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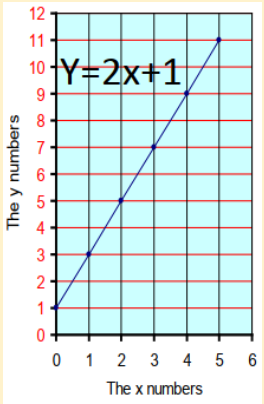
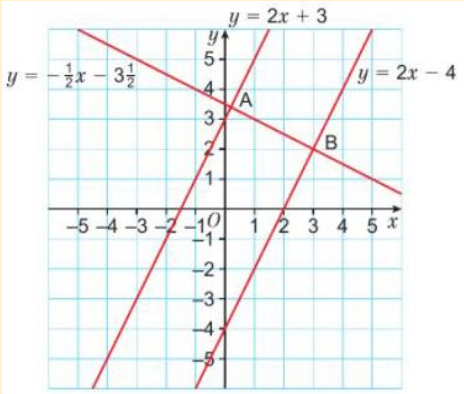
Linear Equations
$y = mx + c$

where m is the gradient

C is where the graph crosses the y



Parallel lines have same gradient



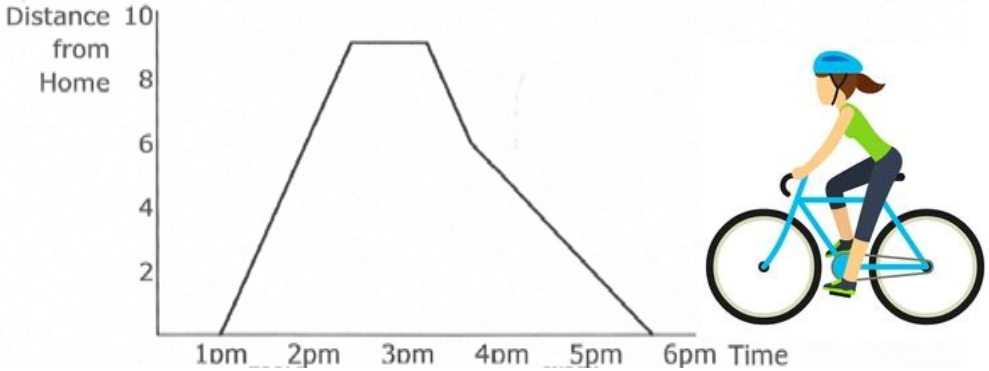
Perpendicular lines have gradients that multiply to give -1
When a graph has gradient m, the perpendicular line to that will have gradient $-\frac{1}{m}$

Velocity – time graph
Straight line – means constant acceleration

A distance – time graph represents a journey. The gradient is the speed

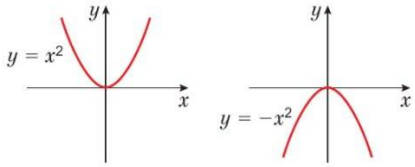
Try to draw a graph which reflects this cyclist's journey

At 1pm she starts off on a journey of 9 miles. She gets there by 2:30pm
She stays there for 45 minutes.
Then she travels for 3 miles in direction of home which takes 30 minutes.
The cyclist then gets a puncture and takes 2hrs to do the last 6 miles home.

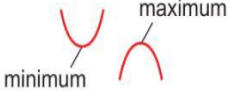


Direct proportion is shown by a straight line graph through the origin
The equation of a circle with centre (0,0) and radius r is $x^2 + y^2 = r^2$

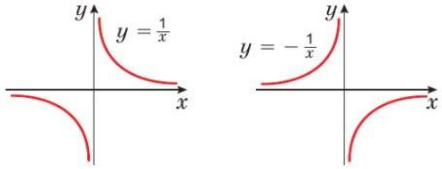
A **quadratic equation** contains a term in x^2 but no higher power of x.
The graph of a quadratic equation is a curved shape called a **parabola**.



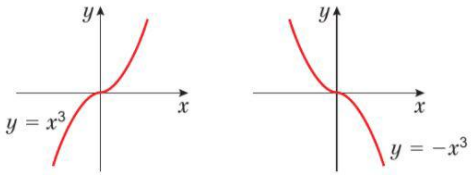
A quadratic graph has either a **minimum point** or a **maximum point** where the graph turns.



Reciprocal functions are in the form $\frac{k}{x}$ where k is a number.



A **cubic function** contains a term in x^3 but no higher power of x.
It can also have terms in x^2 and x and number terms.



