

Graphing straight lines

Wednesday, 16 January 2019 8:46 am

★ By the end of the lesson I would hope that you have an understanding of the concepts below which you can apply to a number of complex questions:

- Know how to use the various techniques used in previous lessons to sketch graphs of straight lines, including:
 - Intercept form
 - Gradient intercept form
- Know how to use your CAS to draw straight lines

RECAP:

We know, from previous lessons, that we can express a straight line in a number of different ways. The general form of the equations of a straight line is given below:

$$mx + ny + p = 0$$

We can rearrange the above to give us equations in ...

Gradient intercept form

$$y = 3x + 4$$

Intercept form

$$-3x + y = 4$$

$$3x + 2y - 6 = 0$$

$$3x + 2y = 6$$

$$2y = -3x + 6$$

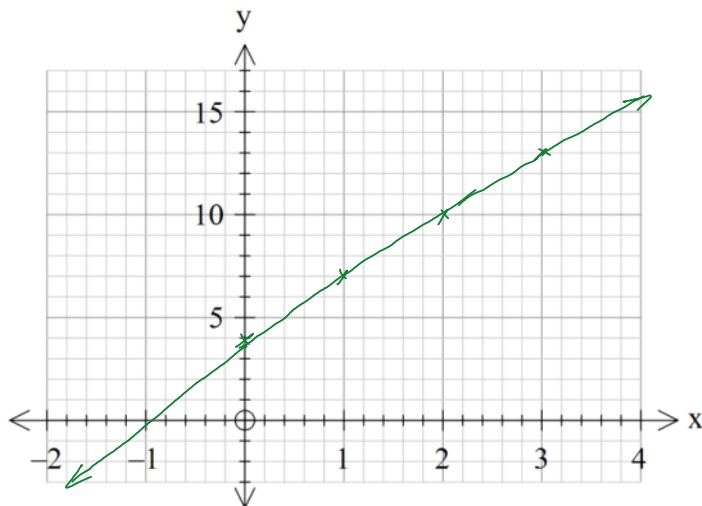
$$y = -\frac{3}{2}x + 3$$

Sketching graphs from each form

In previous lessons we have looked at how to sketch the graphs. This is a recap of that work.

Example:

Sketch the following graph, $y = 3x + 4$



$$y = 3x + 4$$

$$y = mx + c$$

$$m = 3$$

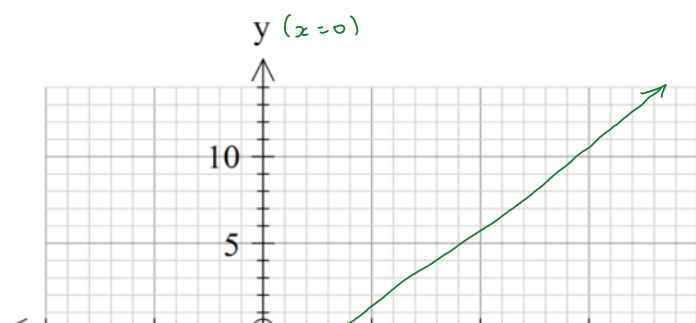
$$c = 4$$

$$m = \frac{3}{1} \rightarrow$$

$$(0, 4)$$

Example:

