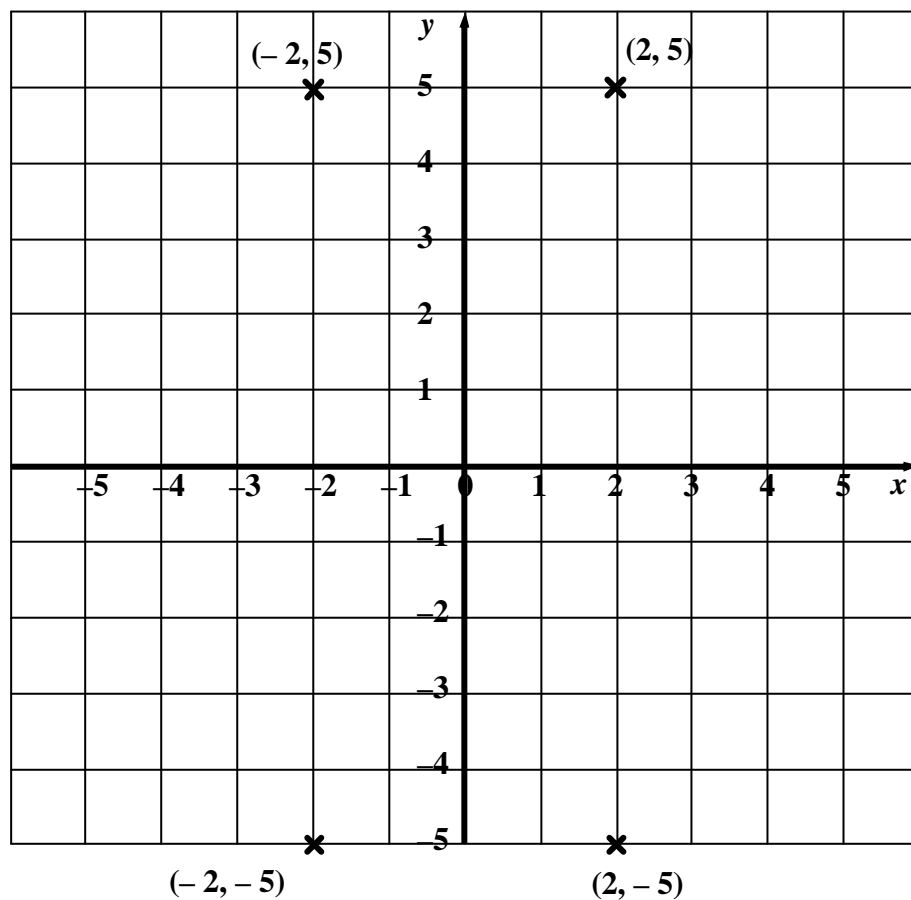


# Linear Graphs

The position of a point on a graph is given by two co-ordinates,  $x$  and  $y$ , where  $x$  is the horizontal co-ordinate and  $y$  is the vertical co-ordinate.

For example  $(2, 5)$  is the point with  $x$  co-ordinate 2 and  $y$  co-ordinate 5. This point is shown on the graph below. This also shows the positions of the points  $(2, -5)$ ,  $(-2, 5)$  and  $(-2, -5)$



Equations involving  $x$  and  $y$  represent straight lines or curves on the graph.

To find the position of a line or curve, draw up a table of values that satisfy the equation and use these to plot points on a graph. Joining the points gives the line or curve.

Equations of the form  $y = mx + c$ , where  $m$  and  $c$  are positive or negative constants, always give **straight lines**.



