

CBSE Class 10 Maths Notes Chapter 4 Quadratic Equations

A quadratic polynomial of the form $ax^2 + bx + c$, where $a \neq 0$ and a, b, c are real numbers, is called a quadratic equation

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

Here a and b are the coefficients of x^2 and x respectively and ' c ' is a constant term.

Any value is a solution of a quadratic equation if and only if it satisfies the quadratic equation.

Quadratic formula: The roots, i.e., α and β of a quadratic equation $ax^2 + bx + c = 0$ are given

by $\frac{-b \pm \sqrt{D}}{2a}$ or $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ provided $b^2 - 4ac \geq 0$.

Here, the value $b^2 - 4ac$ is known as the discriminant and is generally denoted by D . ' D ' helps us to determine the nature of roots for a given quadratic equation. Thus $D = b^2 - 4ac$.

The rules are:

1. If $D = 0 \Rightarrow$ The roots are Real and Equal.
2. If $D > 0 \Rightarrow$ The two roots are Real and Unequal.
3. If $D < 0 \Rightarrow$ No Real roots exist.

If α and β are the roots of the quadratic equation, then Quadratic equation is $x^2 - (\alpha + \beta)x + \alpha\beta = 0$ Or $x^2 - (\text{sum of roots})x + \text{product of roots} = 0$

where, Sum of roots $(\alpha + \beta) = \frac{-\text{coefficient of } x}{\text{coefficient of } x^2} = \frac{-b}{a}$

Product of roots $(\alpha \times \beta) = \frac{\text{coefficient term}}{\text{coefficient of } x^2} = \frac{c}{a}$