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Quadratic Equations

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

where a, b, and c are constants and $a \neq 0$.

Note that the highest power of an unknown of a quadratic equation is 2.

General Form

Roots

Quadratic Equations (QE)

Solving QE

Factorisation

Completing the Square

Using a Formula

2 real and different roots

$$b^2 - 4ac > 0$$

2 real and equal roots

$$b^2 - 4ac = 0$$

No real roots

$$b^2 - 4ac < 0$$

Conditions for the Type of Root

Forming QE from Roots

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

If α and β are the roots of a quadratic equation

$$\alpha + \beta = -\frac{b}{a} \quad \alpha\beta = \frac{c}{a}$$

The Quadratic Equation

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

or

$$x^2 - (\text{SoR})x + (\text{PoR}) = 0$$

SoR = Sum of Roots

PoR = Product of Roots