

Quadratic Equations

CBSE Class 10 Maths · Knowledge organiser

KEY DEFINITIONS

Quadratic equation

An equation $ax^2 + bx + c = 0$ with $a \neq 0$.

Discriminant

$D = b^2 - 4ac$ decides the nature of the roots.

Root

A value of x that satisfies the equation.

KEY FORMULAS

$$ax^2 + bx + c = 0, a \neq 0 \quad x = \frac{-b \pm \sqrt{D}}{2a}, \quad D = b^2 - 4ac$$

Nature of roots
 $D > 0$ two distinct real;
 $D = 0$ two equal real ($x = -\frac{b}{2a}$);
 $D < 0$ no real roots

WORKED EXAMPLE

Solve $x^2 + 2x - 4 = 0$: $D = 4 + 16 = 20$,

$$x = \frac{-2 \pm 2\sqrt{5}}{2} = -1 \pm \sqrt{5}.$$

YOU SHOULD BE ABLE TO...

- Recognise a quadratic, solve it by factorisation or the formula and find the discriminant.
- Decide the nature of the roots, find k for equal or real roots and set up quadratic word problems from speed, area and number situations.
- Write full-marks 5-mark word problems: equation formed, solved, the impossible root rejected with a reason, answer in context.
- Handle surd coefficients, rational equations and 'for every value of m ' discriminant proofs.

COMMON MISTAKES

- ✗ Dividing both sides by x and losing the root $x = 0$.
- ✗ Using b instead of $-b$ in the formula, or dividing only the root term by $2a$.
- ✗ Forgetting to rearrange to " $= 0$ " before factorising.
- ✗ Not rejecting inadmissible roots in word problems.