begin{array}{l}
 \sqrt{2} \times 5\sqrt{2} = 10 \\
 \begin{array}{c} \diagup \quad \diagdown \\ 5 \quad 2 \end{array} \\
 5 + 2 = 7 \\
 5 \times 2 = 10
 \end{array}$$

By using the property, if the product of two numbers is zero, then at least one of them is zero, we get

$$\begin{aligned}
 \therefore & (\sqrt{2}x + 5) = 0 \text{ or } (x + \sqrt{2}) = 0 \\
 \therefore & x = \boxed{\frac{-5}{\sqrt{2}}} \text{ or } x = -\sqrt{2} \\
 \therefore & \boxed{\frac{-5}{\sqrt{2}}} \text{ and } -\sqrt{2} \text{ are roots of the equation.}
 \end{aligned}$$

$$\begin{aligned}
 \text{viii. } & 3x^2 - 2\sqrt{6}x + 2 = 0 \\
 \therefore & 3x^2 - \sqrt{6}x - \sqrt{6}x + 2 = 0 \\
 \therefore & \sqrt{3}x(\sqrt{3}x - \sqrt{2}) - \sqrt{2}(\sqrt{3}x - \sqrt{2}) = 0 \\
 \therefore & (\sqrt{3}x - \sqrt{2})(\sqrt{3}x - \sqrt{2}) = 0
 \end{aligned}
 \quad
 \begin{array}{l}
 3 \times 2 = 6 \\
 \begin{array}{c} \diagup \quad \diagdown \\ -\sqrt{6} \quad -\sqrt{6} \end{array} \\
 -\sqrt{6} - \sqrt{6} = -2\sqrt{6} \\
 -\sqrt{6} \times -\sqrt{6} = 6
 \end{array}$$

By using the property, if the product of two numbers is zero, then at least one of them is zero, we get

$$\begin{aligned}
 \therefore & \sqrt{3}x - \sqrt{2} = 0 \text{ or } \sqrt{3}x - \sqrt{2} = 0 \\
 \therefore & \sqrt{3}x = \sqrt{2} \text{ or } \sqrt{3}x = \sqrt{2} \\
 \therefore & x = \frac{\sqrt{2}}{\sqrt{3}} \text{ or } x = \frac{\sqrt{2}}{\sqrt{3}} \\
 \therefore & \text{The roots of the given quadratic equation} \\
 & \text{are } \frac{\sqrt{2}}{\sqrt{3}} \text{ and } \frac{\sqrt{2}}{\sqrt{3}}.
 \end{aligned}$$

$$\text{ix. } 2m(m - 24) = 50$$

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$$\therefore 2m^2 - 48m = 50$$

$$\therefore 2m^2 - 48m - 50 = 0$$

$$\therefore m^2 - 24m - 25 = 0 \dots [\text{Dividing both sides by 2}]$$

$$\therefore m^2 - 25m + m - 25 = 0$$

$$\therefore m(m - 25) + 1(m - 25) = 0$$

$$\therefore (m - 25)(m + 1) = 0$$

By using the property, if the product of two numbers is zero, then at least one of them is zero, we get

$$\begin{array}{r} -25 \\ \swarrow \quad \searrow \\ -25 \quad +1 \\ -25 \times 1 = -25 \\ -25 + 1 = -24 \end{array}$$

$$\therefore m - 25 = 0 \text{ or } m + 1 = 0$$

$$\therefore m = 25 \text{ or } m = -1$$

$\therefore$  The roots of the given quadratic equation are 25 and -1.

x.  $25m^2 = 9$

$$\therefore 25m^2 - 9 = 0$$

$$\therefore (5m)^2 - (3)^2 = 0$$

$$\therefore (5m + 3)(5m - 3) = 0$$

$$\dots [\because a^2 - b^2 = (a + b)(a - b)]$$

By using the property, if the product of two numbers is zero, then at least one of them is zero, we get

$$\therefore 5m + 3 = 0 \text{ or } 5m - 3 = 0$$

$$\therefore 5m = -3 \text{ or } 5m = 3$$

$$\therefore m = -3/5 \text{ or } m = 3/5$$

$\therefore$  The roots of the given quadratic equation are  $-3/5$  and  $3/5$ .

xi.  $7m^2 = 21m$

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$$\therefore 7m^2 - 21m = 0$$

$$\therefore m^2 - 3m = 0 \dots [\text{Dividing both sides by 7}]$$

$$\therefore m(m - 3) = 0$$

By using the property, if the product of two numbers is zero, then at least one of them is zero, we get

$$\therefore m = 0 \text{ or } m - 3 = 0$$

$$\therefore m = 0 \text{ or } m = 3$$

$\therefore$  The roots of the given quadratic equation are 0 and 3.

$$\text{xii. } m^2 - 11 = 0$$

$$\therefore m^2 - (\sqrt{11})^2 = 0$$

$$\therefore (m + \sqrt{11})(m - \sqrt{11}) = 0$$

$$\dots [\because (a)^2 - (b)^2 = (a + b)(a - b)]$$

By using the property, if the product of two numbers is zero, then at least one of them is zero, we get

$$\therefore m + \sqrt{11} = 0 \text{ or } m - \sqrt{11} = 0$$

$$\therefore m = -\sqrt{11} \text{ or } m = \sqrt{11}$$

$\therefore$  The roots of the given quadratic equation are  $-\sqrt{11}$  and  $\sqrt{11}$

### Practice Set 2.3

#### Question 1.

Solve the following quadratic equations by completing the square method.

1.  $x^2 + x - 20 = 0$

2.  $x^2 + 2x - 5 = 0$

3.  $m^2 - 5m = -3$

<https://www.indcareer.com/schools/maharashtra-board-solutions-for-class-10-maths-part-1-chapter-2-quadratic-equations/>

4.  $9y^2 - 12y + 2 = 0$

5.  $2y^2 + 9y + 10 = 0$

6.  $5x^2 = 4x + 7$

**Solution:**

1.  $x^2 + x - 20 = 0$

If  $x^2 + x + k = (x + a)^2$ , then

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

Comparing the coefficients, we get

$$1 = 2a \text{ and } k = a^2$$

$$\therefore a = \frac{1}{2} \text{ and } k = \left(\frac{1}{2}\right)^2 = \frac{1}{4}$$

$$\text{Now, } x^2 + x - 20 = 0$$

$$\therefore x^2 + x + \frac{1}{4} - \frac{1}{4} - 20 = 0$$

$$\therefore \left(x + \frac{1}{2}\right)^2 - \left(\frac{1+80}{4}\right) = 0$$

$$\therefore \left(x + \frac{1}{2}\right)^2 - \left(\frac{81}{4}\right) = 0$$

$$\therefore \left(x + \frac{1}{2}\right)^2 = \frac{81}{4}$$

Taking square root of both sides, we get

$$x + \frac{1}{2} = \pm \frac{9}{2}$$

$$\therefore x + \frac{1}{2} = \frac{9}{2} \quad \text{or} \quad x + \frac{1}{2} = -\frac{9}{2}$$

$$\therefore x = \frac{9}{2} - \frac{1}{2} \quad \text{or} \quad x = -\frac{9}{2} - \frac{1}{2}$$

$$\therefore x = \frac{8}{2} = 4 \quad \text{or} \quad x = -\frac{10}{2} = -5$$

$\therefore$  The roots of the given quadratic equation are 4 and -5.

