

Chapter No 4

Quadratic Equations

Example 3

Quadratic Equation

An equation containing one or more terms in which the variable is raised to maximum positive power two. In general;

$ax^2 + bx + c = 0$ where $a \neq 0$ is called Quadratic Equation in variable x .

3 Methods.

To solve Quadratic Equation there are three different methods named as;

1. Factorization method.
2. Completing Square method.
3. Quadratic Formula method.

Example 1

Solve by Factorization $x^2 - 7x + 10 = 0$

$$x^2 - 2x - 5x + 10 = 0$$

$$x(x-2) - 5(x-2) = 0$$

$$(x-2)(x-5) = 0$$

$$x-2 = 0, \quad x-5 = 0$$

$$\Rightarrow x = 2, \quad \Rightarrow x = 5$$

Example 2

Solve $x^2 + 4x - 437 = 0$ by Completing Sq.

$$x^2 + 4x = 437$$

Adding $(\frac{4}{2})^2 = (2)^2$ on both sides.

$$x^2 + 4x + (2)^2 = 437 + (2)^2$$

$$(x+2)^2 = 437 + 4$$

$$(x+2)^2 = 441$$

$$x+2 = \pm 21 \quad \because \sqrt{441} = 21$$

$$x+2 = 21, \quad x+2 = -21$$

$$x = 21-2, \quad x = -21-2$$

$$x = 19, \quad x = -23$$

$$\{19, -23\}$$

Solve $6x^2 + x - 15 = 0$ by Q. Formula

Comparing $6x^2 + x - 15 = 0$

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

we have $a = 6, b = 1, c = -15$

By using Quadratic Formula.

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

$$x = \frac{-1 \pm \sqrt{(1)^2 - 4(6)(-15)}}{2(6)}$$

$$x = \frac{-1 \pm \sqrt{1+360}}{12} \Rightarrow x = \frac{-1 \pm \sqrt{361}}{12}$$

$$x = \frac{-1 \pm 19}{12} \quad \because \sqrt{361} = 19$$

$$x = \frac{-1+19}{12}, \quad x = \frac{-1-19}{12}$$

$$x = \frac{18}{12}, \quad x = \frac{-20}{12}$$

$$x = \frac{3}{2}, \quad x = -\frac{5}{3} \quad \left\{ \frac{3}{2}, -\frac{5}{3} \right\}$$

Example 4

Solve $8x^2 - 14x - 15 = 0$ by Quadratic For

Comparing $8x^2 - 14x - 15 = 0$

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

We have $a = 8, b = -14, c = -15$

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

$$x = \frac{-(-14) \pm \sqrt{(-14)^2 - 4(8)(-15)}}{2(8)}$$

$$x = \frac{14 \pm \sqrt{196 + 480}}{16} \Rightarrow x = \frac{14 \pm \sqrt{676}}{16}$$

$$x = \frac{14 \pm 26}{16} \quad \because \sqrt{676} = 26$$

$$x = \frac{14+26}{16}, \quad x = \frac{14-26}{16}$$

$$x = \frac{40}{16}, \quad x = \frac{-12}{16} \quad \left\{ 5/2, -3/4 \right\}$$

$$x = 5/2, \quad x = -3/4$$