Y9 Maths Knowledge Organiser Topic 8: Quadratic Graphs

What must I be able to do?

New content:

- ☐ Sketch graphs of quadratic functions, considering orientation and labelling the point of intersection with the y axis, considering what happens to y for large positive and negative values of x
  - ➢ Mathswatch 99 (GCSE)
- ☐ Find approximate solutions of a quadratic equation from the graph of the corresponding function
  - ➢ Mathswatch 160 (GCSE)

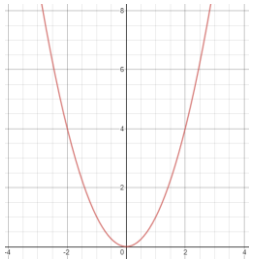
Key vocabulary

Quadratic function	An equation where the highest power of a variable (usually x) is 2, e.g. it contains an x^2 power but not an x^3 or higher. We use both the word function and equation to mean the same thing here.
Roots	The values of x in a quadratic equation which give a value of y = 0. On a graph, this is where it crosses the x-axis.

General form of a quadratic equation

The general equation of a quadratic is $y = ax^2 + bx + c$, where a, b and c are all constant values. The +c represents the intercept and tells us where the graph will cross the y-axis.

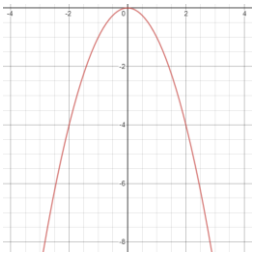
If the a is positive, the graph will form a u shape.



$y = x^2$

The graph is a smooth curve between each point and is called a parabola.

If the a is negative the graph will form a n shape.



$y = -x^2$

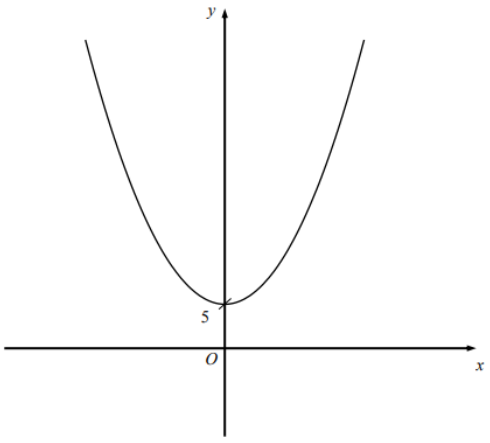
Sketching quadratics

All you need to know is whether it forms a u or a n shape, and identify where it would cross the y-axis.

e.g. sketch the graph $y = 3x^2 + 5$

a = 3 so is positive. So this is a u shape

c = 5, so crosses at (0, 5)



As it is a sketch, there is no need to plot any points accurately. The graph should be symmetrical about the y-axis and just label the crossing point.

Plotting and using quadratic graphs

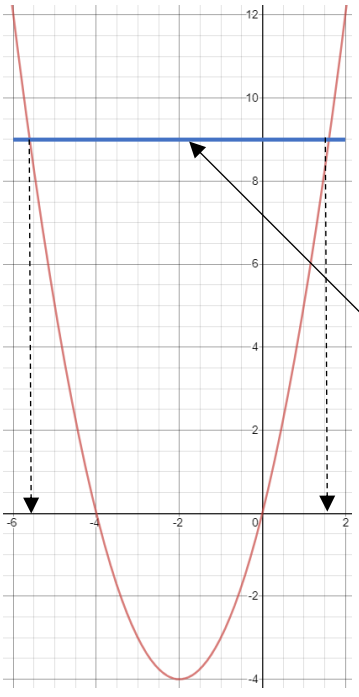
e.g. a) Complete the table of values for $y = x^2 + 4x$ and plot the graph

x	-6	-4	-2	0	2
y	12	0	-4	0	12

$y = (-6)^2 + 4 \times -6$

$y = 36 - 24 = 12$

As a quadratic graph is symmetrical, you will often see repeating values of y



b) Use the graph to find estimates for the solutions of $x^2 + 4x = 9$

We already have the graph of $y = x^2 + 4x$

We draw on to the same axis the graph of $y = 9$

Where the 2 graphs intersect (cross) we read off the two x values.

So x = 1.5 and x = -5.5