$$2. x^2 + 2x - 5 = 0$$

If  $x^2 + 2x + k = (x + a)^2$ , then

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

Comparing the coefficients, we get

$$2 = 2a \text{ and } k = a^2$$

$$\therefore a = 1 \text{ and } k = (1)^2 = 1$$

$$\text{Now, } x^2 + 2x - 5 = 0$$

<https://www.indcareer.com/schools/maharashtra-board-solutions-for-class-10-maths-part-1-chapter-2-quadratic-equations/>

$$\therefore x^2 + 2x + 1 - 1 - 5 = 0$$

$$\therefore (x + 1)^2 - 6 = 0$$

$$\therefore (x + 1)^2 = 6$$

Taking square root of both sides, we get

$$x + 1 = \pm \sqrt{6}$$

$$\therefore x + 1 = \sqrt{6} \text{ or } x + 1 = -\sqrt{6}$$

$$\therefore x = \sqrt{6} - 1 \text{ or } x = -\sqrt{6} - 1$$

$\therefore$  The roots of the given quadratic equation are  $\sqrt{6} - 1$  and  $-\sqrt{6} - 1$ .

$$3. m^2 - 5m = -3$$

$$\therefore m^2 - 5m + 3 = 0$$

If  $m^2 - 5m + k = (m + a)^2$ , then

$$m^2 - 5m + k = m^2 + 2am + a^2$$

Comparing the coefficients, we get

$$-5 = 2a \text{ and } k = a^2$$

$$4. 9y^2 - 12y + 2 = 0$$

$$\therefore y^2 - \frac{4}{3}y + \frac{2}{9} = 0 \quad \dots [\text{Dividing both sides by 9}]$$

If  $y^2 - \frac{4}{3}y + k = (y + a)^2$ , then

$$y^2 - \frac{4}{3}y + k = y^2 + 2ay + a^2$$

Comparing the coefficients, we get

$$-\frac{4}{3} = 2a \text{ and } k = a^2$$

$$\therefore a = -\frac{2}{3} \text{ and } k = \left(-\frac{2}{3}\right)^2 = \frac{4}{9}$$

$$\text{Now, } y^2 - \frac{4}{3}y + \frac{2}{9} = 0$$

$$\therefore y^2 - \frac{4}{3}y + \frac{4}{9} - \frac{4}{9} + \frac{2}{9} = 0$$

$$\therefore \left(y - \frac{2}{3}\right)^2 - \frac{2}{9} = 0$$

$$\therefore \left(y - \frac{2}{3}\right)^2 = \frac{2}{9}$$

Taking square root of both sides, we get

$$y - \frac{2}{3} = \pm \frac{\sqrt{2}}{3}$$

$$\therefore y - \frac{2}{3} = \frac{\sqrt{2}}{3} \quad \text{or} \quad y - \frac{2}{3} = -\frac{\sqrt{2}}{3}$$

$$\therefore y = \frac{\sqrt{2} + 2}{3} \quad \text{or} \quad y = \frac{-\sqrt{2} + 2}{3}$$

**$\therefore$  The roots of the given quadratic equation are  $\frac{\sqrt{2} + 2}{3}$  and  $\frac{-\sqrt{2} + 2}{3}$ .**

5.  $2y^2 + 9y + 10 = 0$

<https://www.indcareer.com/schools/maharashtra-board-solutions-for-class-10-maths-part-1-chapter-2-quadratic-equations/>

$$\therefore y^2 + \frac{9}{2}y + 5 = 0 \text{ ...[Dividing both sides by 2]}$$

If  $y^2 + \frac{9}{2}y + k = (y + a)^2$ , then

$$y^2 + \frac{9}{2}y + k = y^2 + 2ay + a^2$$

Comparing the coefficients, we get

$$\frac{9}{2} = 2a \text{ and } k = a^2$$

$$\therefore a = \frac{9}{4} \text{ and } k = \left(\frac{9}{4}\right)^2 = \frac{81}{16}$$

$$\text{Now, } y^2 + \frac{9}{2}y + 5 = 0$$

$$\therefore y^2 + \frac{9}{2}y + \frac{81}{16} - \frac{81}{16} + 5 = 0$$

$$\therefore \left(y + \frac{9}{4}\right)^2 + \left(\frac{-81 + 80}{16}\right) = 0$$

$$\therefore \left(y + \frac{9}{4}\right)^2 - \frac{1}{16} = 0$$

$$\therefore \left(y + \frac{9}{4}\right)^2 = \frac{1}{16}$$

Taking square root of both sides, we get

$$y + \frac{9}{4} = \pm \frac{1}{4}$$

$$\therefore y + \frac{9}{4} = \frac{1}{4} \quad \text{or} \quad y + \frac{9}{4} = -\frac{1}{4}$$

$$\therefore y = \frac{1}{4} - \frac{9}{4} \quad \text{or} \quad y = -\frac{1}{4} - \frac{9}{4}$$

$$\therefore y = \frac{-8}{4} = -2 \quad \text{or} \quad y = -\frac{10}{4} = \frac{-5}{2}$$

$\therefore$  The roots of the given quadratic equation are -2 and  $-\frac{5}{2}$ .

<https://www.indcareer.com/schools/maharashtra-board-solutions-for-class-10-maths-part-1-chapter-2-quadratic-equations/>

$$6. 5x^2 = 4x + 7$$

$$\therefore 5x^2 - 4x - 7 = 0$$

$$\therefore x^2 - \frac{4}{5}x - \frac{7}{5} = 0 \quad \dots[\text{Dividing both sides by 5}]$$

$$\text{If } x^2 - \frac{4}{5}x + k = (x + a)^2, \text{ then}$$

$$x^2 - \frac{4}{5}x + k = x^2 + 2ax + a^2$$

Comparing the coefficients, we get

$$-\frac{4}{5} = 2a \text{ and } k = a^2$$

$$\therefore a = -\frac{2}{5} \text{ and } k = \left(-\frac{2}{5}\right)^2 = \frac{4}{25}$$

$$\text{Now, } x^2 - \frac{4}{5}x - \frac{7}{5} = 0$$

$$\therefore x^2 - \frac{4}{5}x + \frac{4}{25} - \frac{4}{25} - \frac{7}{5} = 0$$

$$\therefore \left(x - \frac{2}{5}\right)^2 - \left(\frac{4+35}{25}\right) = 0$$

$$\therefore \left(x - \frac{2}{5}\right)^2 - \frac{39}{25} = 0$$

$$\therefore \left(x - \frac{2}{5}\right)^2 = \frac{39}{25}$$

Taking square root of both sides, we get

$$x - \frac{2}{5} = \pm \frac{\sqrt{39}}{5}$$

$$\therefore x - \frac{2}{5} = \frac{\sqrt{39}}{5} \quad \text{or} \quad x - \frac{2}{5} = -\frac{\sqrt{39}}{5}$$

$$\therefore x = \frac{2+\sqrt{39}}{5} \quad \text{or} \quad x = \frac{2-\sqrt{39}}{5}$$

$\therefore$  The roots of the given quadratic equation are  $\frac{2+\sqrt{39}}{5}$  and  $\frac{2-\sqrt{39}}{5}$ .

#### Practice Set 2.4

##### Question 1.

Compare the given quadratic equations to the general form and write values of a, b, c.

i.  $x^2 - 7x + 5 = 0$

ii.  $2m^2 = 5m - 5$

iii.  $y^2 = 7y$

<https://www.indcareer.com/schools/maharashtra-board-solutions-for-class-10-maths-part-1-chapter-2-quadratic-equations/>

