

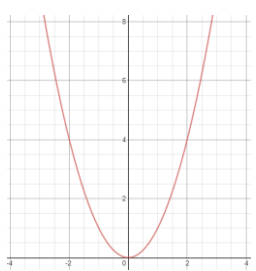
Y9 Maths Knowledge Organiser Topic 14: Quadratic Functions

<p>What must I be able to do?</p> <p>New content:</p> <ul style="list-style-type: none"> □ 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 □ Find approximate solutions of a quadratic equation from the graph of the corresponding function <ul style="list-style-type: none"> ➤ Sparx U989, U667 	<p>Key vocabulary</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Quadratic function</td> <td>An equation where the <u>highest power</u> of a variable (usually x) is <u>2</u>, 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.</td> </tr> <tr> <td>Roots</td> <td>The values of x in a quadratic equation which give a value of $y = 0$. On a graph, this is where it <u>crosses the x-axis</u>.</td> </tr> </table>	Quadratic function	An equation where the <u>highest power</u> of a variable (usually x) is <u>2</u> , 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 <u>crosses the x-axis</u> .
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General form of a quadratic equation

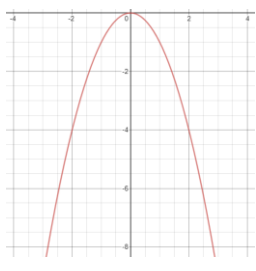
The general equation of a quadratic is $y = ax^2 + bx + c$, where a, b and c are all constant values. The +c represents the intercept and tells us where the graph will cross the y-axis.

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



$y = x^2$

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



$y = -x^2$

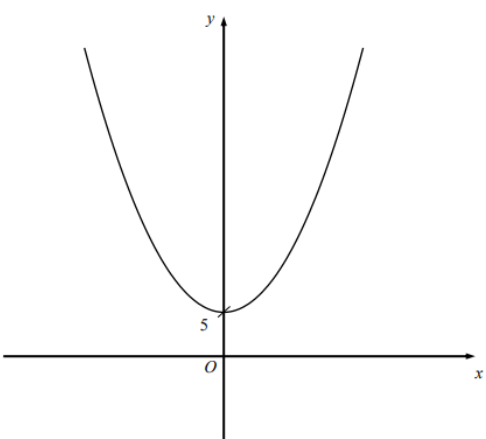
Sketching quadratics

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.

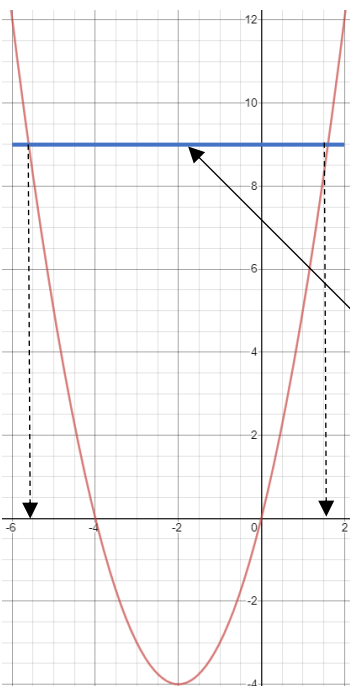
Plotting and using quadratic graphs

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

$y = (-6)^2 + 4x - 6$
 $y = 36 - 24 = 12$

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 $x = -5.5$