

# Finding the equation of a straight line graph

Year 11 General Maths
Units 1 and 2

www.maffsguru.com

# Learning Objectives

By the end of the lesson, I hope that you understand and can apply the following to a range of questions from the Unit 1 and 2 General Mathematics course.

- To be able to use the y-intercept and the slope to find the equation of a straight line.
- To be able to use two points on a graph to find the equation of a straight line.



# Recap

In the previous lesson we looked at the "new" equation of a straight line graph and how we can read off the gradient and intercept.

So, if we are given:

$$y = 8 + 2x$$

We can read the values as:

**Gradient = 2**
**Intercept = (0, 8)**

$y = a + bx$

$y = 8 + 2x$

$y\text{-int} = (0, 8)$

$\text{slope} = \frac{2}{1}$

We need to be careful of all the tricks!

We can write the equation in a different way:

$$y - 8 = 2x$$

**Notice that the 'y' is not on its own.**



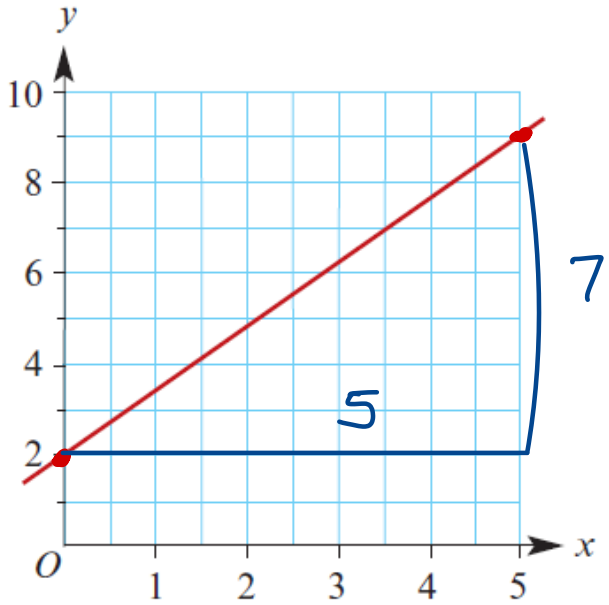
## Example

Let's dive straight in with an example. The great thing is, once we have the basics, the rest of the work doesn't really change!

Determine the equation of the straight-line graph shown opposite.

$$y = a + bx$$

$$y = 2 + \frac{7}{5}x$$






# Using two points to find the equation of a straight line.

We don't always need to have the graph to be able to find the equation of a straight line.

If we have two points, we can find all the information we need.

Now. There is a hard way and an easy way!!

I'm going to show you the easy way by using the following formula:

$$y - y_1 = m(x - x_1)$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

The gradient of the line between the two points

**Remember:**

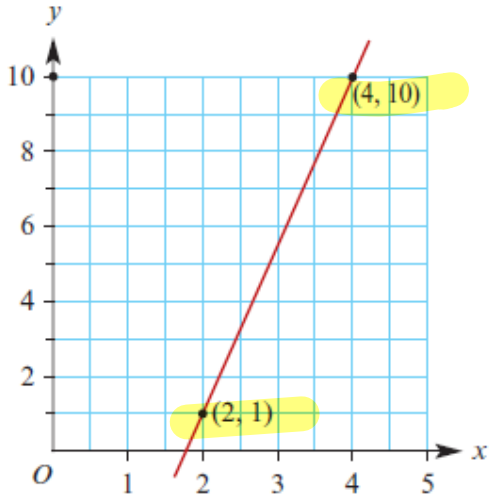
$$x_1, x_2, y_1 \text{ and } y_2$$

Are the x- and y-values of the points



## Example

Find the equation of the line that passes through the points (2, 1) and (4, 10).




**Notice here they have given two points and the graph. This isn't always going to happen.**

$x_1, y_1$
$(2, 1)$

$$m = b = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{10 - 1}{4 - 2}$$

$$= \frac{9}{2}$$

$$y - y_1 = m(x - x_1)$$

$$y - 1 = \frac{9}{2}(x - 2)$$

$$y = \frac{9}{2}(x - 2) + 1$$

$$y = \frac{9}{2}x - 9 + 1$$

$$\therefore y = -8 + \frac{9}{2}x$$



## Example

Find the equation of the line that passes through the points (2, 4) and (3, 10).