**Solution:**

i.  $x^2 - 7x + 5 = 0$

Comparing the above equation with

$$ax^2 + bx + c = 0, \text{ we get}$$

$$a = 1, b = -7, c = 5$$

ii.  $2m^2 = 5m - 5$

$$\therefore 2m^2 - 5m + 5 = 0$$

Comparing the above equation with

$$am^2 + bm + c = 0, \text{ we get}$$

$$a = 2, b = -5, c = 5$$

iii.  $y^2 = 7y$

$$\therefore y^2 - 7y + 0 = 0$$

Comparing the above equation with

$$ay^2 + by + c = 0, \text{ we get}$$

$$a = 1, b = -7, c = 0$$

**Question 2.**

**Solve using formula.**

i.  $x^2 + 6x + 5 = 0$

ii.  $x^2 - 3x - 2 = 0$

iii.  $3m^2 + 2m - 7 = 0$

iv.  $5m^2 - 4m - 2 = 0$

v.  $y^2 + 13y = 2$

<https://www.indcareer.com/schools/maharashtra-board-solutions-for-class-10-maths-part-1-chapter-2-quadratic-equations/>

vi.  $5x^2 + 13x + 8 = 0$

**Solution:**

i.  $x^2 + 6x + 5 = 0$

Comparing the above equation with

$ax^2 + bx + c = 0$ , we get

$a = 1, b = 6, c = 5$

$\therefore b^2 - 4ac = (6)^2 - 4 \times 1 \times 5$

$= 36 - 20 = 16$

$$\begin{aligned}x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\&= \frac{-6 \pm \sqrt{16}}{2(1)} \\&= \frac{-6 \pm 4}{2} = \frac{2(-3 \pm 2)}{2}\end{aligned}$$

$\therefore x = -3 \pm 2$

$\therefore x = -3 + 2$  or  $x = -3 - 2$

$\therefore x = -1$  or  $x = -5$

$\therefore$  The roots of the given quadratic equation are -1 and -5.

ii.  $x^2 - 3x - 2 = 0$

Comparing the above equation with

$ax^2 + bx + c = 0$ , we get

$a = 1, b = -3, c = -2$

$\therefore b^2 - 4ac = (-3)^2 - 4 \times 1 \times (-2)$

$= 9 + 8 = 17$

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$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
$$= \frac{-(-3) \pm \sqrt{17}}{2(1)}$$

$$\therefore x = \frac{3 \pm \sqrt{17}}{2}$$

$$\therefore x = \frac{3 + \sqrt{17}}{2} \text{ or } x = \frac{3 - \sqrt{17}}{2}$$

$\therefore$  **The roots of the given quadratic equation are  $\frac{3 + \sqrt{17}}{2}$  and  $\frac{3 - \sqrt{17}}{2}$ .**

iii.  $3m^2 + 2m - 7 = 0$

Comparing the above equation with

$am^2 + bm + c = 0$ , we get

$a = 3, b = 2, c = -7$

$\therefore b^2 - 4ac = (2)^2 - 4 \times 3 \times (-7)$

$= 4 + 84 = 88$

$$m = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-2 \pm \sqrt{88}}{2(3)}$$

$$= \frac{-2 \pm \sqrt{4 \times 22}}{6}$$

$$= \frac{-2 \pm 2\sqrt{22}}{6}$$

$$= \frac{2(-1 \pm \sqrt{22})}{6}$$

$$\therefore m = \frac{-1 \pm \sqrt{22}}{3}$$

$$\therefore m = \frac{-1 + \sqrt{22}}{3} \quad \text{or} \quad m = \frac{-1 - \sqrt{22}}{3}$$

$\therefore$  The roots of the given quadratic equation are  $\frac{-1 + \sqrt{22}}{3}$  and  $\frac{-1 - \sqrt{22}}{3}$ .

iv.  $5m^2 - 4m - 2 = 0$

Comparing the above equation with

$$am^2 + bm + c = 0, \text{ we get}$$

$$a = 5, b = -4, c = -2$$

$$\therefore b^2 - 4ac = (-4)^2 - 4 \times 5 \times (-2)$$

$$= 16 + 40 = 56$$

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$$\begin{aligned}m &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\&= \frac{-(-4) \pm \sqrt{56}}{2(5)} \\&= \frac{4 \pm \sqrt{4 \times 14}}{10} \\&= \frac{4 \pm 2\sqrt{14}}{10} \\&= \frac{2(2 \pm \sqrt{14})}{10} \\ \therefore m &= \frac{2 \pm \sqrt{14}}{5} \\ \therefore m &= \frac{2 + \sqrt{14}}{5} \quad \text{or} \quad m = \frac{2 - \sqrt{14}}{5} \\ \therefore \text{The roots of the given quadratic equation} \\ &\text{are } \frac{2 + \sqrt{14}}{5} \text{ and } \frac{2 - \sqrt{14}}{5}.\end{aligned}$$

$$v. y^2 + 13y = 2$$

$$\therefore 3y^2 + y = 6 \dots (\text{Multiplying both sides by 3})$$

$$\therefore 3y^2 + y - 6 = 0$$

Comparing the above equation with

$$ay^2 + by + c = 0, \text{ we get}$$

$$a = 3, b = 1, c = -6$$

$$\therefore b^2 - 4ac = (1)^2 - 4 \times 3 \times (-6)$$

$$= 1 + 72 = 73$$

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$$y = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
$$= \frac{-1 \pm \sqrt{73}}{2(3)}$$

$$\therefore y = \frac{-1 \pm \sqrt{73}}{6}$$

$$\therefore y = \frac{-1 + \sqrt{73}}{6} \text{ or } y = \frac{-1 - \sqrt{73}}{6}$$

$\therefore$  **The roots of the given quadratic equation are  $\frac{-1 + \sqrt{73}}{6}$  and  $\frac{-1 - \sqrt{73}}{6}$ .**

vi.  $5x^2 + 13x + 8 = 0$

Comparing the above equation with

$ax^2 + bx + c = 0$ , we get

$a = 5, b = 13, c = 8$

$\therefore b^2 - 4ac = (13)^2 - 4 \times 5 \times 8$

$= 169 - 160 = 9$

$\therefore b^2 - 4ac = (13)^2 - 4 \times 5 \times 8$   
 $= 169 - 160 = 9$

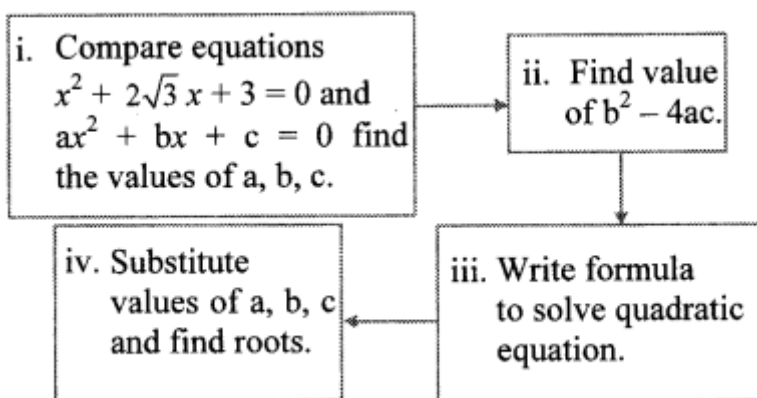
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
$$= \frac{-13 \pm \sqrt{9}}{2(5)}$$
$$= \frac{-13 \pm 3}{10}$$

$$\begin{aligned}\therefore x &= \frac{-13+3}{10} & \text{or} & \quad x = \frac{-13-3}{10} \\ \therefore x &= \frac{-10}{10} & \text{or} & \quad x = \frac{-16}{10} \\ \therefore x &= -1 & \text{or} & \quad x = \frac{-8}{5}\end{aligned}$$

The roots of the given quadratic equation are -1 and  $-\frac{8}{5}$ .

### Question 3.

With the help of the flow chart given below solve the equation  $x^2 + 2\sqrt{3}x + 3 = 0$  using the formula.



### Solution:

i.  $x^2 + 2\sqrt{3}x + 3 = 0$

Comparing the above equation with

$ax^2 + bx + c = 0$ , we get

$a = 1, b = 2\sqrt{3}, c = 3$

ii.  $b^2 - 4ac = (2\sqrt{3})^2 - 4 \times 1 \times 3$

$= 12 - 12$

$= 0$

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$$\text{iii. } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\text{iv. } x = \frac{-2\sqrt{3} \pm 0}{2(1)}$$

$$\therefore x = \frac{-2\sqrt{3} + 0}{2} \text{ or } x = \frac{-2\sqrt{3} - 0}{2}$$

$$\therefore x = -\sqrt{3} \text{ or } x = -\sqrt{3}$$

$\therefore$  The roots of the given quadratic equation are  $-\sqrt{3}$  and  $-\sqrt{3}$ .

