

Year 9 – Reasoning with Algebra

Straight Line Graphs

Suggested reading

HOW MANY SOCKS MAKE A PAIR?

Surprisingly interesting everyday maths

ROB EASTAWAY

Want to know more? Scan the QR code to visit the curriculum overview for Year 9 Maths, including topic summaries, key words, and books that you may want to read in your own time



What do I need to be able to do?

By the end of this unit you should be able to:

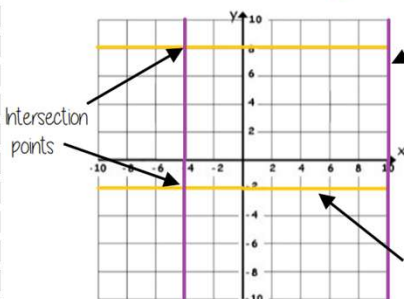
- Compare gradients
- Compare intercepts
- Understand and use $y = mx + c$
- Find the equation of a line from a graph
- Interpret gradient and intercepts of real-life graphs

Keywords

- Gradient:** the steepness of a line
- Intercept:** where two lines cross. The y-intercept: where the line meets the y-axis
- Parallel:** two lines that never meet with the same gradient
- Co-ordinate:** a set of values that show an exact position on a graph
- Linear:** linear graphs (straight line) – linear common difference by addition/ subtraction
- Asymptote:** a straight line that a graph will never meet
- Reciprocal:** a pair of numbers that multiply together to give 1
- Perpendicular:** two lines that meet at a right angle

Lines parallel to the axes

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All the points on this line have a x coordinate of 10

Lines parallel to the y axis take the form $x = a$ and are vertical

Lines parallel to the x axis take the form $y = a$ and are horizontal

All the points on this line have a y coordinate of -2

e.g (3, -2), (7, -2), (-2, -2) all lay on this line because the y coordinate is -2

'a' can be ANY positive or negative value including 0

Plotting $y = mx + c$ graphs

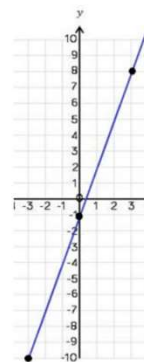
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$y = 3x - 1$ → 3 x the x coordinate then - 1

x	-3	0	3
y	-10	-1	8

Draw a table to display this information

This represents a coordinate pair (-3, -10)



You only need two points to form a straight line

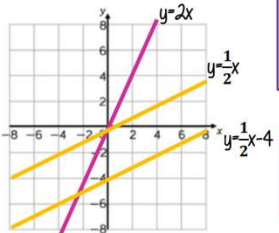
Plotting more points helps you decide if your calculations are correct (if they do make a straight line)

Remember to join the points to make a line

Compare Gradients

$y = mx + c$

The coefficient of x (the number in front of x) tells us the gradient of the line



The greater the gradient – the steeper the line

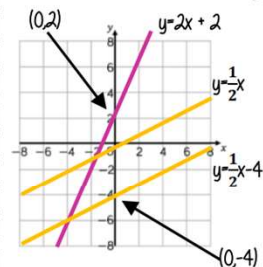
Positive gradients

Negative gradients

Parallel lines have the same gradient

Compare Intercepts

$y = mx + c$ ← The value of c is the point at which the line crosses the y-axis. Y intercept



The coordinate of a y intercept will always be (0,c)

Lines with the same y-intercept cross in the same place

$y = mx + c$

The coefficient of x (the number in front of x) tells us the gradient of the line

$y = mx + c$

y and x are coordinates

The value of c is the point at which the line crosses the y-axis. Y intercept

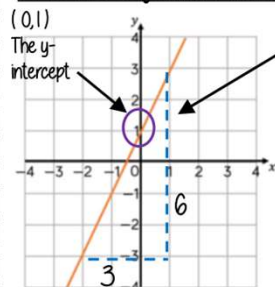
The equation of a line can be rearranged. Eg

$y = c + mx$

$c = y - mx$

Identify which coefficient you are identifying or comparing

Find the equation from a graph



The Gradient $\frac{6}{3} = 2$

$y = 2x + 1$

The direction of the line indicates a positive gradient

Positive gradients

Negative gradients

Real life graphs

A plumber charges a £25 callout fee, and then £12.50 for every hour. Complete the table of values to show the cost of hiring the plumber.

Time (h)	0	1	2	3	8
Cost (£)	£25				£125

In real life graphs like this values will always be positive because they measure distances or objects which cannot be negative.

The y-intercept shows the minimum charge. The gradient represents the price per mile

Direct Proportion graphs

To represent direct proportion the graph must start at the origin

When you have 0 pens this has 0 cost. The gradient shows the price per pen

A box of pens costs £2.30

Complete the table of values to show the cost of buying boxes of pens.

Boxes	0	1	2	3	8
Cost (£)		£2.30			