Y11 HIGHER HT1 Graphs

$y = mx + c$

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

$$y = mx + c$$

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

y and x are **coordinates**

The equation of a line can be rearranged: E.g:

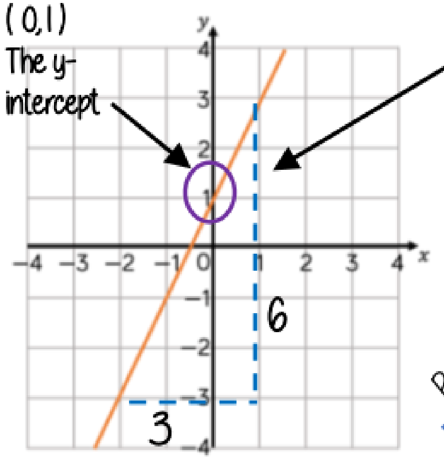
$$y = c + mx$$

$$c = y - mx$$

Identify which coefficient you are identifying or comparing

Find the equation from a graph

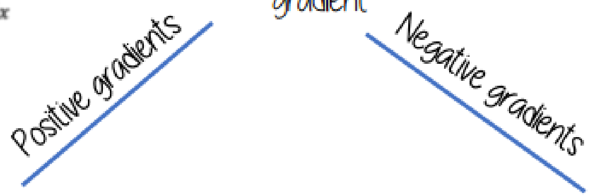
(0,1)
The y-intercept



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

$$\boxed{y = 2x + 1}$$

The direction of the line indicates a positive gradient



Plotting y = mx + c graphs

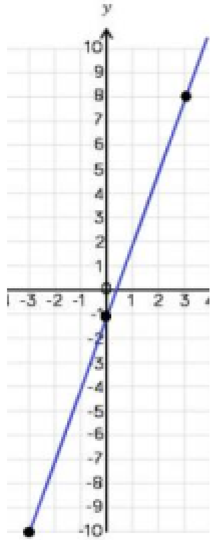
R

$\boxed{y = 3x - 1}$ → 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

Y11 HIGHER HT1 Graphs

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

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

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.

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

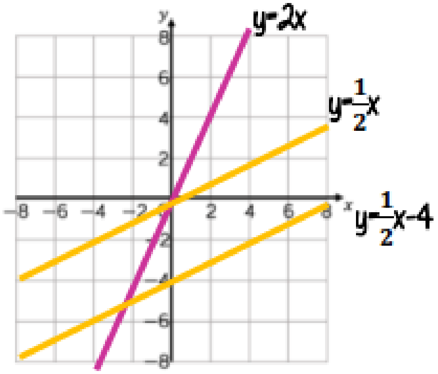
A box of pens costs £2.30
Complete the table of values to show the cost of buying boxes of pens.

Boxes	0	1	2	3	8
Cost (£)		£2.30			

Compare Gradients

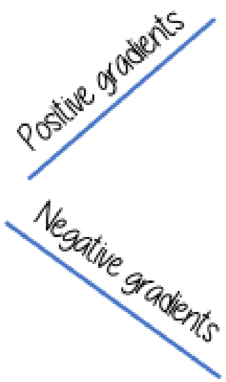
$y = mx + c$

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

Parallel lines have the **same** gradient



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

Y11 HIGHER HT1 Graphs

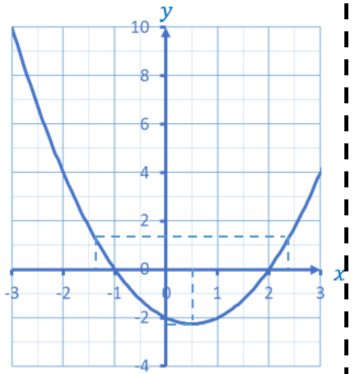
Quadratic Graphs

$y = x^2 + x - 2$

x	-3	-2	-1	0	1	2	3
y	4	0	-2	-2	0	4	10

Complete the table of values by substituting in each x value. E.g. $(-3)^2$+ (-3) -2 = 4

