

$$y^2 + 13y + 36 = y^2 - 12y + 36$$

$$y^2 - y^2 + 13y + 12y + 36 - 36 = 0$$

$$25y = 0$$

$\Rightarrow$

$$y = 0$$

Put  $y = 0$  in  $x^2 + x^2 + y$ , we get

$$x^2 + 3x = y$$

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

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

$$x(x + 3) = 0$$

Either  $x = 0$  or  $x + 3 = 0$

Thus, solution set =  $\{-3, 0\}$

## SOLVED MISCELLANEOUS EXERCISE - 1

### Q1. Multiple Choice Questions:

Four possible answers are given for the following questions. Tick (✓) the correct answer.

(i) Standard form of quadratic equation is:

(a)  $bx + c = 0$ ,  $b \neq 0$

(b)  $ax^2 + bx + c = 0$ ,  $a \neq 0$

(c)  $ax^2 = bx$ ,  $a \neq 0$

(d)  $ax^2 = 0$ ,  $a \neq 0$

(ii) The number of terms in a standard quadratic equation  $ax^2 + bx + c = 0$  is

(a) 1

(b) 2

(c) 3

(d) 4

(iii) The number of methods to solve a quadratic equation is:

(a) 1

(b) 2

(c) 3

(d) 4

(iv) The quadratic formula is:

(a)  $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

(b)  $\frac{b \pm \sqrt{b^2 - 4ac}}{2a}$

(c)  $\frac{-b \pm \sqrt{b^2 + 4ac}}{2a}$

(d)  $\frac{b \pm \sqrt{b^2 + 4ac}}{2a}$

(v) Two linear factors of  $x^2 - 15x + 56$  are:

(a)  $(x - 7)$  and  $(x + 8)$

(b)  $(x + 7)$  and  $(x - 8)$

(c)  $(x - 7)$  and  $(x - 8)$

(d)  $(x + 7)$  and  $(x + 8)$

(vi) An equation, which remains unchanged when  $x$  is replaced by  $\frac{1}{x}$  is called a/an

(a) Exponential equation

(b) Reciprocal equation

(c) Radical equation

(d) None of these

(vii) An equation of the type  $3^x + 3^{2x} + 6 = 0$  is a/an:

(a) Exponential equation

(b) Radical equation

(c) Reciprocal equation

(d) None of these

(viii) The solution set of equation  $4x^2 - 16 = 0$  is:

(a)  $\{\pm 4\}$

(b)  $\{4\}$

(c)  $\{\pm 2\}$

(d)  $\pm 2$

(ix) An equation of the form  $2x^2 - 3x^3 + 7x^2 - 3x + 2 = 0$  is called a/an

(a) Reciprocal equation

(b) Radical equation

(c) Exponential equation

(d) None of these

Answers:

(i)	b	(ii)	c	(iii)	c	(iv)	a	(v)	c
(vi)	b	(vii)	a	(viii)	c	(ix)	a		

Q2. Write short answers of the following questions. .

(i) Solve  $x^2 + 2x - 2 = 0$

Ans:

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

Compare it with

$$ax^2 + bx + c = 0$$

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

By using quadratic equation, we get

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

$$x = \frac{-2 \pm \sqrt{(2)^2 - 4(2)(-2)}}{2(2)}$$

$$x = \frac{-2 \pm \sqrt{4 + 16}}{4}$$

$$x = \frac{-2 \pm \sqrt{20}}{4} = \frac{-2 \pm 2\sqrt{5}}{4}$$

$$x = \frac{2(-1 \pm \sqrt{5})}{4} = -1 \pm \sqrt{5}$$

Thus, the solution set =  $\{-1 \pm \sqrt{5}\}$

(ii) Solve by factorization  $5x^2 = 15x$

Ans:

$$5x^2 = 15x$$

$$5x^2 - 15x = 0$$

$$5x(x - 3) = 0$$

Either

$$5x = 0$$

or

$$x - 3 = 0$$

$\Rightarrow$

$$x = 0$$

$$x = 3$$

Thus, the solution set =  $\{0, 3\}$

(iii) Write in standard form  $\frac{1}{x+4} + \frac{1}{x-4} = 3$

Ans:

$$\frac{1}{x+4} + \frac{1}{x-4} - 3 \Rightarrow \frac{x-4+x+4}{(x+4)(x-4)} = 3$$

$$\frac{2x}{x^2-16} = 3 \Rightarrow 3(x^2-16) = 2x$$

$$3x^2 - 48 - 2x = 0$$

$$3x^2 - 2x - 48 = 0$$

(iv) Write the names of the methods for solving a quadratic equation.