### Question 1.

Solve the equation  $2x^2 + 13x + 15 = 0$  by factorisation method, by completing the square method and by using the formula. Verify that you will get the same roots every time. (Textbook pg. no. 43)

**Solution:**

#### i. Factorisation method:

$$\begin{aligned} 2x^2 + 13x + 15 &= 0 \\ \therefore 2x^2 + 10x + 3x + 15 &= 0 \\ \therefore 2x(x + 5) + 3(x + 5) &= 0 \\ \therefore (x + 5)(2x + 3) &= 0 \end{aligned}$$

$$\begin{array}{c} 30 \\ \swarrow \quad \searrow \\ 10 \quad 3 \\ 10 \times 3 = 10 \\ 10 + 3 = 13 \end{array}$$

By using the property, if the product of two numbers is zero, then at least zero, we get

$$\therefore x + 5 = 0 \text{ or } 2x + 3 = 0$$

$$\therefore x + -5 = 0 \text{ or } 2x = -3 = 0$$

$$\therefore x + -5 = \text{or } x = -32$$

$\therefore$  The roots of the given quadratic equation are  $-32$  and  $-5$ .

#### ii. Completing the square method:

$$2x^2 + 13x + 15 = 0$$

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$$\therefore x^2 + \frac{13}{2}x + \frac{15}{2} = 0 \text{ ...[Dividing both sides by 2]}$$

If  $x^2 + \frac{13}{2}x + k = (x + a)^2$ , then

$$x^2 + \frac{13}{2}x + k = x^2 + 2ax + a^2$$

Comparing the coefficients, we get

$$\frac{13}{2} = 2a \text{ and } k = a^2$$

$$\therefore a = \frac{13}{4} \text{ and } k = \left(\frac{13}{4}\right)^2 = \frac{169}{16}$$

$$\text{Now, } x^2 + \frac{13}{2}x + \frac{15}{2} = 0$$

$$\therefore x^2 + \frac{13}{2}x + \frac{169}{16} - \frac{169}{16} + \frac{15}{2} = 0$$

$$\therefore \left(x + \frac{13}{4}\right)^2 + \left(\frac{-169 + 120}{16}\right) = 0$$

$$\therefore \left(x + \frac{13}{4}\right)^2 - \frac{49}{16} = 0$$

$$\therefore \left(x + \frac{13}{4}\right)^2 = \frac{49}{16}$$

Taking square root of both sides, we get

$$x + \frac{13}{4} = \pm \frac{7}{4}$$

$$\therefore x + \frac{13}{4} = \frac{7}{4} \quad \text{or} \quad x + \frac{13}{4} = -\frac{7}{4}$$

$$\therefore x = \frac{7}{4} - \frac{13}{4} \quad \text{or} \quad x = \frac{-7}{4} - \frac{13}{4}$$

$$\therefore x = \frac{7-13}{4} \quad \text{or} \quad x = \frac{-7-13}{4}$$

$$\therefore x = \frac{-6}{4} \quad \text{or} \quad x = \frac{-20}{4}$$

$$\therefore x = \frac{-3}{2} \quad \text{or} \quad x = -5$$

$\therefore$  The roots of the given quadratic equation are  $-\frac{3}{2}$  and  $-5$ .

iii. Formula method:

$$2x^2 + 13x + 15 = 0$$

Comparing the above equation with

$$ax^2 + bx + c = 0, \text{ we get}$$

$$a = 2, b = 13, c = 15$$

$$\therefore b^2 - 4ac = (13)^2 - 4 \times 2 \times 15$$

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$$= 169 - 120 = 49$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-13 \pm \sqrt{49}}{2(2)}$$

$$= \frac{-13 \pm 7}{4}$$

$$\therefore x = \frac{-13+7}{4} \quad \text{or} \quad x = \frac{-13-7}{4}$$

$$\therefore x = \frac{-6}{4} \quad \text{or} \quad x = \frac{-20}{4}$$

$$\therefore x = \frac{-3}{2} \quad \text{or} \quad x = -5$$

$\therefore$  The roots of the given quadratic equation are  $-\frac{3}{2}$  and  $-5$ .

$\therefore$  By all the above three methods, we get the same roots of the given quadratic equation.

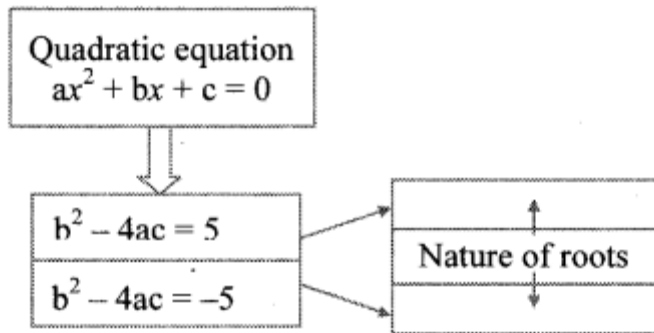
### Practice Set 2.5

#### Question 1.

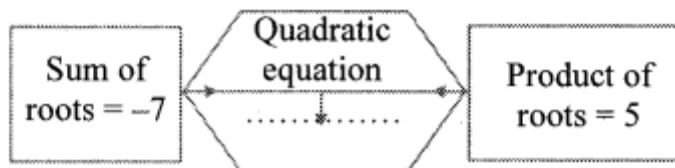
Fill in the gaps and complete.

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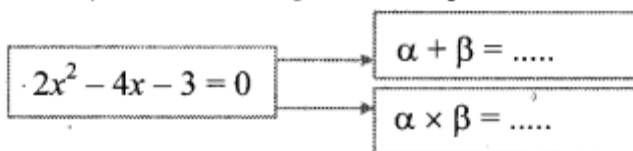
i.



ii.

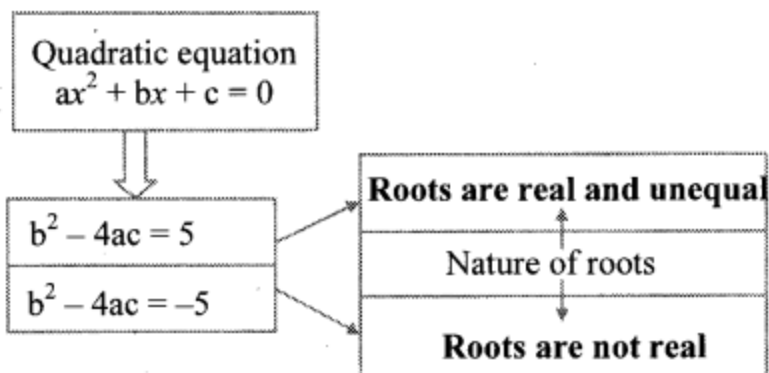


iii. If  $\alpha, \beta$  are roots of quadratic equation,

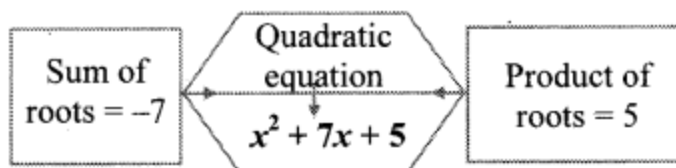


Answer:

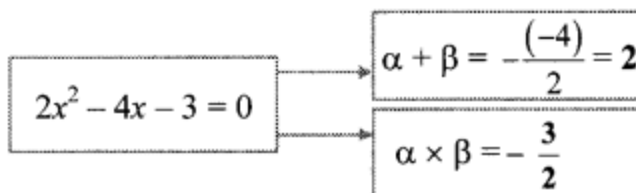
i.



ii.



iii.