Links: V191 - V171 - V197 - V196

Year 9 – Maths_H / Unit 6 – Graphs – HT5

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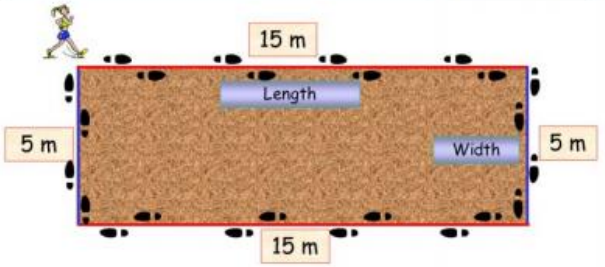
Corbett Maths Video Links: V312 – V377 – V358

Perimeter

The perimeter of a shape is the distance around the outside.

Rectangles



Perimeter = 15 m + 5 m + 15 m + 5 m = 40 m

The Area of a Circle

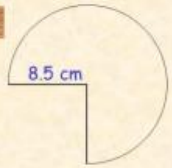
$A = \pi r^2$

Find the area of the $\frac{1}{3}$ and $\frac{1}{4}$ circles.

3

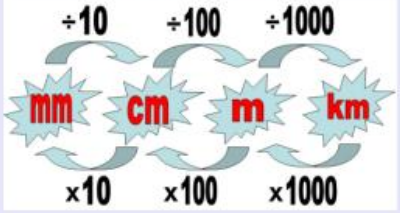
$A = \frac{1}{3}\pi r^2$
$= \frac{1}{3} \times \pi \times 6^2$
$= 28.3\ cm^2$ (1 dp)

4



$A = \frac{1}{4}\pi r^2$
$= \frac{1}{4} \times \pi \times 8.5^2$
$= 170.2\ cm^2$ (1 dp)

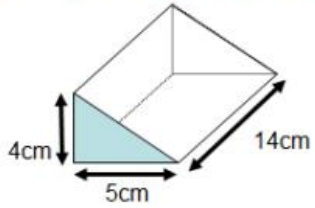
Metric conversions:



VOLUME is how many cubic units fit **inside** a shape.

For a prism* Volume = Area x length

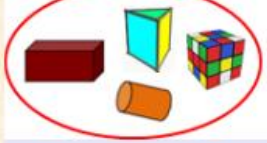
*a shape that is the same all the way along its length



$A = \frac{1}{2} \times 4 \times 5 = 10cm^2$ $V = A \times L = 10 \times 14 = 140cm^3$

So, always start by working out the **area** on front of the shape – this has to be the same all the way along the length (i.e. it has to be a prism).

PRISMS



NOT PRISMS

Error bounds:

The lengths have been measured to the nearest metre

What the minimum and maximum values that the base and height could be?

$5.5 \le base < 6.5m$ $2.5 \le height < 3.5m$

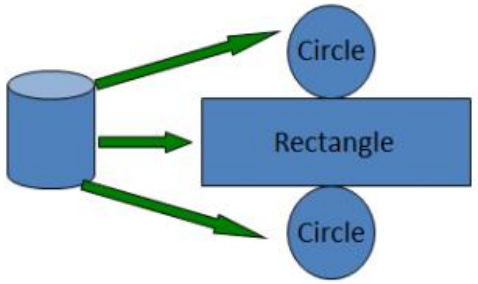
What the minimum and maximum values that the *perimeter* could be?

$16m \le perimeter < 20m$

What the minimum and maximum values that the *area* could be?

$13.75m^2 \le area < 22.75m^2$

SURFACE AREA is how many square units fit onto the **outside** of a shape.

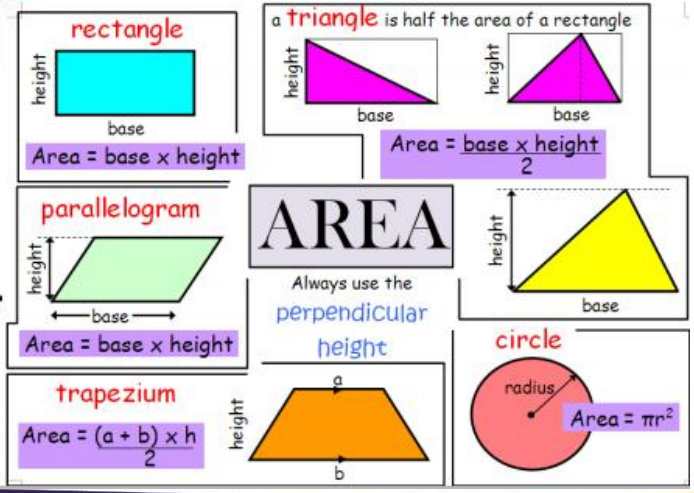


It's helpful to think of the net of the shape: the surface area is just the area of all the bits of the net added together.

e.g. A cube of side length 5cm:

Area of one face = 5 x 5 = $25cm^2$

Total surface area = 25 x 6 = $150cm^2$



Year 9 – Maths_H / Unit 7 – Area and Volume – HT5