

The equation of a line in the form $y - y_1 = m(x - x_1)$

A flash resource for use with this topic can be found at <http://www.meidistance.co.uk/flash/ascgl2xb.html>

Below are some suggestions how you might use this in your teaching.

First of all, to familiarise yourself with the features, click on 'show line' and 'show equation' and drag the red dot. The gradient can be changed using the up and down arrows.

15 minute starter to the lesson when this form is introduced.

First 'hide equation' and 'hide line', set the gradient to 2 and let the point be $(3,4)$.

Questions to ask your students:

- Where will the line cross the y -axis?
- Where will the line cross the x -axis?
- Tell me a point in the third quadrant which the line passes through.

Now 'show line'. Were the students' answers correct?

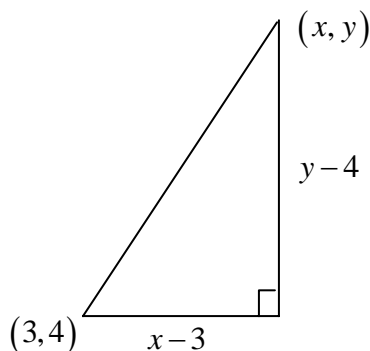
- What is the equation of this line?

They will probably think of $y = mx + c$ and say " $y = 2x - 2$ "

Now 'show equation'.

- Where does the equation $(y - 4) = 2(x - 3)$ come from?

This is the important point. Take a point higher up the line and, since this is a general point, let its coordinates be (x, y) . Now draw a right-angled triangle with these points at the ends of the hypotenuse:



Since the gradient is 2 then $\frac{y-4}{x-3} = 2$ for **all** points on the line.

Hence $y - 4 = 2(x - 3)$ is the equation of the line.

You might like to think what happens as the general point slides to a position on the line below $(3,4)$. Now both the numerator

and denominator of $\frac{y-4}{x-3}$ are negative but the value is still 2.

Using the arrows change the gradient and discuss what is happening to the equations of the lines (all of which pass through the same point P).

'Hide line' and 'Hide equation'

Ask questions of the type:

- With gradient 2 tell me a point below the x – axis where I could place the point so that the line passes through the origin. What is the equation of this line?
- With gradient -1 tell me a point with positive x – coordinate where I should place the point so that the line passes through the origin. What is the equation of this line?

'Show line' but 'Hide equation'

Recap the important point with each of the following by marking a general point (x, y) on the line and explaining why $\frac{y - y_1}{x - x_1} = m$ for any such point (x, y) on the curve.

- With gradient of 3 and P at $(2, 0)$: Tell me the equation of this line.
- With gradient of 3 and P at $(-2, -4)$: Tell me the equation of this line.
- With gradient of -1 and P at $(6, 0)$: Tell me the equation of this line.