## Question 2.

Find the value of discriminant.

i.  $x^2 + 7x - 1 = 0$

ii.  $2y^2 - 5y + 10 = 0$

iii.  $\sqrt{2}x^2 + 4x + 2\sqrt{2} = 0$

**Solution:**

i.  $x^2 + 7x - 1 = 0$

Comparing the above equation with

<https://www.indcareer.com/schools/maharashtra-board-solutions-for-class-10-maths-part-1-chapter-2-quadratic-equations/>

$ax^2 + bx + c = 0$ , we get

$$a = 1, b = 7, c = -1$$

$$\therefore b^2 - 4ac = (7)^2 - 4 \times 1 \times (-1)$$

$$= 49 + 4$$

$$\therefore b^2 - 4ac = 53$$

ii.  $2y^2 - 5y + 10 = 0$

Comparing the above equation with

$ay^2 + by + c = 0$ , we get

$$a = 2, b = -5, c = 10$$

$$\therefore b^2 - 4ac = (-5)^2 - 4 \times 2 \times 10$$

$$= 25 - 80$$

$$\therefore b^2 - 4ac = -55$$

iii.  $\sqrt{2}x^2 + 4x + 2\sqrt{2} = 0$

Comparing the above equation with

$ax^2 + bx + c = 0$ , we get

$$a = \sqrt{2}, b = 4, c = 2\sqrt{2}$$

$$\therefore b^2 - 4ac = (4)^2 - 4 \times \sqrt{2} \times 2\sqrt{2}$$

$$= 16 - 16$$

$$\therefore b^2 - 4ac = 0$$

### Question 3.

**Determine the nature of roots of the following quadratic equations.**

i.  $x^2 - 4x + 4 = 0$

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ii.  $2y^2 - 7y + 2 = 0$

iii.  $m^2 + 2m + 9 = 0$

**Solution:**

i.  $x^2 - 4x + 4 = 0$

Comparing the above equation with

$ax^2 + bx + c = 0$ , we get

$a = 1, b = -4, c = 4$

$\therefore \Delta = b^2 - 4ac$

$= (-4)^2 - 4 \times 1 \times 4$

$= 16 - 16$

$\therefore \Delta = 0$

$\therefore$  Roots of the given quadratic equation are real and equal.

ii.  $2y^2 - 7y + 2 = 0$

Comparing the above equation with

$ay^2 + by + c = 0$ , we get

$a = 2, b = -7, c = 2$

$\therefore \Delta = b^2 - 4ac$

$= (-7)^2 - 4 \times 2 \times 2$

$= 49 - 16$

$\therefore \Delta = 33$

$\therefore \Delta > 0$

$\therefore$  Roots of the given quadratic equation are real and unequal.

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iii.  $m^2 + 2m + 9 = 0$

Comparing the above equation with

$am^2 + bm + c = 0$ , we get

$$a = 1, b = 2, c = 9$$

$$\therefore \Delta = b^2 - 4ac$$

$$= (2)^2 - 4 \times 1 \times 9$$

$$= 4 - 36$$

$$\therefore \Delta = -32$$

$$\therefore \Delta < 0$$

$\therefore$  Roots of the given quadratic equation are not real.

#### Question 4.

Form the quadratic equation from the roots given below.

i. 0 and 4

ii. 3 and -10

iii. 12, 12

iv.  $2 - \sqrt{5}$ ,  $2 + \sqrt{5}$

**Solution:**

i. Let  $\alpha = 0$  and  $\beta = 4$

$$\therefore \alpha + \beta = 0 + 4 = 4$$

$$\text{and } \alpha \times \beta = 0 \times 4 = 0$$

$\therefore$  The required quadratic equation is

$$x^2 - (\alpha + \beta)x + \alpha\beta = 0$$

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$$\therefore x^2 - 4x + 0 = 0$$

$$\therefore x^2 - 4x = 0$$

ii. Let  $\alpha = 3$  and  $\beta = -10$

$$\therefore \alpha + \beta = 3 - 10 = -7$$

$$\text{and } \alpha \times \beta = 3 \times -10 = -30$$

$\therefore$  The required quadratic equation is

$$x^2 - (\alpha + \beta)x + \alpha\beta = 0$$

$$\therefore x^2 - (-7)x + (-30) = 0$$

iii. Let  $\alpha = \frac{1}{2}$  and  $\beta = -\frac{1}{2}$

$$\therefore \alpha + \beta = \frac{1}{2} - \frac{1}{2} = 0$$

$$\text{and } \alpha \times \beta = \frac{1}{2} \times -\frac{1}{2} = -\frac{1}{4}$$

$\therefore$  The required quadratic equation is  
 $x^2 - (\alpha + \beta)x + \alpha\beta = 0$

$$\therefore x^2 - 0x + \left(-\frac{1}{4}\right) = 0$$

$$\therefore x^2 - \frac{1}{4} = 0$$

$$\therefore 4x^2 - 1 = 0$$

iv. Let  $\alpha = 2 - \sqrt{5}$  and  $\beta = 2 + \sqrt{5}$

$$\therefore \alpha + \beta = 2 - \sqrt{5} + 2 + \sqrt{5} = 4$$

$$\text{and } \alpha \times \beta = (2 - \sqrt{5})(2 + \sqrt{5})$$

$$= (2)^2 - (\sqrt{5})^2$$

$$\dots [\because (a + b)(a - b) = a^2 - b^2]$$

$$= 4 - 5 = -1$$

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∴ The required quadratic equation is

$$x^2 - (\alpha + \beta)x + \alpha\beta = 0$$

$$\therefore x^2 - 4x - 1 = 0$$

**Question 5.**

**Sum of the roots of a quadratic equation is double their product. Find k if equation is  $x^2 - 4kx + k + 3 = 0$ .**

**Solution:**

$$x^2 - 4kx + k + 3 = 0$$

Comparing the above equation with

$$ax^2 + bx + c = 0, \text{ we get}$$

$$a = 1, b = -4k, c = k + 3$$

Let  $\alpha$  and  $\beta$  be the roots of the given quadratic equation.

$$\text{Then, } \alpha + \beta = -\frac{b}{a} \text{ and } \alpha\beta = \frac{c}{a}$$

According to the given condition,

$$\begin{aligned} \alpha + \beta &= 2\alpha\beta \\ \therefore \frac{-b}{a} &= \frac{2c}{a} \\ \therefore -b &= 2c \\ \therefore -(-4k) &= 2(k + 3) \\ \therefore 4k &= 2k + 6 & \therefore 4k - 2k &= 6 \\ \therefore 2k &= 6 & \therefore k &= \frac{6}{2} \\ \therefore k &= 3 \end{aligned}$$

**Question 6.**

$\alpha, \beta$  are roots of  $y^2 - 2y - 7 = 0$  find,

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i.  $\alpha^2 + \beta^2$

ii.  $\alpha^3 + \beta^3$

**Solution:**

$$y^2 - 2y - 7 = 0$$

Comparing the above equation with

$$ay^2 + by + c = 0, \text{ we get}$$

$$a = 1, b = -2, c = -7$$

$$\therefore \alpha + \beta = -\frac{b}{a} = -\frac{(-2)}{1} = 2$$

$$\alpha\beta = \frac{c}{a} = -\frac{7}{1} = -7$$

i.  $(\alpha + \beta)^2 = \alpha^2 + 2\alpha\beta + \beta^2$

$$\therefore \alpha^2 + \beta^2 = (\alpha + \beta)^2 - 2\alpha\beta$$
$$= (2)^2 - 2(-7) = 4 + 14$$

$$\therefore \alpha^2 + \beta^2 = 18$$

ii.  $(\alpha + \beta)^3 = \alpha^3 + \beta^3 + 3\alpha\beta(\alpha + \beta)$

$$\therefore \alpha^3 + \beta^3 = (\alpha + \beta)^3 - 3\alpha\beta(\alpha + \beta)$$
$$= (2)^3 - 3(-7)(2) = 8 + 42$$

$$\therefore \alpha^3 + \beta^3 = 50$$

**Question 7.**

The roots of each of the following quadratic equations are real and equal, find k.

