## Quadratic equations - Points to Remember

## 1. General Form of a Quadratic Polynomial:

A polynomial of degree 2 is called a quadratic polynomial. The general form of a quadratic polynomial is $\mathrm{ax} 2+\mathrm{bx}+\mathrm{c}$ where $\mathrm{a}, \mathrm{b}, \mathrm{c}$ are real numbers such that $\mathrm{a} \neq 0$ and x is a real variable.

## 2. Value of a Quadratic Polynomial:

If $\mathrm{px}=\mathrm{ax} 2+\mathrm{bx}+\mathrm{c}, \mathrm{a} \neq 0$ is a quadratic polynomial and a is a real number, then $\mathrm{p} \alpha=\mathrm{a} \alpha 2+\mathrm{b} \alpha+\mathrm{c}$ is known as the value of the quadratic polynomial px.

## 3. Zeros of a Quadratic Polynomial:

A real number $\alpha$ is said to be a zero of the quadratic polynomials $\mathrm{px}=\mathrm{ax} 2+\mathrm{bx}+\mathrm{c}$, if $\mathrm{p} \alpha=0$.

## 4. Quadratic Equation:

If $\mathrm{px}=\mathrm{ax} 2+\mathrm{bx}+\mathrm{c}$ is a quadratic polynomial, then $\mathrm{px}=0$ i.e. $\mathrm{ax} 2+\mathrm{bx}+\mathrm{c}=0, \mathrm{a} \neq 0$ is called a quadratic equation.

## 5. Roots of a Quadratic Equation:

A real number $\alpha$ is said to be a root of the quadratic equation $\mathrm{ax} 2+\mathrm{bx}+\mathrm{c}=0$, if $\mathrm{a} \alpha 2+\mathrm{b} \alpha+\mathrm{c}=0$.
In other words, $\alpha$ is a root of $a x 2+b x+c=0$ if and only if $\alpha$ is a zero of the polynomials $p x=a x 2+b x+c$.

## 6. Methods to Find the Roots of a Quadratic Equation:

(i) Factorisation:

If $\mathrm{ax} 2+\mathrm{bx}+\mathrm{c}, \mathrm{a} \neq 0$ is factorisable into a product of two linear factors, then the roots of the quadratic equation $\mathrm{ax} 2+\mathrm{bx}+\mathrm{c}=0$ can be found by equating each factor to zero.
(ii) Completing the square method:

The roots of a quadratic equation can also be found by using the method of completing the square.
(iii) Quadratic formula:

The roots of a quadratic equation $\mathrm{ax} 2+\mathrm{bx}+\mathrm{c}=0$ are given by
$\mathrm{x}=-\mathrm{b} \pm \mathrm{b} 2-4 \mathrm{ac} 2 \mathrm{a}$ provided $\mathrm{b} 2-4 \mathrm{ac} \geq 0$.
7. Nature of the Roots:

A quadratic equation $a \times 2+b x+c=0$ has
(i) Two distinct real roots, if b2-4ac>0,
(ii) Two equal roots (i.e., coincident roots), if $\mathrm{b} 2-4 \mathrm{ac}=0$, and
(iii) No real roots, if b2-4ac<0.

