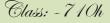


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Notes for Quadratic Equations

Quadratic polynomial: A Polynomial of the form $p(x) = ax^2 + bx + c$, where *a* 0 and *a*, *b*, *c* are

real numbers and *x* is a real variable is called a **quadratic polynomial**.

Quadratic equation: An equation p(x) = 0, where p(x) is a quadratic polynomial is called a

quadratic equation i.e. $ax^2 + bx + c = 0$, a = 0.

Roots of Quadratic Equations

Those values of *x* for which $ax^2 + bx + c = 0$ is satisfied are called **Roots** of quadratic equation.

Quadratic equation is classified into two categories

• Pure quadratic equation of type

$$ax^2 + c = 0$$

by putting b = 0 in $ax^2 + bx + c = 0$

• Affected quadratic equation of type $ax^2 + bx + c = 0, b 0$.

Roots of Quadratic Equations

If α , β are the **Roots** of the polynomial $ax^2 + bx + c$. Then α , β are called roots of corresponding

equation

 $ax^2 + bx + c = 0$

 $\Rightarrow \quad p(\alpha) = p(\beta) = 0$

i.e. $a\alpha^2 + b\alpha + c = 0$

and $a\beta^2 + b\beta + c = 0$

Pure quadratic $ax^2 + c = 0$ can be solved by any one of the following methods:

- By Taking square root
- By factorisation

Affected quadratic equation can be solved by any one of the following method:

- By splitting middle term
- By method of completing the square

The quadratic formula or Sridharacharya's formula to find the roots of $ax^2 + bx + c = 0$ is

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

 $D = b^2 - 4ac$, is called the discriminant which decides the nature of roots.

- If *D* > 0, Roots are real and unequal.
- If D = 0, Roots are real and equal.
- If D < 0, No Real roots are possible.