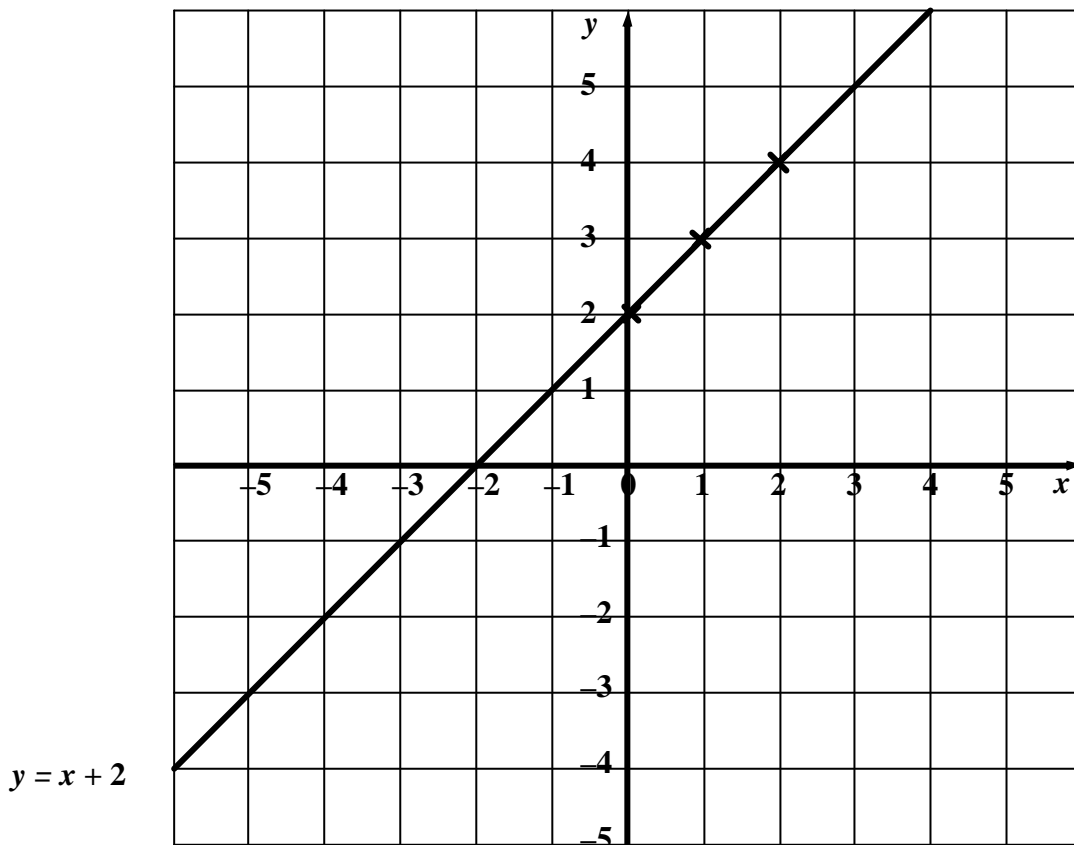
**Example**  $y = x + 2$

**To draw the line :**

- Choose 3 values for  $x$ .
- Work out the corresponding values for  $y$ .
- Plot the points on a graph.
- Join the points with a straight line.
- Label the line with its equation.

**For  $y = x + 2$**

$x$	0	1	2
$y$	2	3	4



**Try these:**

Use the equations to complete the tables below.  
 Draw the lines on the graph above. Remember to label each line.

$y = x + 1$

$x$	0	1	2
$y$			

$y = x + 3$

$x$	0	1	2
$y$			

$y = x - 1$

$x$	1	2	3
$y$			

$y = x - 2$

$x$	2	3	4
$y$			

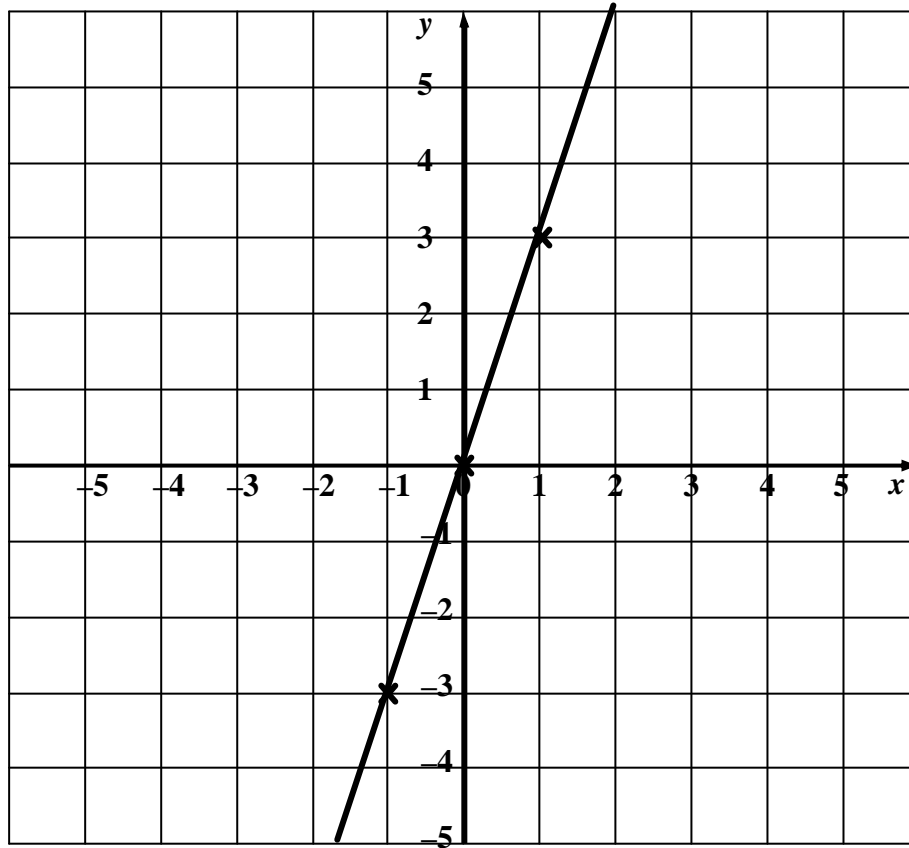
Write down what you notice:



**Example**

$$y = 3x$$

$x$	-1	0	1
$y$	-3	0	3



$$y = 3x$$

**Try these:**

Use the equations to complete the tables below.