i.  $3y^2 + ky + 12 = 0$

ii.  $kx(x-2) + 6 = 0$

**Solution:**

i.  $3y^2 + ky + 12 = 0$

Comparing the above equation with

<https://www.indcareer.com/schools/maharashtra-board-solutions-for-class-10-maths-part-1-chapter-2-quadratic-equations/>

$ay^2 + by + c = 0$ , we get

$$a = 3, b = k, c = 12$$

$$\therefore \Delta = b^2 - 4ac$$

$$= (k)^2 - 4 \times 3 \times 12$$

$$= k^2 - 144 = k^2 - (12)^2$$

$$\therefore \Delta = (k + 12)(k - 12) \dots [\because a^2 - b^2 = (a + b)(a - b)]$$

Since, the roots are real and equal.

$$\therefore \Delta = 0$$

$$\therefore (k + 12)(k - 12) = 0$$

$$\therefore k + 12 = 0 \text{ or } k - 12 = 0$$

$$\therefore k = -12 \text{ or } k = 12$$

ii.  $kx(x - 2) + 6 = 0$

$$\therefore kx^2 - 2kx + 6 = 0$$

Comparing the above equation with

$$ax^2 + bx + c = 0, \text{ we get}$$

$$a = k, b = -2k, c = 6$$

$$\therefore \Delta = b^2 - 4ac$$

$$= (-2k)^2 - 4 \times k \times 6$$

$$= 4k^2 - 24k$$

$$\therefore \Delta = 4k(k - 6)$$

Since, the roots are real and equal.

$$\therefore \Delta = 0$$

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$$\therefore 4k(k - 6) = 0$$

$$\therefore k(k - 6) = 0$$

$$\therefore k = 0 \text{ or } k - 6 = 0$$

But, if  $k = 0$  then quadratic coefficient becomes zero.

$$\therefore k \neq 0$$

$$\therefore k = 6$$

**Question 1.**

Fill in the blanks. (Textbook pg. no. 44)

**Solution:**

| Value of discriminant |   | Nature of roots  |
|-----------------------|---|------------------|
| 50                    | → | Real and unequal |
| -30                   | → | Not real         |
| 0                     | → | Real and equal   |

**Question 2.**

Determine nature of roots of the quadratic equation:  $x^2 + 2x - 9 = 0$  (Textbook pg. no. 45)

**Solution:**

<https://www.indcareer.com/schools/maharashtra-board-solutions-for-class-10-maths-part-1-chapter-2-quadratic-equations/>

Comparing  $x^2 + 2x - 9 = 0$  with  $ax^2 + bx + c = 0$ , we get

$$a = \boxed{1}, b = 2, c = \boxed{-9}$$

$$\therefore b^2 - 4ac = 2^2 - 4 \times \boxed{1} \times \boxed{-9}$$

$$\therefore \Delta = 4 - \boxed{-36}$$

$$\therefore \Delta = 4 + 36$$

$$\therefore \Delta = 40$$

$$\therefore b^2 - 4ac > 0$$

$\therefore$  The roots of the given equation are real and unequal.

### Question 3.

Fill in the empty boxes properly. (Textbook pg. no. 46)

**Solution:**

$$10x^2 + 10x + 1 = 0$$

Comparing the above equation with

$$ax^2 + bx + c = 0, \text{ we get}$$

$$a = 10, b = 10, c = 1$$

$$\therefore \alpha + \beta = \boxed{\frac{-b}{a} = \frac{-10}{10} = -1}$$

$$\text{and } \alpha \times \beta = \boxed{\frac{c}{a} = \frac{1}{10}}$$

### Question 4.

Write the quadratic equation if addition of the roots is 10 and product of the roots is 9.  
(Textbook pg, no. 48)

**Answer:**

<https://www.indcareer.com/schools/maharashtra-board-solutions-for-class-10-maths-part-1-chapter-2-quadratic-equations/>

Quadratic equation:  $x^2 - \boxed{10}x + \boxed{9} = \boxed{0}$

**Question 5.**

What will be the quadratic equation if  $\alpha = 2$ ,  $\beta = 5$ . (Textbook pg. no, 48)

**Solution:**

$$\begin{aligned}x^2 - (\alpha + \beta)x + (\alpha\beta) &= 0 \\ \therefore x^2 - (\boxed{2} + \boxed{5})x + \boxed{2} \times \boxed{5} &= 0 \\ \therefore \boxed{1}x^2 - \boxed{7}x + \boxed{10} &= 0\end{aligned}$$

**Practice Set 2.6**

**Question 1.**

Product of Pragati's age 2 years ago and years hence is 84. Find her present age.

**Solution:**

Let the present age of Pragati be  $x$  years.

$\therefore$  2 years ago,

Age of Pragati =  $(x - 2)$  years

After 3 years,

Age of Pragati =  $(x + 3)$  years

According to the given condition,

$$(x - 2)(x + 3) = 84$$

$$\therefore x(x + 3) - 2(x + 3) = 84$$

$$\therefore x^2 + 3x - 2x - 6 = 84$$

$$\therefore x^2 + x - 6 - 84 = 0$$

<https://www.indcareer.com/schools/maharashtra-board-solutions-for-class-10-maths-part-1-chapter-2-quadratic-equations/>

$$\therefore x^2 + x - 90 = 0$$

$$x^2 + 10x - 9x - 90 = 0$$

$$\therefore x(x + 10) - 9(x + 10) = 0$$

$$\therefore (x + 10)(x - 9) = 0$$

By using the property, if the product of two numbers is zero, then at least one of them is zero, we get

$$\therefore x + 10 = 0 \text{ or } x - 9 = 0$$

$$\therefore x = -10 \text{ or } x = 9$$

But, age cannot be negative.

$$\therefore x = 9$$

$\therefore$  Present age of Pragati is 9 years.

#### Question 2.

**The sum of squares of two consecutive even natural numbers is 244; find the numbers.**

#### Solution:

Let the first even natural number be  $x$ .

$\therefore$  the next consecutive even natural number will be  $(x + 2)$ .

According to the given condition,

$$x^2 + (x + 2)^2 = 244$$

$$\therefore x^2 + x^2 + 4x + 4 = 244$$

$$\therefore 2x^2 + 4x + 4 - 244 = 0$$

$$\therefore 2x^2 + 4x - 240 = 0$$

$$\therefore x^2 + 2x - 120 = 0 \dots [\text{Dividing both sides by 2}]$$

$$\therefore x^2 + 12x - 10x - 120 = 0$$

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$$\therefore x(x + 12) - 10(x + 12) = 0$$

$$\therefore (x + 12)(x - 10) = 0$$

By using the property, if the product of two numbers is zero, then at least one of them is zero, we get

$$\therefore x + 12 = 0 \text{ or } x - 10 = 0$$

$$\therefore x = -12 \text{ or } x = 10$$

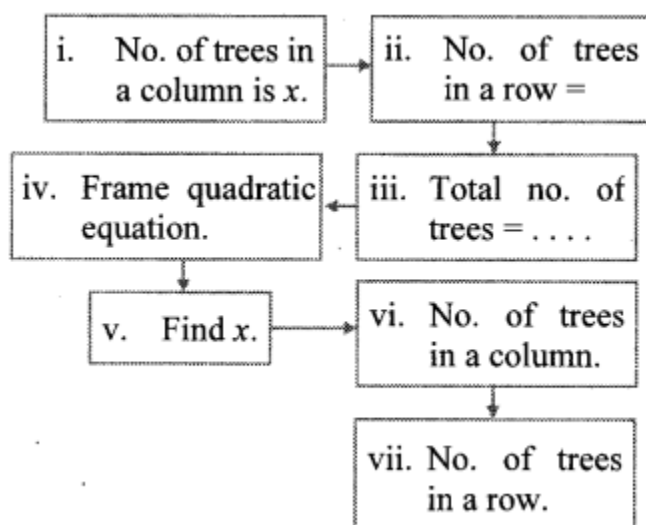
But, natural number cannot be negative.

$$\therefore x = 10 \text{ and } x + 2 = 10 + 2 = 12$$

$\therefore$  The two consecutive even natural numbers are 10 and 12.

