

Algebra Booster 3 – Drawing Quadratic Graphs

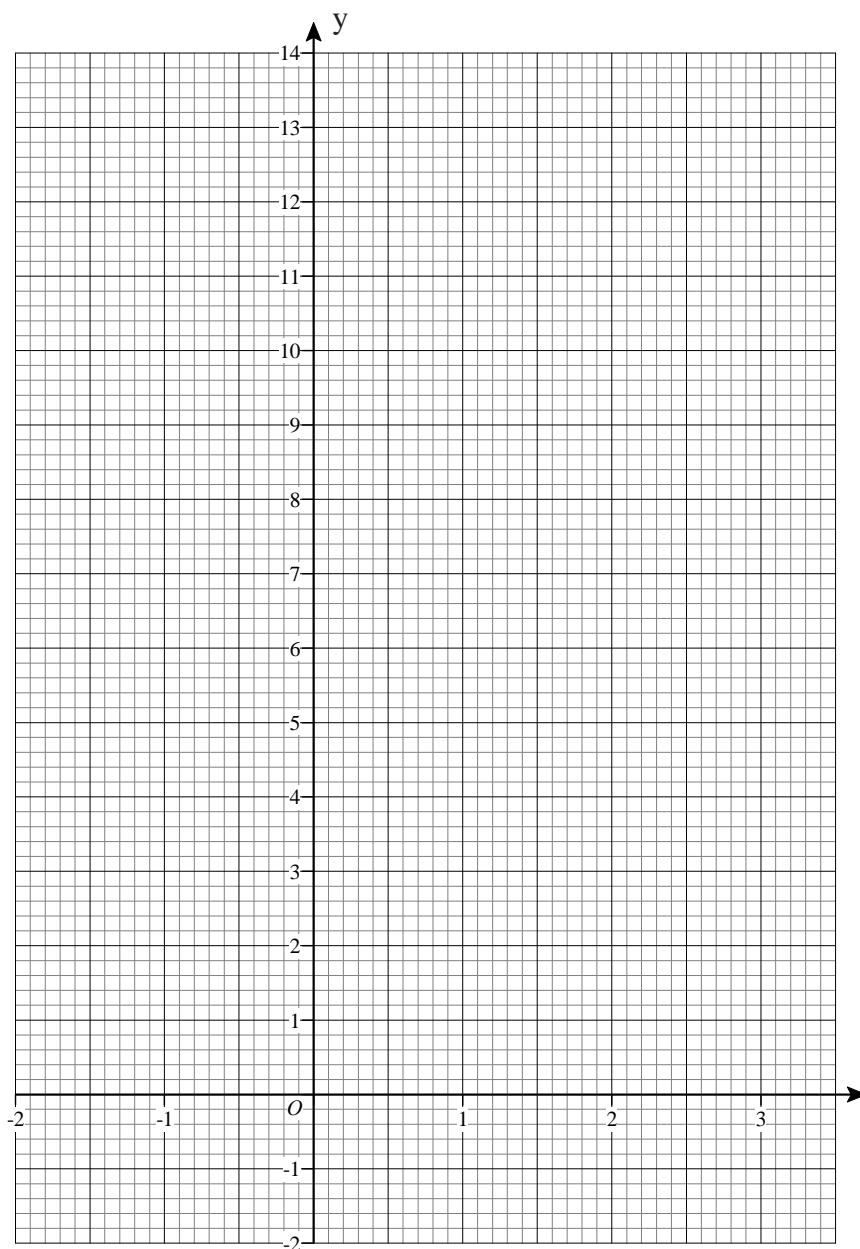
Check:

- a) Complete the table for the equation

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

x	-2	-1	0	1	2
y	14				

- b) Draw the graph of $y = 3x^2 - x$ on the axes at the bottom of the page
- c) Use your graph to find the value of y when $x = 1.5$
- d) Use your graph to find the value of y when $x = -1.5$
- e) Use your graph to solve $3x^2 - x = 10$



Learn:

Maths Watch Reference - 116

Plotting quadratic graphs is similar to linear graphs, You will be asked to complete a table of values from which you can plot points on the graph. You may then be asked to use your graph to find values, usually when $y = 0$.