Draw the graph of $y = x^2 + x - 2$ for values of x from -3 to 3



On your graph, show that when $x = 0.5$, an estimate for y is -2.3 by drawing a line up to the curve at x = 0.5

Keywords

Parabola: The shape of a quadratic graph

Asymptote: A straight line that continually approaches a given curve but does not meet it

Infinity: Increases without a bound

Exponential: Rate of increase becomes quicker and quicker as the thing that increases becomes larger

Tangent: A straight line or plane that touches a curve or curved surface at a point, but if extended does not cross it at that point

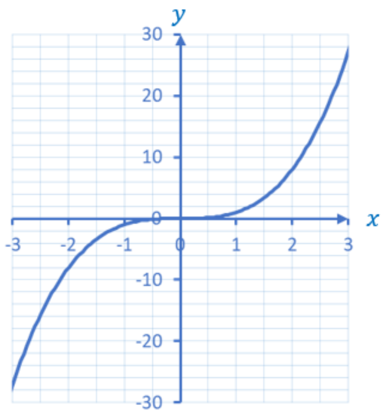
Cubic Graphs

$y = x^3$

x	-3	-2	-1	0	1	2	3
y	-27	-8	-1	0	1	8	27

Complete the table of values by substituting in each x value. E.g. $(-3)^3$= -27

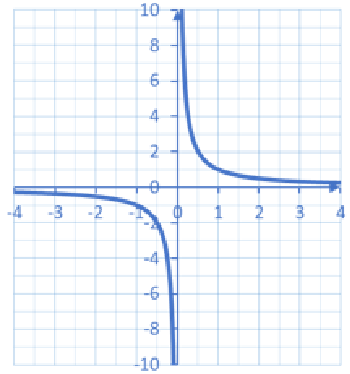
Draw the graph of $y = x^3$ for values of x from -3 to 3



Y11 HIGHER HT1 Graphs

Reciprocal Graphs

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



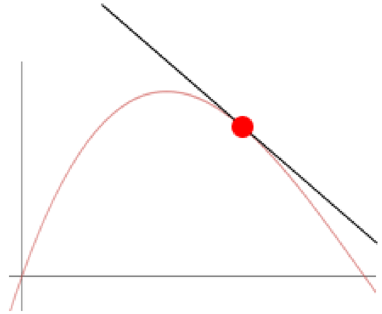
When x tends towards negative infinity, y tends towards 0

When x tends towards positive infinity, y tends towards 0

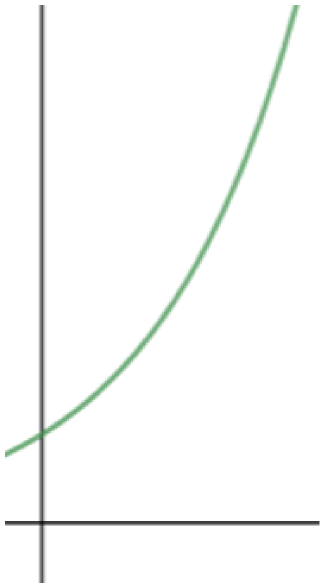
When x tends towards zero, y tends towards infinity

Tangent at a given point on a curve

B



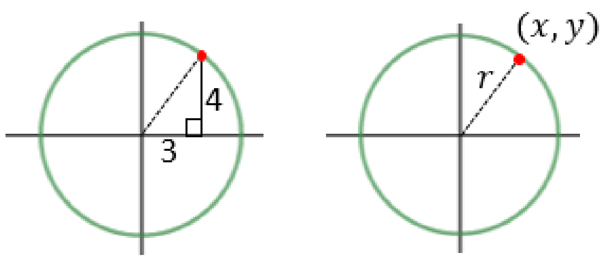
Exponential Graphs



The sketch shows a curve with equation $y = ab^x$ where a and b are constants and $b > 0$