### Question 3.

In the orange garden of Mr. Madhusudan there are 150 orange trees. The number of trees in each row is 5 more than that in each column. Find the number of trees in each row and each column with the help of following flow chart.



### Solution:

i. Number of trees in a column is  $x$ .

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ii. Number of trees in a row =  $x + 5$

iii. Total number of trees =  $x \times (x + 5)$

iv. According to the given condition,

$$x(x + 5) = 150$$

$$\therefore x^2 + 5x = 150$$

$$\therefore x^2 + 5x - 150 = 0$$

$$v. x^2 + 15x - 10x - 150 = 0$$

$$\therefore x(x + 15) - 10(x + 15) = 0$$

$$\therefore (x + 15)(x - 10) = 0$$

By using the property, if the product of two numbers is zero, then at least one of them is zero, we get

$$\therefore x + 15 = 0 \text{ or } x - 10 = 0$$

$$\therefore x = -15 \text{ or } x = 10$$

But, number of trees cannot be negative.

$$\therefore x = 10$$

vi. Number of trees in a column is 10.

vii. Number of trees in a row =  $x + 5 = 10 + 5 = 15$

$\therefore$  Number of trees in a row is 15.

#### Question 4.

**Vivek is older than Kishor by 5 years. The Find their present ages is 16 Find their Present ages**

**Solution:**

Let the present age of Kishor be  $x$ .

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∴ Present age of Vivek =  $(x + 5)$  years

According to the given condition,

$$\begin{aligned}\frac{1}{x} + \frac{1}{x+5} &= \frac{1}{6} \\ \therefore \frac{x+5+x}{x(x+5)} &= \frac{1}{6} \\ \therefore \frac{2x+5}{x(x+5)} &= \frac{1}{6}\end{aligned}$$

$$\therefore 6(2x + 5) = x(x + 5)$$

$$\therefore 12x + 30 = x^2 + 5x$$

$$\therefore x^2 + 5x - 12x - 30 = 0$$

$$\therefore x^2 - 7x - 30 = 0$$

$$\therefore x^2 - 10x + 3x - 30 = 0$$

$$\therefore x(x - 10) + 3(x - 10) = 0$$

$$\therefore (x - 10)(x + 3) = 0$$

By using the property, if the product of two numbers is zero, then at least one of them is zero, we get

$$\therefore x - 10 = 0 \text{ or } x + 3 = 0$$

$$\therefore x = 10 \text{ or } x = -3$$

But, age cannot be negative.

$$\therefore x = 10 \text{ and } x + 5 = 10 + 5 = 15$$

∴ Present ages of Kishor and Vivek are 10 years and 15 years respectively.

**Question 5.**

<https://www.indcareer.com/schools/maharashtra-board-solutions-for-class-10-maths-part-1-chapter-2-quadratic-equations/>

Suyash scored 10 marks more in second test than that in the first. 5 times the score of the second test is the same as square of the score in the first test. Find his score in the first test.

**Solution:**

Let the score of Suyash in the first test be  $x$ .

$\therefore$  Score in the second test =  $x + 10$  According to the given condition,

$$5(x + 10) = x^2$$

$$\therefore 5x + 50 = x^2$$

$$\therefore x^2 - 5x - 50 = 0$$

$$\therefore x^2 - 10x + 5x - 50 = 0$$

$$\therefore x(x - 10) + 5(x - 10) = 0$$

$$\therefore (x - 10)(x + 5) = 0$$

By using the property, if the product of two numbers is zero, then at least one of them is zero, we get

$$\therefore x - 10 = 0 \text{ or } x + 5 = 0$$

$$\therefore x = 10 \text{ or } x = -5$$

But, score cannot be negative.

$$\therefore x = 10$$

$\therefore$  The score of Suyash in the first test is 10.

**Question 6.**

'Mr. Kasam runs a small business of making earthen pots. He makes certain number of pots on daily basis. Production cost of each pot is ₹ 40 more than 10 times total number of pots, he makes in one day. If production cost of all pots per day is ₹ 600, find production cost of one pot and number of pots he makes per day.

**Solution:**

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Let Mr. Kasam make  $x$  number of pots on daily basis.

Production cost of each pot = ₹  $(10x + 40)$

According to the given condition,

$$x(10x + 40) = 600$$

$$\therefore 10x^2 + 40x = 600$$

$$\therefore 10x^2 + 40x - 600 = 0$$

$$\therefore x^2 + 4x - 60 = 0 \dots [\text{Dividing both sides by } 10]$$

$$\therefore x^2 + 10x - 6x - 60 = 0$$

$$\therefore x(x + 10) - 6(x + 10) = 0$$

$$\therefore (x + 10)(x - 6) = 0$$

By using the property, if the product of two numbers is zero, then at least one of them is zero, we get

$$\therefore x + 10 = 0 \text{ or } x - 6 = 0$$

$$\therefore x = -10 \text{ or } x = 6$$

But, number of pots cannot be negative.

$$\therefore x = 6$$

$$\therefore \text{Production cost of each pot} = 7(10x + 40)$$

$$= ₹ [(10 \times 6) + 40]$$

$$= ₹(60 + 40) = ₹ 100$$

Production cost of one pot is ₹ 100 and the number of pots Mr. Kasam makes per day is 6.

#### Question 7.

**Pratik takes 8 hours to travel 36 km downstream and return to the same spot. The speed of boat in still water is 12 km. per hour. Find the speed of water current.**

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**Solution:**

Let the speed of water current be  $x$  km/hr. Speed of boat is 12 km/hr. ( $x < 12$ )

In upstream, speed of the water current decreases the speed of the boat and it is the opposite in downstream.

$\therefore$  speed of the boat in upstream =  $(12 - x)$  km/hr and speed of the boat in downstream =  $(12 + x)$  km/hr.

$$\text{Now, Time} = \frac{\text{Distance}}{\text{Speed}}$$

Time required to cover 36 km upstream

$$= \frac{36}{12-x} \text{ hrs}$$

Time required to cover 36 km downstream

$$= \frac{36}{12+x} \text{ hrs}$$

According to the given condition,

$$\frac{36}{12-x} + \frac{36}{12+x} = 8$$

$$\therefore 36 \left( \frac{1}{12-x} + \frac{1}{12+x} \right) = 8$$

$$\therefore \frac{1}{12-x} + \frac{1}{12+x} = \frac{8}{36}$$

$$\therefore \frac{(12+x) + (12-x)}{(12-x)(12+x)} = \frac{2}{9}$$

$$\therefore \frac{24}{144-x^2} = \frac{2}{9} \quad \dots [\because (a+b)(a-b) = a^2 - b^2]$$

$$\therefore 24 \times 9 = 2(144 - x^2)$$

$$\therefore 216 = 288 - 2x^2$$

$$\therefore 2x^2 = 288 - 216$$

$$\therefore 2x^2 = 72$$

$$\therefore x^2 = 36$$

$$\therefore x = \pm 6 \quad \dots [\text{Taking square root of both sides}]$$

But, speed cannot be negative.

$$\therefore x = 6$$

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∴ The speed of water current is 6 km/hr.

**Question 8.**

**Pintu takes 6 days more than those of Nishu to complete certain work. If they work together they finish it in 4 days. How many days would it take to complete the work if they work alone.**

**Solution:**

Let Nishu take  $x$  days to complete the work alone.

∴ Total work done by Nishu in 1 day =  $1x$

Also, Pintu takes  $(x + 6)$  days to complete the work alone.