Plot the graph of

$$y = x^2 - 3$$

for values of x between -3 and 3 .

We can use a table of values to generate coordinates that lie on the graph as follows:

x	-3	-2	-1	0	1	2	3
$y = x^2 - 3$	6	1	-2	-3	-2	1	6

↓ ↓ ↓ ↓ ↓ ↓ ↓

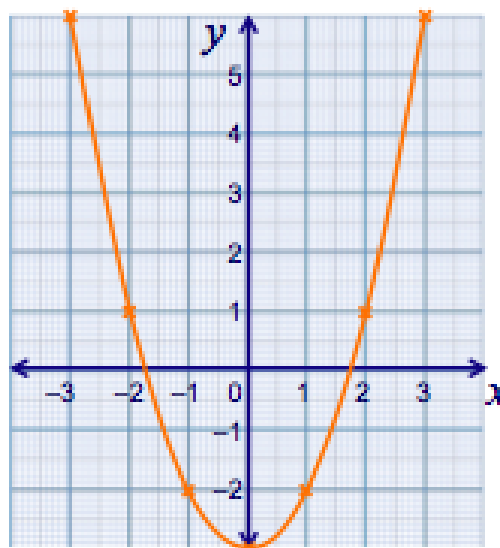
$(-3, 6)$ $(-2, 1)$ $(-1, -2)$ $(0, -3)$ $(1, -2)$ $(2, 1)$ $(3, 6)$

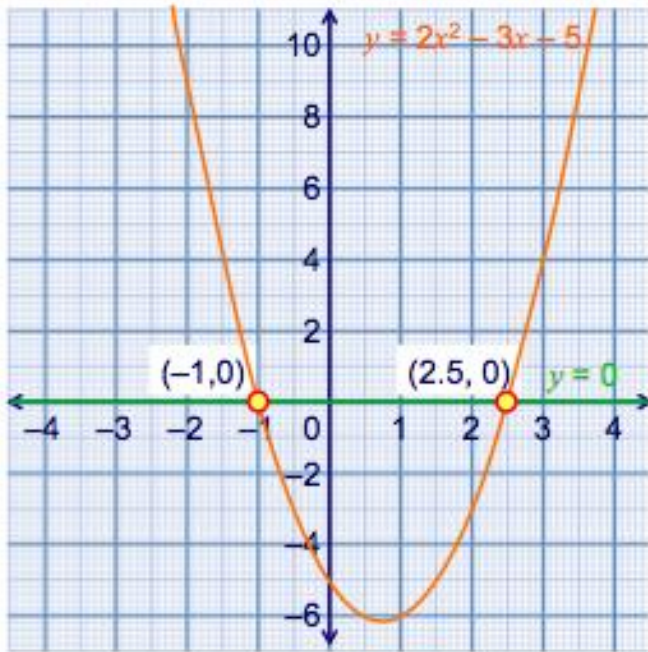
The points given in the table are plotted ...

... and the points are then joined together with a smooth curve.

The shape of this graph is called a **parabola**.

It is characteristic of a **quadratic function**.





The graphs of $y = 2x^2 - 3x - 5$ and $y = 0$ intersect at the points:

$$(-1, 0)$$

and $(2.5, 0)$.