Sketch the following graph by first finding the intercepts, $y = 4x - 3$



$$y = 4x - 3$$

$$x = 0 \quad y = -3$$

$$(0, -3)$$

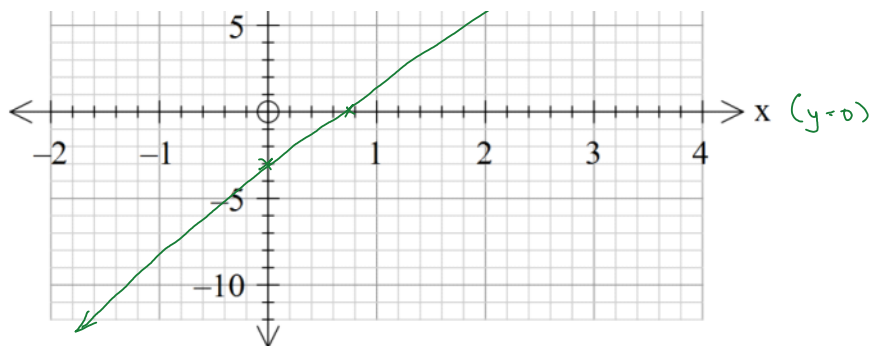
$$y = 0$$

$$0 = 4x - 3$$

$$3 = 4x$$

$$x = \frac{3}{4}$$

$$(\frac{3}{4}, 0)$$



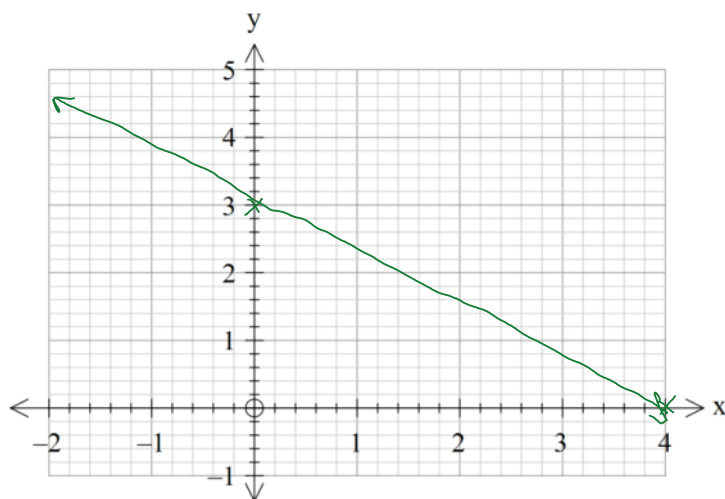
$$3 = 4x$$

$$x = \frac{3}{4}$$

$$(3/4, 0)$$

Example:

Sketch the graph of $3x + 4y = 12$



$$x = 0$$

$$y = 0$$

$$3x + 4y = 12$$

$$4y = 12$$

$$y = 3$$

$$3x + 4y = 12$$

$$3x = 12$$

$$x = \frac{4}{1}$$

$$(0, 3)$$

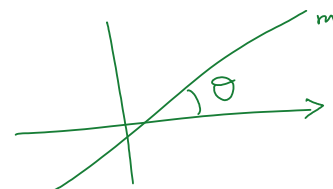
$$(4, 0)$$

Finding the angle a line makes with the positive direction of the x-axis

It might be important for us to find the angle between a line and the positive direction of the x-axis. To do this we use the theory from the previous lesson where we know (for a line with a positive gradient):

$$m = \tan \theta$$

$$m = \tan \theta$$



Example:

Find the magnitude of the angle θ that the line makes with the positive direction of the x-axis for the function, $y = 3x + 2$

$$y = 3x + 2$$

$$m = \tan \theta$$

$$3 = \tan \theta$$

$$\theta = \tan^{-1}(3) = \underline{\underline{71.57^\circ}}$$

Example:

Question has been taken from the Cambridge Essentials Textbook Series

Find the magnitude of the angle θ that the line makes with the positive direction of the x-axis for the function, $3y = 3x - 6$

$$3y = 3x - 6$$

$$m = 1$$

$$y = \underline{\underline{x - 2}}$$

$$m = \tan \theta$$

$$1 = \tan \theta$$

$$\theta = \tan^{-1}(1)$$

$$\theta = \underline{\underline{45^\circ}}$$

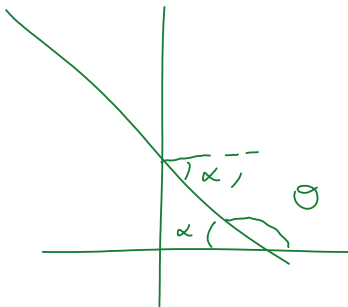
Example:

Question has been taken from the Cambridge Essentials Textbook Series

Find the magnitude of the angle θ that the line makes with the positive direction of the x -axis for the function, $y = -0.3x + 1.5$

$$y = \underline{\underline{-0.3x + 1.5}}$$

$$m = -0.3$$



$$m = \tan \theta$$

$$\tan \alpha = -0.3$$

$$\alpha = \underline{\underline{-16.7^\circ}}$$

$$\theta = 180 - \alpha$$

$$\theta = 180 - 16.7$$

$$\theta = \underline{\underline{163.3^\circ}}$$