

## Solution of Quadratic Equations

The general quadratic equation  $ax^2 + bx + c = 0$  has real-valued coefficients  $a, b, c$  and  $a \neq 0$ .

There are a number of ways of solving (or finding the roots) of a quadratic equation. The most common methods are

1. [Factorisation](#)
2. [Graphical Methods](#)
3. [Completing the Square](#)
4. [Formula](#)

[Click on the headings above to find out more about each method]

As for the nature of the solution, the quadratic equation

1. Two distinct real solutions if  $b^2 - 4ac > 0$ ,
2. One real (or repeated) solution  $b^2 - 4ac = 0$ ,
3. Two complex conjugate solutions if  $b^2 - 4ac < 0$ .

For example the equation  $x^2 + 2x = 0$  has two distinct solutions since  $2^2 - 4 \times 1 \times 0 = 4 > 0$ .

For example the equation  $x^2 + 2x + 1 = 0$  has one real solution since  $2^2 - 4 \times 1 \times 1 = 0$ .

For example the equation  $x^2 + 2x + 2 = 0$  has two complex conjugate solutions since  $2^2 - 4 \times 2 \times 1 = -4 < 0$ .