The x -value of these coordinates give us the same solutions

$$x = -1$$

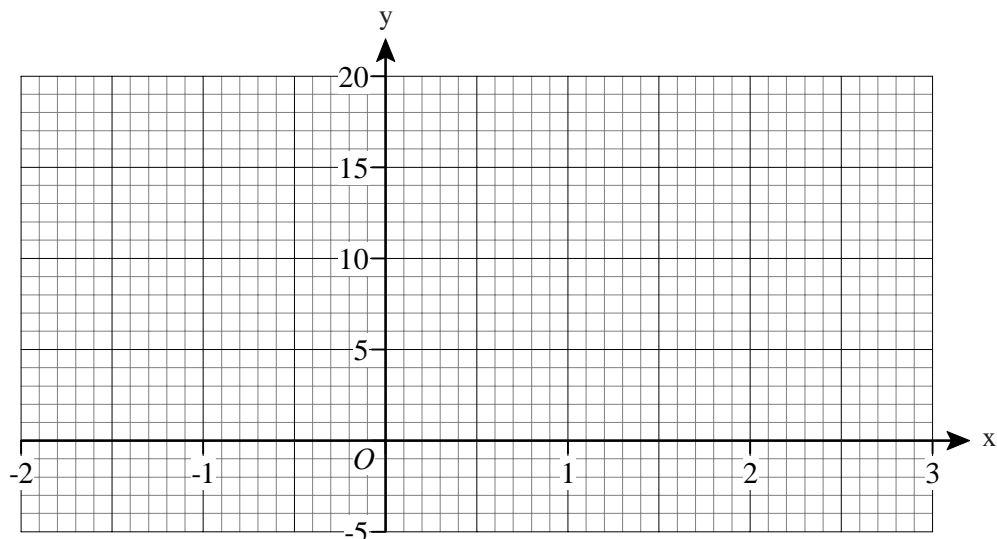
and $x = 2.5$

Practice:

- 1) a) Complete the table of values for $y = 2x^2 - 3x$

x	-2	-1	0	1	2	3
y	14		0			9

- b) On the grid, draw the graph of $y = 2x^2 - 3x$ for values of x from -2 to 3

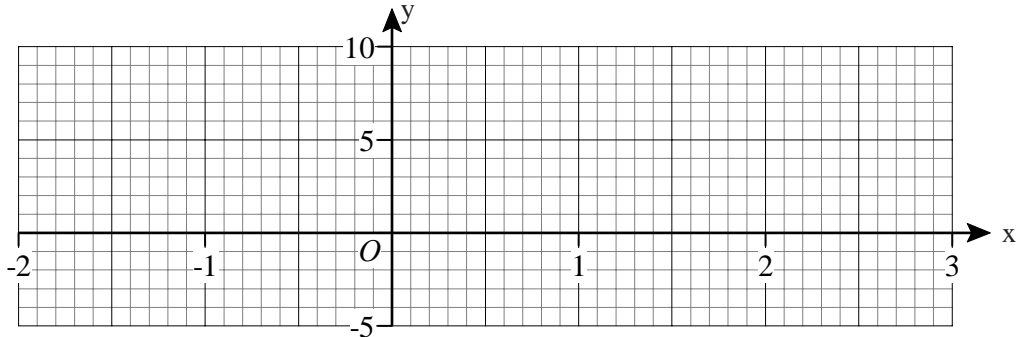


- c) Use the graph to find the value of y when $x = -1.5$
 d) Use the graph to find the values of x when $y = 4$

2) a) Complete the table of values for $y = x^2 - 2x$

x	-2	-1	0	1	2	3
y	8		0			

b) On the grid, draw the graph of $y = x^2 - 2x$ for values of x from -2 to 3



c) (i) On the same axes draw the straight line $y = 2.5$

(ii) Write down the values of x for which $x^2 - 2x = 2.5$

Exam Preparation:

Remember: each of these pairs of numbers are the coordinates of one point on the graph of $y = x^2 + 4x - 1$

2. Table of values for the equation $y = x^2 + 4x - 1$

x	-5	-4	-3	-2	-1	0	1	2
y	4	-1	-4	-5	-4	-1	4	11

we must put each of these values into the equation and see what value of y comes out.

Fill in the missing values of y in the table.