Draw the lines on the graph above. Remember to label each line.

$$y = 2x$$

$x$	0	1	2
$y$			

$$y = -2x$$

$x$	0	1	2
$y$			

$$y = -3x$$

$x$	-1	0	1
$y$			

$$y = 0.5x$$

$x$	0	2	4
$y$			

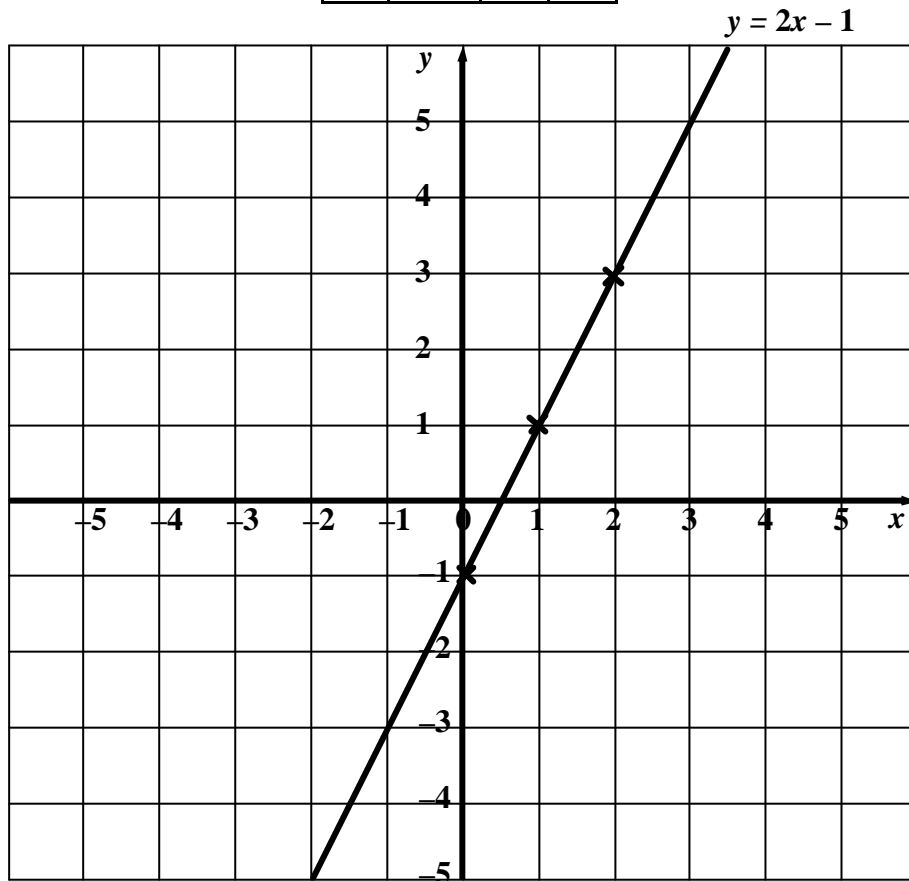
Write down what you notice:



**Example**

$$y = 2x - 1$$

x	0	1	2
y	-1	1	3



Note that you could find the position of a line using just 2 points, but it is advisable to plot at least one more point as a check.

**Try these:**

Use the equations to complete the tables below.

Draw the lines on the graph above. Remember to label each line.

$$y = 2x + 1$$

x	0	1	2
y			

$$y = 2x - 3$$

x	0	1	2
y			

$$y = 3x - 1$$

x	0	1	2
y			

$$y = 0.5x - 1$$

x	0	2	4
y			



**Teacher Notes**

**Unit** Intermediate Level, *Using algebra, functions and graphs*  
Advanced level, *Working with algebraic and graphical techniques*

**Skills used in this activity:**

- calculating values from an algebraic equation
- plotting points on a graph

**Notes**

This activity is intended as an introduction to linear graphs leading to the link between the constants in the standard form of the equation ( $y = mx + c$ ) and the gradient and position of the line.

You will need to explain that:

- the type of equation used in this activity will always give a straight line;
- although two points are sufficient to draw a straight line, it is advisable to work out a third point as a check;
- if any of the points calculated do not fit on the axes, then other points may be needed.

These points can be explained whilst showing the first three slides in the powerpoint presentation which show how to draw the graphs given on the first three pages of the activity.

Students can then be asked to draw the other graphs. The work can be shared between groups of students if you wish (according to ability), with the groups discussing the results before you go through the main points with the whole class.

Note that the number of graphs to be drawn by the students can be reduced/increased by adapting the Word version of the activity.

**Answers**

All the graphs in the activity are drawn on the last three slides of the powerpoint presentation - you can use these when discussing the results with the class as a whole.

