

# YEAR 9 — REASONING WITH ALGEBRA...

## Straight Line Graphs

### 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

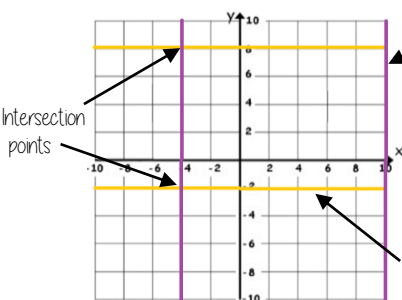
**Linear:** linear graphs (straight line) — linear common difference by addition/ subtraction

**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



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  
eg (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

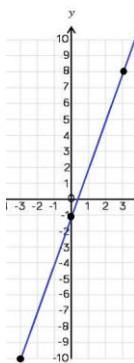
### Plotting $y = mx + c$ graphs

$y = 3x - 1$  → 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

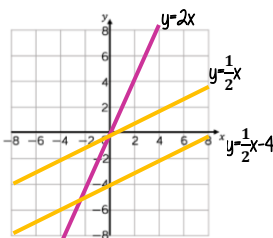
Plotting more points helps you decide if your calculations are correct (if they do make a straight line)

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

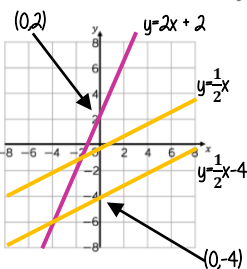
Negative gradients

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

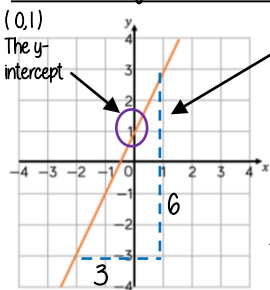
The equation of a line can be rearranged. Eg

$y = c + mx$

$c = y - mx$

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.

### Direct Proportion graphs

To represent direct proportion the graph must start at the origin

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			

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

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