When x is -4:

$$y = (-4)^2 + 4(-4) - 1 = 16 - 16 - 1 = -1$$

$\therefore y = -1$

When x is -2:

$$y = (-2)^2 + 4(-2) - 1 = 4 - 8 - 1 = -5$$

$\therefore y = -5$

When x is -1:

$$y = (-1)^2 + 4(-1) - 1 = 1 - 4 - 1 = -4$$

$\therefore y = -4$

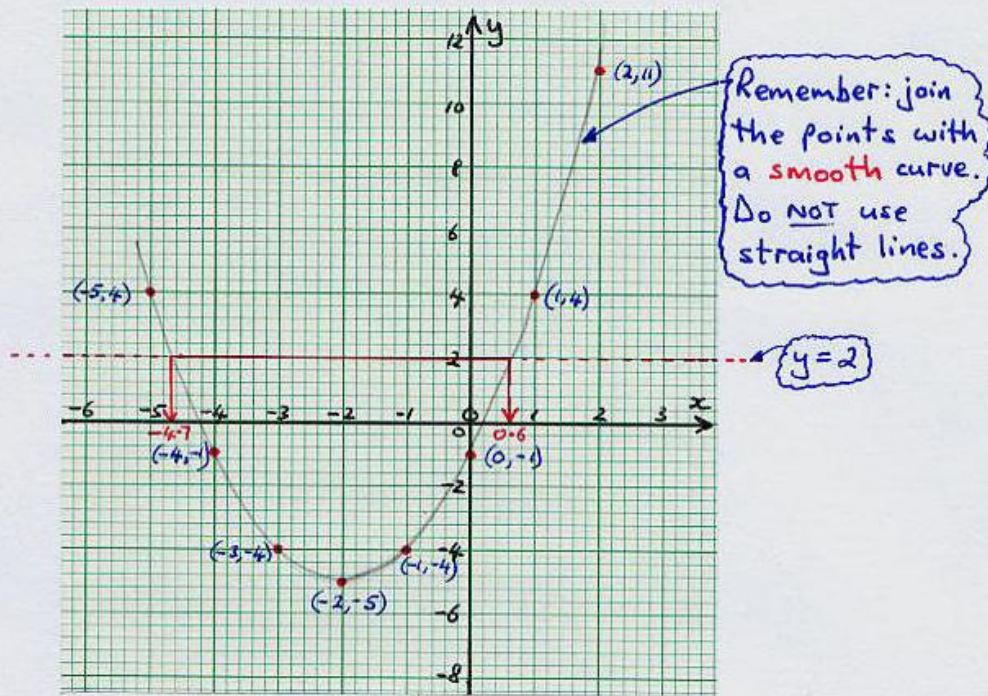
When x is 0:

$$y = 0^2 + 4(0) - 1 = 0 + 0 - 1 = -1$$

$\therefore y = -1$

Anything multiplied by zero is zero. This leaves just the -1 at the end of the equation.

(b) On the grid below, draw the graph of $y = x^2 + 4x - 1$



(c) From your graph estimate the values of x for which $y = 2$.

$y = 2$ is a straight, horizontal line passing through $(0, 2)$ on the y -axis. This line then cuts the curve $y = x^2 + 4x - 1$ at two points. At these points we come straight down to the x -axis and read off the two x -values. These values will, of course, be 'estimates' because each person will draw the graph slightly different. However, the two values must not be much larger or smaller than the values I have given here.

$$x = \dots 0.6 \dots$$

$$x = \dots -4.7 \dots$$

(2 marks)

Confirm:

- a) Complete the table for the equation
 $y = 2x^2 - 3x$

x	-2	-1	0	1	2	3
y	14					

- b) Draw the graph of $y = 2x^2 - 3x$ on the axes at the bottom of the page
- c) Use your graph to find the value of y when $x = 2.3$
- d) Use your graph to find the value of y when $x = -1.5$
- e) Use your graph to solve $2x^2 - 3x = 5$
- f) Use your graph to solve $2x^2 - 3x = 8$

