Y10 Maths Knowledge Organiser Foundation Tier: Non-linear graphs

What must I be able to do?	Key vocabulary	
New content: ☐ Solve a quadratic equation by factorising ➢ Sparx U228, U960 ☐ Recognise and plot cubic, exponential and reciprocal graphs ➢ Sparx U980, U229, U593	**Root**	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.
	Turning point	On a quadratic graph, the turning point is the maximum or minimum point on the curve.

Solving by factorising

Step 1: Rearrange the equation so that one side is equal to 0

Step 2: Factorise the equation

Step 3: Solve each factor equal to 0.

e.g. Solve $x^2 - 6x + 10 = 2$

$x^2 - 6x + 8 = 0$

$(x - 4)(x - 2) = 0$

Either $x - 4 = 0$ or $x - 2 = 0$

$x = 4$ and $x = 2$

e.g. Solve $2x^2 - 5x - 3 = 0$

$(2x + 1)(x - 3) = 0$

Either $2x + 1 = 0$ or $x - 3 = 0$

$2x = -1$

$x = -\frac{1}{2}$ and $x = 3$

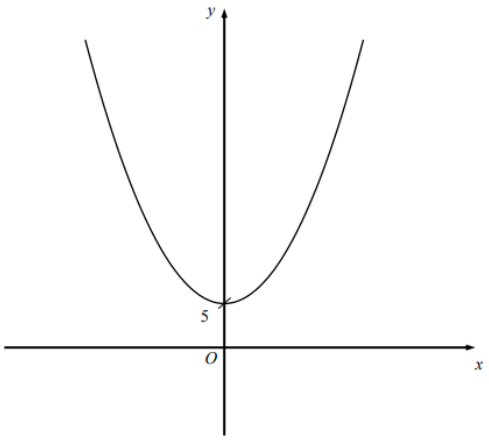
Sketching quadratics

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.

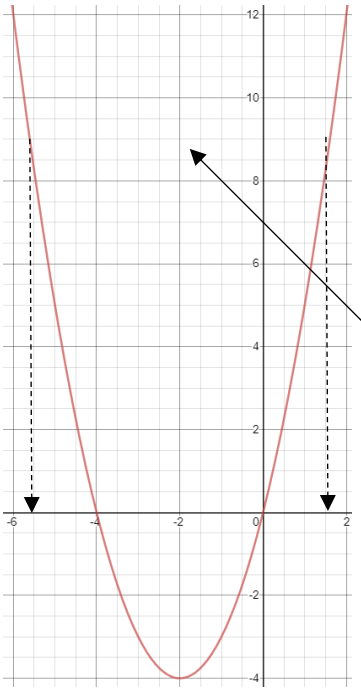
Plotting and using quadratic graphs

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 $y = 9$

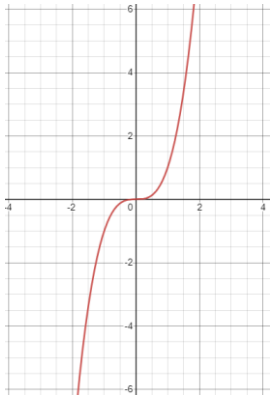
Where the 2 graphs intersect (cross) we read off the two x values.

So x = 1.5 and x = -5.5

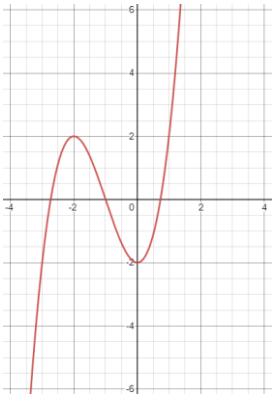
Equations of other types of graphs

Cubic graphs:

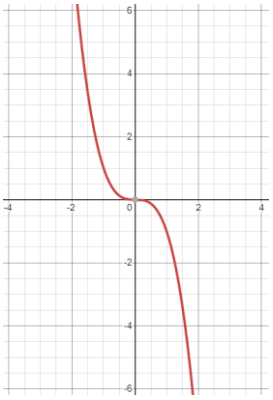
$y = x^3$



$y = x^3 + 3x^2 - 2$



$y = -x^3$

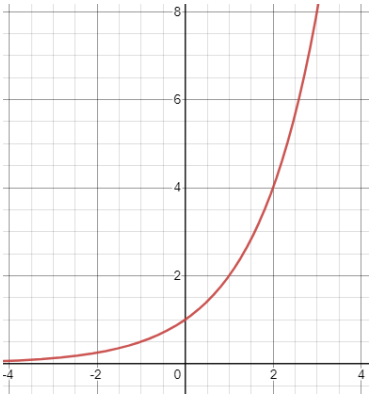


Has a maximum of two turning points.

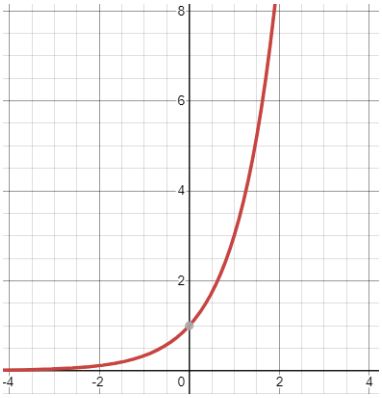
y-axis goes from negative to positive.

Exponential graphs

$y = 2^x$



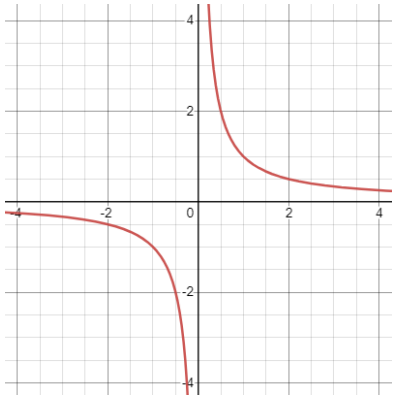
$y = 3^x$



All basic exponential curves will pass through the coordinate (0,1).

Reciprocal graphs

$y = \frac{1}{x}$



With all of these graphs you need to be able to plot one if given the equation and a table of points to complete.

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