∴ Total work done by Pintu in 1 day =  $1x+6$

∴ Total work done by both in 1 day =  $(1x + 1x+6)$

But, both take 4 days to complete the work together.

∴ Total work done by both in 1 day = 14

According to the given condition,

$$\begin{aligned}\frac{1}{x} + \frac{1}{x+6} &= \frac{1}{4} \\ \therefore \frac{x+6+x}{x(x+6)} &= \frac{1}{4} \\ \therefore \frac{2x+6}{x(x+6)} &= \frac{1}{4}\end{aligned}$$

$$\therefore 4(2x + 6) = x(x + 6)$$

$$\therefore 8x + 24 = x^2 + 6x$$

$$\therefore x^2 + 6x - 8x - 24 = 0$$

$$\therefore x^2 - 2x - 24 = 0$$

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$$\therefore x^2 - 6x + 4x - 24 = 0$$

$$\therefore x(x - 6) + 4(x - 6) = 0$$

$$\therefore (x - 6)(x + 4) = 0$$

By using the property, if the product of two numbers is zero, then at least one of them is zero, we get

$$\therefore x - 6 = 0 \text{ or } x + 4 = 0$$

$$\therefore x = 6 \text{ or } x = -4$$

But, number of days cannot be negative,

$$\therefore x = 6 \text{ and } x + 6 = 6 + 6 = 12$$

$\therefore$  Number of days taken by Nishu and Pintu to complete the work alone is 6 days and 12 days respectively.

#### Question 9.

If 460 is divided by a natural number, quotient is 6 more than five times the divisor and remainder is 1. Find quotient and divisor.

**Solution:**

Let the natural number be  $x$ .

$$\therefore \text{Divisor} = x, \text{Quotient} = 5x + 6$$

$$\text{Also, Dividend} = 460 \text{ and Remainder} = 1$$

$$\text{Dividend} = \text{Divisor} \times \text{Quotient} + \text{Remainder}$$

$$\begin{array}{lcl} \therefore 460 = x \times (5x + 6) + 1 & & \\ \therefore 460 = 5x^2 + 6x + 1 & & \\ \therefore 5x^2 + 6x + 1 - 460 = 0 & & \\ \therefore 5x^2 + 6x - 459 = 0 & & \\ \therefore 5x^2 - 45x + 51x - 459 = 0 & & \\ \therefore 5x(x - 9) + 51(x - 9) = 0 & & \\ \therefore (x - 9)(5x + 51) = 0 & & \end{array} \quad \begin{array}{l} : \\ 5 \times -459 \\ = 5 \times -9 \times 51 \\ = -45, +51 \end{array}$$

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By using the property, if the product of two numbers is zero, then at least one of them is zero, we get

$$\therefore x - 9 = 0 \text{ or } 5x + 51 = 0$$

$$\therefore x = 9 \text{ or } x = -515$$

But, natural number cannot be negative,

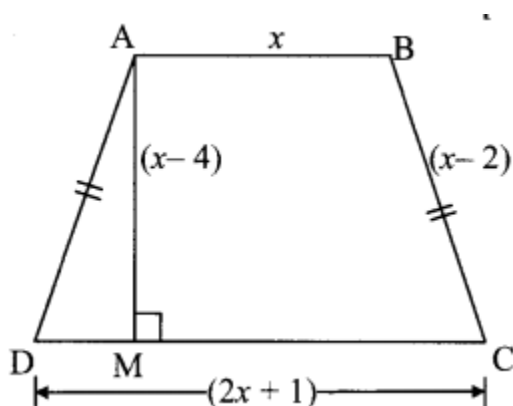
$$\therefore x = 9$$

$$\therefore \text{Quotient} = 5x + 6 = 5(9) + 6 = 45 + 6 = 51$$

$\therefore$  Quotient is 51 and Divisor is 9.

**Question 10.**

In the given fig.  $\square ABCD$  is a trapezium,  $AB \parallel CD$  and its area is  $33 \text{ cm}^2$ . From the information given in the figure find the lengths of all sides of the  $\square ABCD$ . Fill in the empty boxes to get the solution.



**Solution:**

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□ABCD is a trapezium.  $AB \parallel CD$

Area of trapezium

$$= \frac{1}{2} \times (\text{Sum of parallel sides}) \times \text{Height}$$

$$\therefore A(\square ABCD) = \frac{1}{2} \times (AB + CD) \times \boxed{AM}$$

$$\therefore 33 = \frac{1}{2} (x + 2x + 1) \times \boxed{(x-4)}$$

$$\therefore \boxed{66} = (3x + 1) \times \boxed{(x-4)}$$

$$\therefore 66 = 3x^2 - 12x + x - 4$$

$$\therefore 3x^2 - \boxed{11x} - \boxed{70} = 0$$

$$\therefore 3x^2 - 21x + 10x - 70 = 0$$

$$\therefore 3x(x-7) + 10(x-7) = 0$$

$$\therefore (3x + 10)(x-7) = 0$$

By using the property, if the product of two numbers is zero, then at least one of them is zero, we get

$$\therefore (3x + 10) = 0 \text{ or } \boxed{(x-7)} = 0$$

$$\therefore x = \frac{-10}{3} \text{ or } x = \boxed{7}$$

But, length is never negative.

$$\therefore x \neq \frac{-10}{3}$$

$$\therefore x = \boxed{7}$$

$$AB = \boxed{x = 7 \text{ cm}}$$

$$CD = \boxed{2x+1 = 2(7)+1 = 15 \text{ cm}}$$

$$AD = BC = \boxed{x-2 = 7-2 = 5 \text{ cm}}$$



# Maharashtra Board Solutions

## Class 10 Maths (Part 1)

- Chapter 1- Linear Equations in Two Variables
- Chapter 2- Quadratic Equations
- Chapter 3- Arithmetic Progression
- Chapter 4- Financial Planning
- Chapter 5- Probability
- Chapter 6- Statistics

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## About About Maharashtra State Board (MSBSHSE)

The Maharashtra State Board of Secondary and Higher Secondary Education or MSBSHSE (Marathi: महाराष्ट्र राज्य माध्यमिक आणि उच्च माध्यमिक शिक्षण मंडळ), is an **autonomous and statutory body established in 1965**. The board was amended in the year 1977 under the provisions of the Maharashtra Act No. 41 of 1965.

The Maharashtra State Board of Secondary & Higher Secondary Education (MSBSHSE), Pune is an independent body of the Maharashtra Government. There are more than 1.4 million students that appear in the examination every year. The Maha State Board conducts the board examination twice a year. This board conducts the examination for SSC and HSC.

The Maharashtra government established the Maharashtra State Bureau of Textbook Production and Curriculum Research, also commonly referred to as Ebalbharati, in 1967 to take up the responsibility of providing quality textbooks to students from all classes studying under the Maharashtra State Board. MSBHSE prepares and updates the curriculum to provide holistic development for students. It is designed to tackle the difficulty in understanding the concepts with simple language with simple illustrations. Every year around 10 lakh students are enrolled in schools that are affiliated with the Maharashtra State Board.

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## FAQs

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Who developed the Maharashtra State board books?

As of now, the MSCERT and Balbharti are responsible for the syllabus and textbooks of Classes 1 to 8, while Classes 9 and 10 are under the Maharashtra State Board of Secondary and Higher Secondary Education (MSBSHSE).

How many state boards are there in Maharashtra?

The Maharashtra State Board of Secondary & Higher Secondary Education, conducts the HSC and SSC Examinations in the state of Maharashtra through its nine Divisional Boards located at Pune, Mumbai, Aurangabad, Nasik, Kolhapur, Amravati, Latur, Nagpur and Ratnagiri.

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### Postal Address

IndCareer.com  
52, Shilpa Nagar,  
Somalwada  
Nagpur - 440015  
Maharashtra, India

**WhatsApp:** +91 9561 204 888

**Website:** <https://www.indcareer.com>

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