Equation of a circle

$x^2 + y^2 = 25$ $\qquad$ $x^2 + y^2 = r^2$



$r = 5$ $\qquad$ $r = \sqrt{x^2 + y^2}$

Y11 HIGHER HT1 Graphs

Conversion Graphs

- Change 5 stones to kilograms.

  c. 32 kg

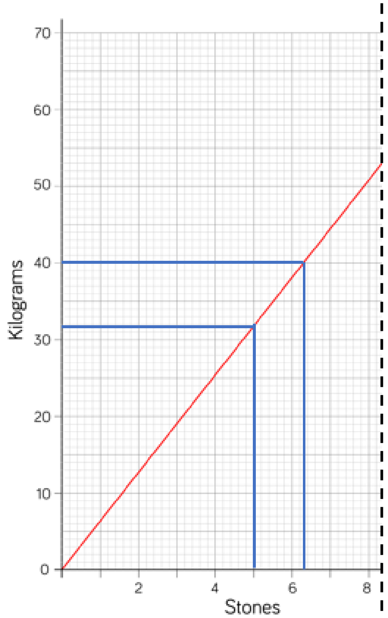
- Change 40 kilograms to stones.

  c. 6.25 st

- Explain how you could use your answers to change 40 kilograms to stones, and to change 35 stones to kg.

  $6.25 \div 8$

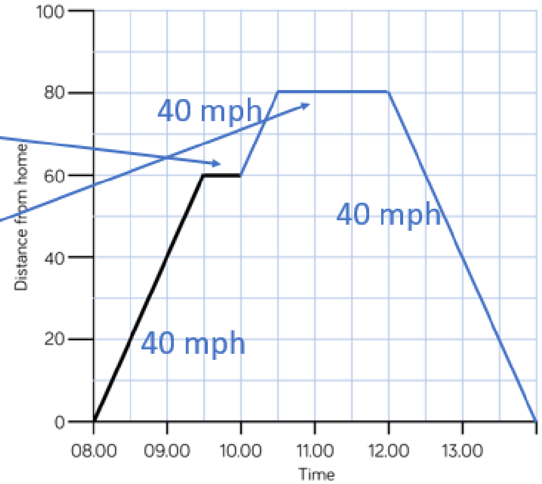
  32×7



Distance/Time Graphs

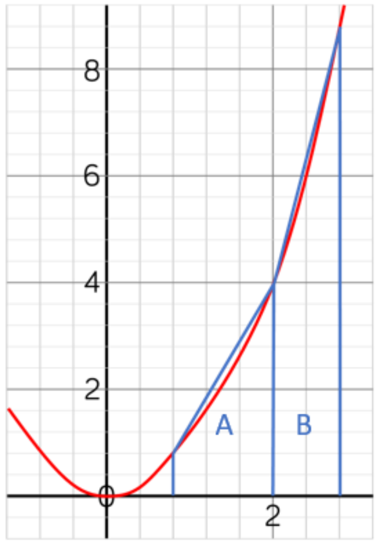
The graph shows part of Dani's journey to London from her home.
She takes a break, then drives the remaining 20 miles to London in half an hour.

She then spends 90 minutes in London before returning directly home, arriving at 2 p.m.



On a distance time/graph a straight line is constant speed and a flat section implies the object is stationary
Positive and negative gradients on a distance/time graph do not represent going uphill or downhill

Trapezium Rule



The diagram shows the graph of $y = x^2$ for values of x from -1 to 3

Use the two trapezia drawn on the graph to estimate the area of under the curve of $y = x^2$ for $1 \leq x \leq 3$

A: $\frac{1}{2} \times (0.8 + 4) \times 1.2 = 2.88$

Total $= 8$ square units

B: $\frac{1}{2} \times (4 + 8.8) \times 0.8 = 5.12$

Is the area an underestimate or an overestimate? Overestimate

Keywords

Direct proportion: The relation between quantities whose ratio is constant

Inverse proportion: This occurs when one value increases and the other decreases

Distance/time graph: A graphical representation of how far an object or person has travelled against time

Acceleration: Increase in speed or rate

Deceleration: Reduction in speed or rate