$x_1 \quad y_1$

$(2, 4)$

$x_2 \quad y_2$

$(3, 10)$

$$y - y_1 = m(x - x_1)$$

$$y - 4 = 6(x - 2)$$

$$y - 4 = 6x - 12$$

$$y = 6x - 12 + 4$$

$$= 6x - 8$$

$$y = -8 + 6x$$

$$b = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{10 - 4}{3 - 2}$$

$$= \frac{6}{1}$$

$$= 6$$



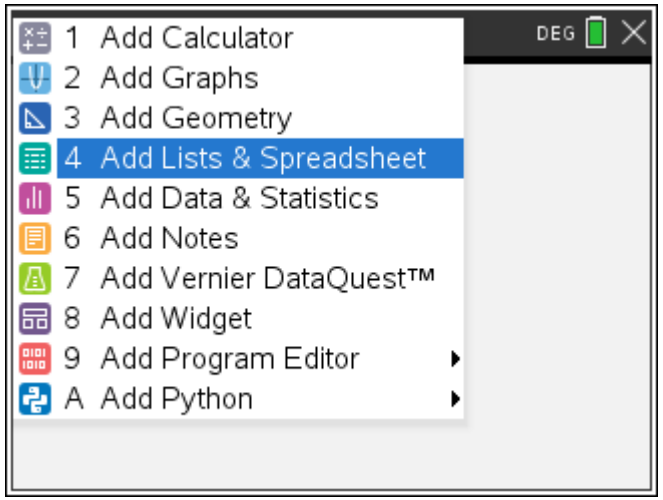
# Using the CAS to make is easier?

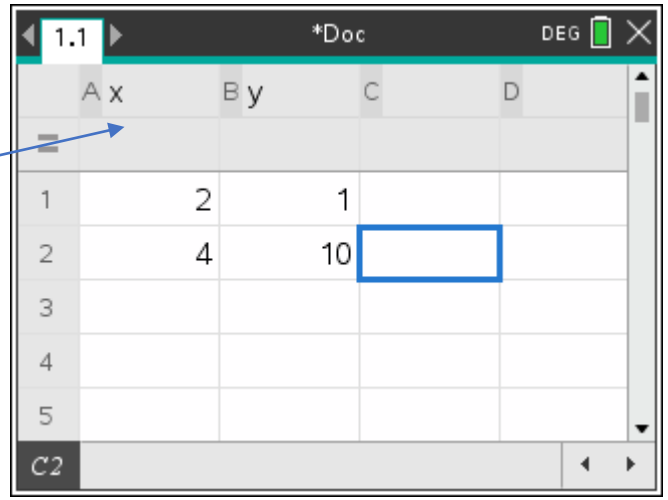
As this is a CAS enabled course, it makes sense to try and use the CAS to make life easier for us.

We are going to use an area of Mathematics called **Regression** (which you will see much more of next year).

We need to open a Lists and Spreadsheet and then put in the important information as shown for the following question:

Find the equation of the line that passes through the two points (2, 1) and (4, 10).




**Really important to put the column headings in first**



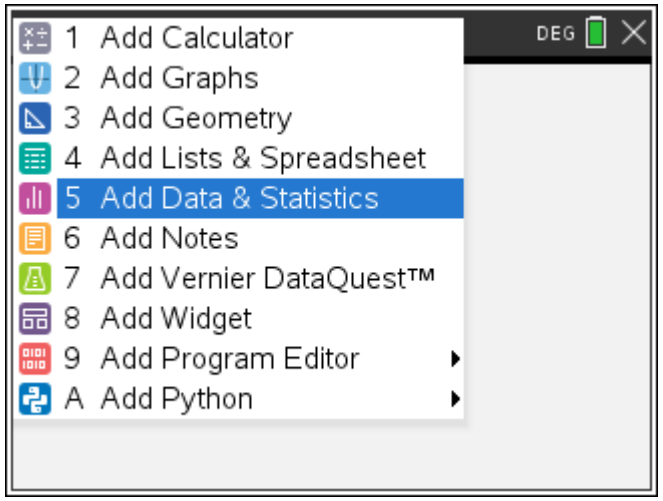
# Using the CAS to make is easier?

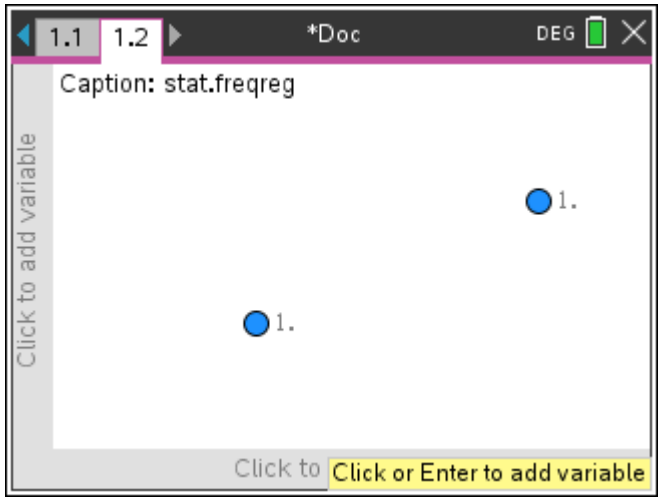
As this is a CAS enabled course, it makes sense to try and use the CAS to make life easier for us.

