Equations of straight lines

Year 11 General Maths Units 1 and 2

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 formula for finding the slope of a straight line.
- To be able to find the y-intercept and slope from a straight-line equation.



Examples have been extracted, with permission, from the Cambridge General Mathematics Units 1 and 2 Textbook

Recap

In the previous lessons we have been looking at the basics of algebra and how to start to understand the important elements of a straight line..

We saw that the most important elements were the y-axis intercept and the gradient of the line.

Gradients can be positive or negative (or zero!).

Let's now look at how we can describe straight lines using the equation of a straight line.

M= MUN



A formula for the gradient (or slope) of a straight line.

We have learned this before, but the gradient of a slope can be found using the following formula:

$$gradient = m = \frac{rise}{run}$$

You choose two points on the line and count how many squares across you go and how many up (or down) you go.

There is another way of finding the gradient if you don't have the graph ...





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



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Example of finding the slope from two coordinates

Find the slope of the line that passes through the points (1, 7) and (4, 2) using the formula for the slope of a line. Give your answer to two decimal places.

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

= $\frac{2 - 7}{4 - 1} = \frac{-5}{3}$
= $-\frac{1.67}{1.67}$

 $x, y x_{2} y_{2}$ (4,2) (1,7) x2 - 21 7-2 - 4 5 -3

m =

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Example of finding the slope from two coordinates

Find the slope of the line through the points (2, 8) and (6, 3) using the formula for the slope of a line. Give your answer to two decimal places.

(2,8) (6,3)m = 5(, - 7, $= \frac{3-8}{6-2} = \frac{-5}{4}$ 1.25 = -



Barry has been at it again!

If I were you ask you for the equation of a straight line, you might remember, from Year 9 or Year 10 that it is:



But, in Year 11 and Year 12 for General Maths, we actually write it in a different way ... with different letters.

THANKS BARRY.



Gradient or slope



This is called the intercept slope form of a straight line



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Example: Finding and writing the equation of a straight line

Write the equation of the straight line as shown in the picture on the right.





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Reading values from equations

Remember: Maths is about understanding and not regurgitating. So, we can give you equations and ask for you to state the y-axis intercept and gradient.

The number in front of the 'x' is always the gradient. Make sure you take notice of the sign of the number (positive or negative).

When the y is on its own, the value without the letter is the y-value of the intercept.

Write down the *y*-intercept and slope of each of the straight-line graphs defined by the following equations.

y = -6 + 9x

:. y int = (0, -6)Slope = 9

a y = -6 + 9x **b** y = 10 - 5x **c** y = -2x **d** y - 4x = 5

y = a + bx

= 0 - 22 :. int (07)

g = 10 - 5x slip = -2 y int = (0, to) y - 4x = 5slop = -5 y = 5 + 4x

+x

Reading values from equations

Write down the equations of the straight lines with the following y-intercepts and slopes. **a** y-intercept = 9 slope = 6 **b** y-intercept = 2 slope = -5

c *y*-intercept = -3 slope = 2

y = a + bx y = a + bx y = 2 - 5x y = 2 - 5x





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Sketching straight lines graphs.

If we know the gradient and intercept, we can use it to sketch a straight-line graph.

The most important thing is to note:

Y-intercept: A start point. **Gradient**: A way to move up/down and across.

Trick: The gradient might be written as a whole number, but we can write any whole number as a fraction.

Example: Sketch the graph of y = 8 + 2x

y = a + bx y = 8 + 2x l m = nxrun





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 5E: All questions

