Graph Help Sheet: Calculating the formula of a graph from knowing two points.

The intercept is the point at which the graph goes through the y axis.

The gradient is the steepness of the line. We work it out by change in y divided by change in x.
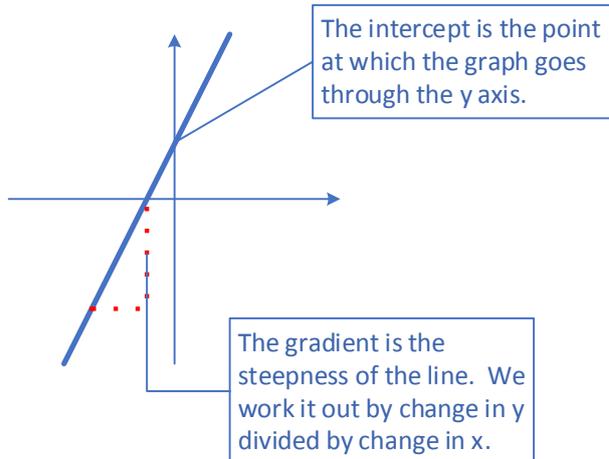
We can calculate the equation of a straight line graph easily if we know two points through which the graph line flows.

To begin with, we have to identify the left most point. This is the point for which the x value is the lower of the two.

So, if we have two points (**-12**,7) and (**3**, 13), the left most point is the (-12, 7) as **-12 < 3**. Remember that we are **comparing x values** only.

The left most point becomes point 1 and the right most becomes point 2.

You must remember several key points at this stage. Firstly, the formula for all straight line graphs is **y=mx+c**. In this formula, the value for m is the gradient or steepness of the graph. The value for c is the intercept which is the point on the y axis where the graph line crosses it.

If we have two points, say (-12,7) and (3,13), then we need to name these co-ordinates x_1, x_2, y_1 and y_2. As previously discussed, the left most point (-12,7) becomes point 1 and so x_1= -12 and y_1 = 7. Consequently, x_2=3 and y_2=13.

To calculate the gradient, we do:

$$\text{Gradient, } m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{13-7}{3-(-12)} = \frac{13-7}{3+12} = \frac{6}{15} = \frac{2}{5}$$

So this gives us the gradient of $\frac{2}{5}$.

Next, we need to calculate the intercept. So here, we choose one of the points. It doesn't matter which one, although I would always try to avoid points with negative numbers. Here, I would choose point (3,13) solely because both numbers are positive.

So we say:

To calculate the intercept:

At point (3,13), x=3 and y=13.

Substituting these values into our equation, we have $y = mx + c$

$$13 = \frac{2}{5}(3) + c$$

$$\therefore 13 - \frac{2}{5}(3) = c$$

$$\therefore 13 - \frac{6}{5} = c$$

$$\therefore c = 11\frac{4}{5}$$

So our equation is $y = \frac{2}{5}x + 11\frac{4}{5}$.

Let (-12, 7) be point 1 as this is the left most point and let (3,13) be point 2.

So we have x_1 = -12, x_2=3, y_1= 7 and y_2=13.

To calculate the gradient:

$$\text{Gradient, } m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{13-7}{3-(-12)} = \frac{13-7}{3+12} = \frac{6}{15} = \frac{2}{5}$$

To calculate the intercept:

At point (3,13), x=3 and y=13.

Substituting these values into our equation, we have $y = mx + c$

$$13 = \frac{2}{5}(3) + c$$

$$\therefore 13 - \frac{2}{5}(3) = c$$

$$\therefore 13 - \frac{6}{5} = c$$

$$\therefore c = 11\frac{4}{5}$$

The equation of the graph line is: $y = \frac{2}{5}x + 11\frac{4}{5}$ as required.