

Definition :

→ An equation involving one variable and having 2 as maximum index [degree] of the variable is called as the Quadratic equation.

For Example : $3x^2 - 5x + 7 = 0$, $3x^2 - 10x = 0$, $7x^2$, etc

Standard form of Quadratic Equations.

→ The general or standard form of a quadratic equation is

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

Standard form

where x is a variable and

→ a, b, c are constants and are real numbers

→ $a \neq 0$

Roots of a quadratic Equations

→ The values of variable which satisfy the equation or the value for which both the side of the equation are equal are called solutions or roots of the equation.

Note: Solving a Quadratic equation means finding its roots.

Methods to Solve Quadratic Equations.

→ There are three methods to solve quadratic equations

1] Factorisation method.

2] Completing square method (perfect square method).

3] Formula method $\rightarrow x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \rightarrow$ Quadratic formula

Nature of roots of Quadratic Equations.

→ Nature of roots of quadratic equation $ax^2 + bx + c = 0$ depends on the value of $b^2 - 4ac$.

Hence, $b^2 - 4ac$ is called discriminant and is denoted by Greek letter Δ (Delta)

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

↓
Discriminant

→ Result:

- 1] If $\Delta = 0$ then roots are real and equal
- 2] If $\Delta > 0$ then roots are real and unequal
- 3] If $\Delta < 0$ then roots are not real.

To obtain a Quadratic Equation Having Given Roots:

→ If α and β are the roots of the quadratic equation in variable x , then the Quadratic equation is given by

$$x^2 - (\text{Sum of the roots})x + \text{product of the roots} = 0$$

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

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