# Quadratic Equations – Solution by Formula

Quadratic equations are equations of the form $ax^2 + bx + c = 0$.

Quadratic equations can be solved in a number of ways but at this level they are usually solved by algebraic or graphical methods including solution by factors, using the formula and iteration techniques.

One of general methods is using the formula

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

to solve any quadratic equations of the form $ax^2 + bx + c = 0$ as shown in the following worked example. There is well known, loved and trusted formula which always works to solve quadratic equations.

If you are asked to solve a quadratic equation to any number of decimal places or significant figures you will have to use this formula.

By looking at the formula you can see that normally there will be two solutions:

only one solution if $b^2 - 4ac = 0$ $x = -b/2a$;
and no real solution of the quadratic equation if $b^2 - 4ac < 0$

If the graph of a quadratic equation does not cross the x-axis than the equation has no real solutions. (If you go on to do Maths at higher level you will find that “imaginary” solutions exist.)

**Worked example**

Solve the equation $x^2 + 3x - 2 = 0$ to two decimal places.

Comparing given quadratic equation with the general form $ax^2 + bx + c = 0$ then:
$a = 1, b = 3, c = -2$

Substituting these values in the formula:

x =

x =

x =

x =

x =

x = 0.561552813  or  x = - 3.561552813
x = 0.56  (2 dec.places)  or  x = - 3.56  (2 dec. places)

*Elena Worsfold*