

Y10 Maths Knowledge Organiser Foundation Tier: Linear graphs

What must I be able to do?

New content:

- Find the equation of a line parallel to another which passes through a specific point
 - Sparx U477

Key vocabulary

Linear graph

A linear equation with 2 variables, usually x and y . When plotted it will form a straight line.

Gradient

The steepness of a graph.

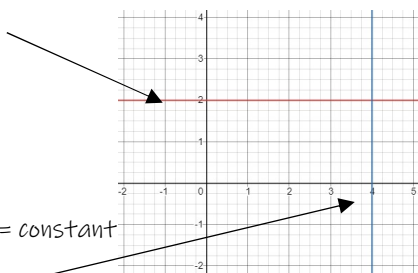
Intercept

The point at which a graph crosses the y-axis.

Horizontal and vertical lines

Horizontal: $y = \text{constant}$

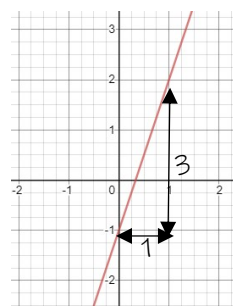
e.g. $y=2$



Vertical: $x = \text{constant}$

e.g. $x=4$

Finding the equation of a graph



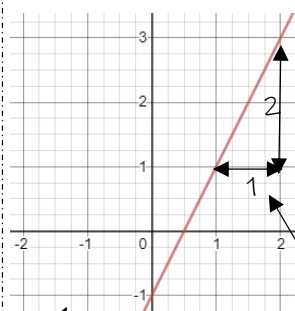
The general form of the equation of a straight line graph is $y = mx + c$ where m is the gradient and c is the y -intercept.

Gradient is $3 \div 1 = 3$ so $m = 3$

It crosses at $(0, -1)$ so $c = -1$

So the equation is $y = 3x - 1$

Calculating the gradient



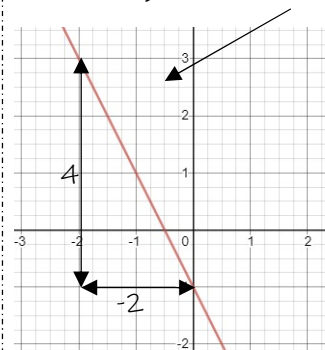
Draw a right angled triangle between 2 points.

The gradient equals: $\frac{\text{change in } y}{\text{change in } x}$

e.g. $2 \div 1 = 2$

The gradient is 2

This graph slopes up from left to right so the gradient is positive. If it sloped up from right to left the gradient would be negative.



e.g. $4 \div -2 = -2$

The gradient is -2

Plotting graphs

From a table - substitute each x value into the equation to generate each coordinate to plot. e.g. $y = 2x + 1$

When $x = 0$, $y = 2 \times 0 + 1 = 1$

When $x = 2$, $y = 2 \times 2 + 1 = 5$

x	0	1	2	3
y	1	3	5	7

When $x = 1$, $y = 2 \times 1 + 1 = 3$

When $x = 3$, $y = 2 \times 3 + 1 = 7$

Coordinates to plot at $(0, 1)$, $(1, 3)$, $(2, 5)$ and $(3, 7)$. Join with a straight line.

Gradient/intercept - first ensure the equation of the line is in the form $y = mx + c$. e.g. $y = 4x + 2$. We know $m = 4$ and $c = 2$.

Plot the intercept at $(0, 2)$. As the gradient is 4, it will travel 4 units upwards for each unit to the right. So 4 units up and 1 to the right of $(0, 2)$ is $(1, 6)$. The next is $(2, 10)$. Plot and join up with a straight line.

Cover up - similar to table but used when in the form $ax + by = c$.
e.g. $3x + 2y = 6$.

x	0	2
y	3	0

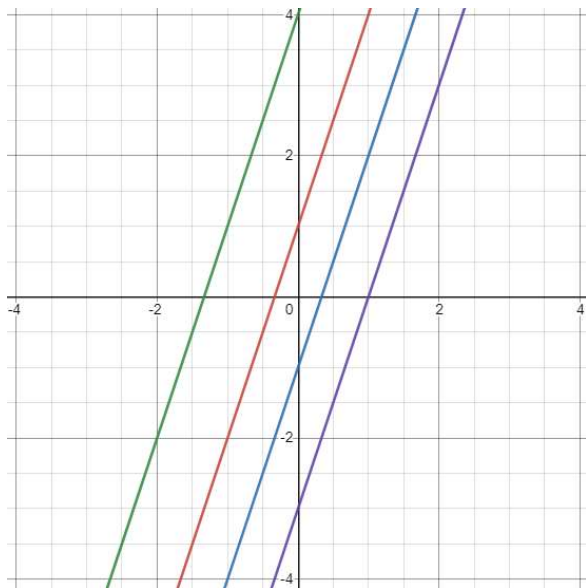
Put $x = 0$. So $2y = 6$ Therefore $y = 3$

Put $y = 0$. So $3x = 6$. Therefore $x = 2$

Gives the coordinates $(0, 3)$ and $(2, 0)$

Parallel lines

2 or more linear graphs which are parallel will have the same gradient.



These 4 graphs all have a gradient of 3 and are the graphs

$$y = 3x + 4$$

$$y = 3x + 1$$

$$y = 3x - 1$$

$$y = 3x - 3$$

Any other graph with a gradient of 3 will also be parallel to these

Equation of a line parallel to another which passes through a specific point

e.g. Find the equation of a line which is parallel to $y = 4x + 2$ and passes through the point $(4, 18)$.

Solution:

The gradient of $y = 4x + 2$ is 4, so the gradient of the second line must also be 4 as it is parallel.

The equation of the second line must be of the form $y = 4x + c$

As we know it passes through the point $(4, 18)$, we know when $x = 4$, $y = 18$.

Substituting these two values into $y = 4x + c$ we get

$$18 = 4 \times 4 + c$$

$$18 = 16 + c$$

To make this true, c must be $+2$. So the equation of this second line is $y = 4x + 2$

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