Ans: Solution of quadratic equations:

To find solution set of a quadratic equation, following methods are used:

(i) Factorization

(ii) Completing square

(v) Solve  $\left(2x - \frac{1}{2}\right)^2 = \frac{9}{4}$

Ans:

$$\left(2x - \frac{1}{2}\right)^2 = \frac{9}{4}$$

Taking square root on both sides, we get

$$2x - \frac{1}{2} = \pm \frac{3}{2}$$

$$2x = \frac{1}{2} \pm \frac{3}{2}$$

$$\text{Either } 2x = \frac{1}{2} + \frac{3}{2} \quad \text{or} \quad 2x = \frac{1}{2} - \frac{3}{2}$$

$$2x = 2$$

$$2x = -1$$

$$\Rightarrow x = 1 \quad x = -\frac{1}{2}$$

Thus, the solution set =  $\left\{-\frac{1}{2}, 1\right\}$

(vi) Solve  $\sqrt{3x+18} = x$

Ans:

$$\sqrt{3x+18} = x$$

Taking square on both sides, we get

$$3x + 18 = x^2$$

$$x^2 - 3x - 18 = 0$$

$$x^2 - 6x + 3x - 18 = 0$$

$$x(x - 6) + 3(x - 6) = 0$$

$$(x - 6)(x + 3) = 0$$

$$\text{Either } x - 6 = 0 \quad \text{or} \quad x + 3 = 0$$

$$x = 6 \quad \quad \quad x = -3$$

Thus, the solution set =  $\{-3, 6\}$

**(vii) Define quadratic equation.**

**Ans: Quadratic Equation:**

An equation, which contains the square of the unknown (variable) quantity, but no higher power, is called a **quadratic equation** or an equation of the second degree.

**(viii) Define exponential equation.**

**Ans: Exponential equations:**

In exponential equations, variable occurs in exponent.

For example,  $5^{1-x} + 5x^{1-x} = 26$ .

**(ix) Define reciprocal equation.**

**Ans: Reciprocal equations of the type:**

$$a\left(x^2 + \frac{1}{x^2}\right) + b\left(x + \frac{1}{x}\right) + c = 0 \text{ or } ax^4 + bx^3 + cx^2 + bx + a = 0$$

An equation is said to be a reciprocal equation, if it remains unchanged, when  $x$  is replaced by  $\frac{1}{x}$ .

Replacing  $x$  by  $\frac{1}{x}$  in  $ax^4 - bx^3 + cx^2 - bx + a = 0$ , we have

$$a\left(\frac{1}{x}\right)^4 - b\left(\frac{1}{x}\right)^3 + c\left(\frac{1}{x}\right)^2 - b\left(\frac{1}{x}\right) + a = 0 \text{ which is simplified as}$$

$$a - bx + cx^2 - by^3 + ax^4 = 0. \text{ We get the same equation.}$$

Thus  $ax^4 - bx^3 + cx^2 - bx + a = 0$  is a reciprocal equation.

**(x) Define radical equation.**

**Ans: Radical equations:**

An equation involving expression under the radical sign is called a **radical equation**.

$$\text{e.g., } \sqrt{x+3} = x+1 \text{ and } \sqrt{x-1} = \sqrt{x-2} + 1$$

**Q3. Fill in the blanks:**

- The standard form of the quadratic equation is \_\_\_\_\_.
- The number of methods to solve a quadratic equation are \_\_\_\_\_.
- The name of the method to derive a quadratic formula is \_\_\_\_\_.
- The solution of the equation  $ax^2 + bx + c = 0$ ,  $a \neq 0$  is \_\_\_\_\_.
- The solution set of  $25x^2 - 1 = 0$  is \_\_\_\_\_.

- (vi) An equation of the form  $2^{2x} - 3 \cdot 2^x + 5 = 0$  is called a/an \_\_\_\_\_ equation.
- (vii) The solution set of the equation  $x^2 - 9 = 0$  is \_\_\_\_\_.
- (viii) An equation of the type  $x^4 + x^3 + x^2 + x + 1 = 0$  called a/an \_\_\_\_\_
- (ix) A root of an equation, which do not satisfy the equation is called \_\_\_\_\_ root.
- (x) An equation involving impression of the variable under \_\_\_\_\_ is called radical.

**Answer**

(i)	$ax^2+bx+c=0$	(ii)	3	(iii)	Completing Square
(iv)	$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	(v)	$\left\{ \pm \frac{1}{5} \right\}$	(vi)	Exponential
(vii)	$\{ \pm 3 \}$	(viii)	Reciprocal	(ix)	Extraneous
(x)	Radical sign				

## SUMMARY

- ✓ An equation which contains the square of the unknown (variable) quantity, but no higher power, is called a quadratic equation or an equation of the second degree.
- ✓ A second degree equation in one variable  $x$ ,  $ax^2 + bx + c = 0$
- ✓ Where  $a \neq 0$  and  $a, b, c$  are real numbers, is called the general or standard form of a quadratic equation.
- ✓ An equation is said to be a reciprocal equation, if it remains unchanged, when  $x$  is replaced by  $\frac{1}{x}$ .
- ✓ In exponential equations, variables occur in exponents.
- ✓ An equation involving expression under the radical sign is called a radical equation.
- ✓ Quadratic formula for  $ax^2 + bx + c = 0$ ,  $a \neq 0$  is  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
- ✓ Any quadratic equation is solved by the following three methods.
  - (i) Factorization      (ii) Completing square      (iii) Quadratic formula