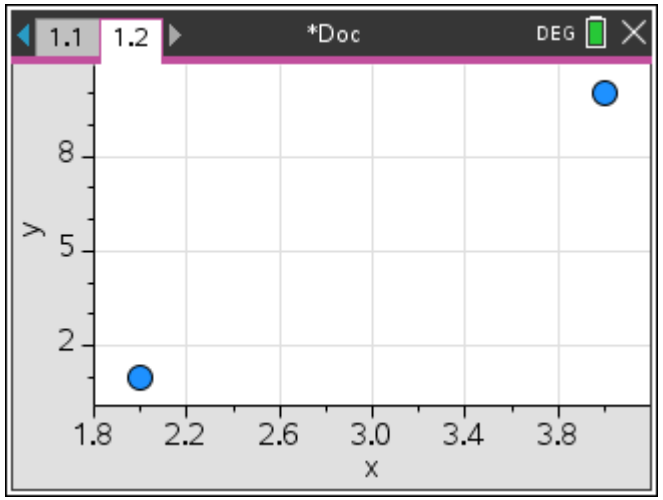
We are going to use an area of Mathematics called **Regression** (which you will see much more of next year).

We need to open a Lists and Spreadsheet and then put in the important information as shown for the following question:

Find the equation of the line that passes through the two points (2, 1) and (4, 10).






# Using the CAS to make is easier?

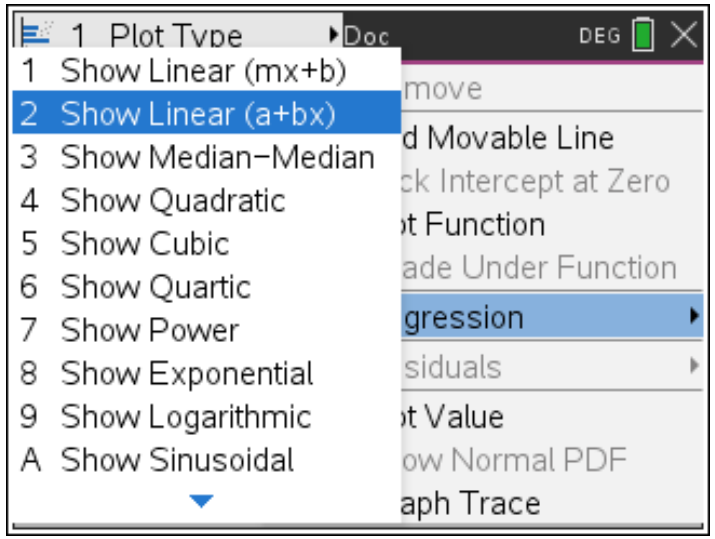
As this is a CAS enabled course, it makes sense to try and use the CAS to make life easier for us.

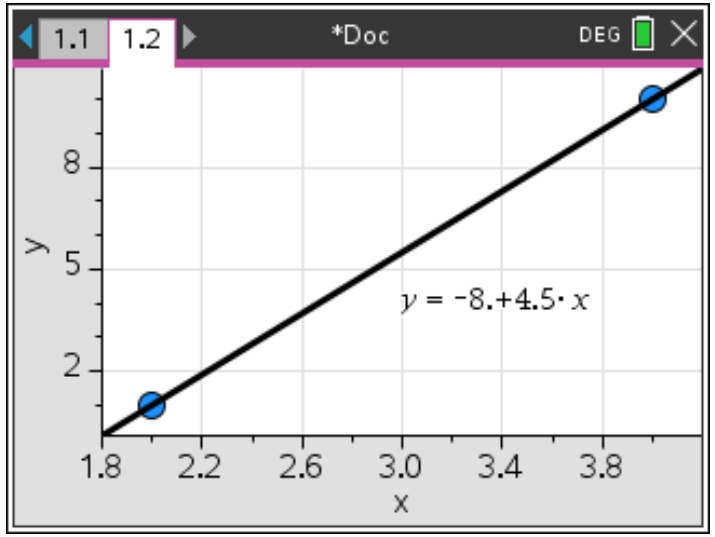
We are going to use an area of Mathematics called **Regression** (which you will see much more of next year).

We need to open a Lists and Spreadsheet and then put in the important information as shown for the following question:

Find the equation of the line that passes through the two points (2, 1) and (4, 10).

$y = -8 + 4.5x$






# Work to complete

The work I am asking to be completed for this topic is shown below.

This is the minimum work which should be completed. The more questions which are answered the better your chance of success in exams. Questions towards the end of the exercises and in the Chapter Review are the best practice you can do.

**Questions to complete**:
Exercise 5F: All questions

