

2

Quadratic Equations

Practice Set 2.1

1. Write any two quadratic equations.

Solⁿ:- The quadratic equations are of the form are,

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

∴ Examples of quadratic equations are,

$$i) 5x^2 + 3x + 9 = 0$$

$$ii) 3x^2 - 7x + 5 = 0$$

2. Decide which of the following are quadratic equations.

$$(1) x^2 + 5x - 2 = 0$$

Solⁿ:- $x^2 + 5x - 2 = 0$

Here, Variable = 1

Maximum power = 2

∴ This is a quadratic equation.

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

Solⁿ:- $y^2 = 5y - 10$

$$∴ y^2 - 5y + 10 = 0$$

Here, Variable = 1

Maximum power = 2

∴ This is a quadratic equation.

$$(3) y^2 + \frac{1}{y} = 2$$

Solⁿ:- $y^2 + \frac{1}{y} = 2$

Multiply both the sides with 'y',

$$\therefore y \times y^2 + y \times \frac{1}{y} = 2 \times y$$

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

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

Here, Variable = 1

Maximum power = 3

∴ This is not a quadratic equation.

$$(4) x + \frac{1}{x} = -2$$

Solⁿ:- $x + \frac{1}{x} = -2$

Multiply both the sides with 'x',

$$\therefore x \times x + x \times \frac{1}{x} = -2 \times x$$

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

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

Here, Variable = 1

Maximum power = 2

\therefore This is a quadratic equation.

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

Solⁿ:- $(m + 2)(m - 5) = 0$

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

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

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

Here, Variable = 1

Maximum power = 2

\therefore This is a quadratic equation.

$$(6) m^3 + 3m^2 - 2 = 3m^3$$

Solⁿ:- $m^3 + 3m^2 - 2 = 3m^3$

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

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

Here, Variable = 1

Maximum power = 3

∴ This is not a quadratic equation.

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

(1) $2y = 10 - y^2$

Solⁿ:- $2y = 10 - y^2$

∴ $y^2 + 2y - 10 = 0$

Comparing with the general form

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

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

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

Solⁿ:- $(x - 1)^2 = 2x + 3$

∴ $x^2 - 2x + 1 = 2x + 3$

∴ $x^2 - 2x + 1 - 2x - 3 = 0$

∴ $x^2 - 4x - 2 = 0$

Comparing with the general form

$bx + c = 0$, we get,

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

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

Solⁿ :-

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

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

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

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

Comparing with the general form

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

$$\therefore a = 1, \quad b = 4, \quad c = 3$$

$$(4) 3m^2 = 2m^2 - 9$$

Solⁿ :-

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

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

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

Comparing with the general form

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

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

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

Soln:- $P(3 + 6p) = -5$

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

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

Comparing with the general form

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

$$\therefore a = 6, \quad b = 3, \quad c = 5$$

$$(6) x^2 - 9 = 13$$

Soln:- $x^2 - 9 = 13$

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

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

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

Comparing with the general form

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

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

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

$$(1) x^2 + 4x - 5 = 0, x = 1, -1$$

Solⁿ :- $x^2 + 4x - 5 = 0$

For $x = 1,$

$$(1)^2 + (4 \times 1) - 5 = 0$$

$$\therefore 1 + 4 - 5 = 0$$

$$\therefore 5 - 5 = 0$$

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

For $x = -1,$

$$(-1)^2 + (4 \times -1) - 5 = 0$$

$$\therefore 1 - 4 - 5 = 0$$

$$\therefore 1 - 9 = 0$$

$$-8 \neq 0$$

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

$$(2) 2m^2 - 5m = 0, m = 2, \frac{5}{2}$$

Solⁿ:- $2m^2 - 5m = 0$

For $m = 2$,

$$2(2)^2 - (5 \times 2) = 0$$

$$\therefore (2 \times 4) - (5 \times 2) = 0$$

$$\therefore 8 - 10 = 0$$

$$\therefore -2 \neq 0$$

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

For $m = \frac{5}{2}$,

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

$$\therefore \left(2 \times \frac{25}{4}\right) - \left(5 \times \frac{5}{2}\right) = 0$$

$$\therefore \frac{25}{2} - \frac{25}{2} = 0$$

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

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

Solⁿ:- As $x = 3$ is a root of the given equation.

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

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

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

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

$$\therefore 9k = 27$$

$$\therefore k = \frac{27}{9}$$

$$\therefore \boxed{k = 3}$$

6. One of the roots of equation $5m^2 + 2m + k = 0$ is $\frac{-7}{5}$. Complete the following activity to find the value of 'k'.

Solution : $\frac{-7}{5}$ is a root of quadratic equation $5m^2 + 2m + k = 0$

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

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

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

$$\frac{35}{5} + k = 0$$

$$k = -7$$