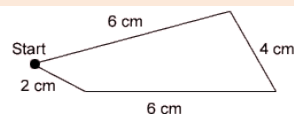


## Calculating Perimeter

### What is perimeter?

The perimeter is the distance or length around the outside of a shape. It is calculated by adding the lengths of all the sides together. **Note:** always remember to include the units in your answer.

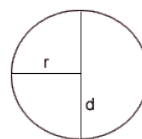
The perimeter of this diagram is:  
 $6 + 4 + 6 + 2 = 18\text{cm}$



The perimeter of a circle is called its **circumference**.

The circumference of a circle is calculated using the following formula:

**Circumference =  $2\pi r$  or  $\pi d$**  where  
 $r$  = the radius of the circle



**What is  $\pi$ ?**  $\pi$ (pi) is the number that represents the ratio between the diameter of a circle and its circumference. If you have a scientific calculator you will have a  $\pi$  button on it.

## Calculating Areas

### What is area?

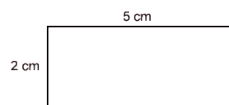
Area is the surface space contained within the edges of a 2-D shape. Area is measured in square units, for example  $\text{mm}^2$ ,  $\text{cm}^2$ ,  $\text{m}^2$

#### Area of Rectangle:

The area of a rectangle is calculated using the formula:

**Area =  $l \times b$**  where:

$l$  = length  
 $b$  = breadth



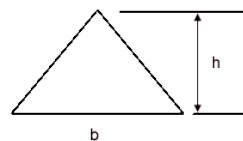
Here,  $l = 5\text{ cm}$  and  $b = 2\text{ cm}$ .  $A = 5 \times 2 = 10\text{ cm}^2$

#### Area of Triangle

The area of a triangle is calculated using the formula:

**Area =  $\frac{1}{2} \times b \times h$**  where:

$b$  = the length of the base of triangle  
 $h$  = the perpendicular height of triangle

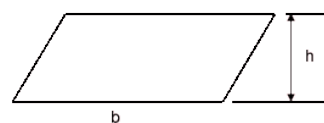


#### Area of Parallelogram

A parallelogram is a four-sided figure where both pairs of opposite sides are parallel. The area of a parallelogram is calculated using the formula:

**Area =  $b \times h$**  where:

$b$  = the length of the base of the parallelogram  
 $h$  = the perpendicular height of parallelogram



## Calculating Areas (con't)

### Area of Trapezium

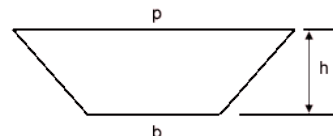
A trapezium is a four-sided shape with one pair of parallel sides. The area of a trapezium is calculated using the formula:

$$\text{Area} = \frac{(b + p) \times h}{2} \quad \text{where:}$$

$b$  = the length of the base of trapezium

$p$  = the length of the parallel edge

$h$  = the perpendicular height of trapezium



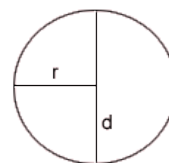
### Area of Circle

The area of a circle is calculated using the formula:

$$\text{Area} = \pi r^2 \quad \text{where:}$$

$r$  = the radius of the circle

(Note: on this diagram  $d$  is the diameter which is twice the radius)



## Calculating Volumes

### What is volume?

The volume, or capacity, of a 3-D shape is how much space is contained within the shape. Volume is measured in cubic units, for example  $\text{mm}^3$ ,  $\text{cm}^3$ ,  $\text{m}^3$

### Volume of Rectangular Solid

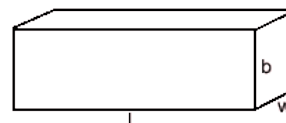
A rectangular solid is a 3D figure with 6 faces that are *either* all rectangles, *or* a mixture of rectangles and squares. The volume of a rectangular solid is calculated using the formula:

$$\text{Volume} = l \times b \times w \quad \text{where:}$$

$l$  = length

$b$  = breadth

$w$  = width



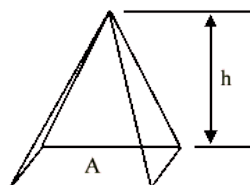
### Volume of Pyramid

A pyramid is a 3D figure. All but one of its faces are triangles that meet a point. The base can be any straight-sided 2D shape. The number of faces a pyramid has depends on the number of sides of the base. A square-based pyramid is shown here. The volume of a pyramid is calculated using the formula:

$$\text{Volume} = \frac{1}{3}Ah \quad \text{where:}$$

$A$  = area of the base

$h$  = perpendicular height



The perpendicular height of a pyramid is the distance from the apex (top point) straight down to the base (as shown in the diagram)

## Calculating Volumes (cont')

### Volume of Cone

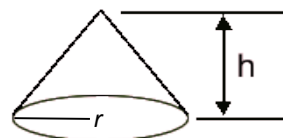
The volume of a cone is calculated using the same formula as for a pyramid:  $\text{volume} = \frac{1}{3}Ah$ . Since the base of a cone is a circle: Area of the base =  $\pi r^2$ , where:  $r$  = radius of the circle.

Therefore the formula can also be written as:

**Volume =  $\frac{1}{3}\pi r^2h$**  where:

$r$  = radius of the circular base

$h$  = perpendicular height



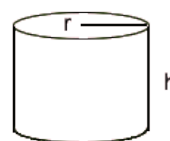
### Volume of Cylinder

The volume of a cylinder is calculated using the formula:

**Volume =  $\pi r^2h$**  where:

$r$  = radius of one circular end (both ends of a cylinder will have the same radius)

$h$  = height of the cylinder



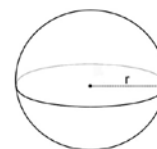
This is the same as multiplying the area of one of the circular faces by the height of the cylinder.

### Volume of Sphere

The radius of a sphere is the distance from the centre of the sphere to the outer edge. The volume of a sphere is calculated using the formula:

**Volume =  $\frac{4}{3}\pi r^3$**  where:

$r$  = the radius of the sphere



## The Metric Prefix System

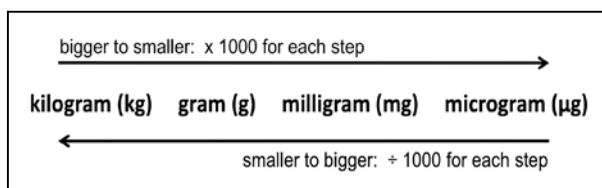
Prefix	Symbol	Power of Ten	Name
giga	G	$10^9 = 1,000,000,000$	billion (thousand million)
mega	M	$10^6 = 1,000,000$	million
kilo	k	$10^3 = 1,000$	thousand
deci	d	$10^{-1} = 1/10^1 = 0.1$	tenth
centi	c	$10^{-2} = 1/10^2 = 0.01$	hundredth
milli	m	$10^{-3} = 1/10^3 = 0.001$	thousandth
micro	mc or $\mu$	$10^{-6} = 1/10^6 = 0.000001$	millionth
nano	n	$10^{-9} = 1/10^9 = 0.000000001$	billionth (thousand millionth)

## Metric Conversions

### Example: Convert 2 L to mL

To convert the volume units from L → mL we multiply by 1000 ( $10^3$ )

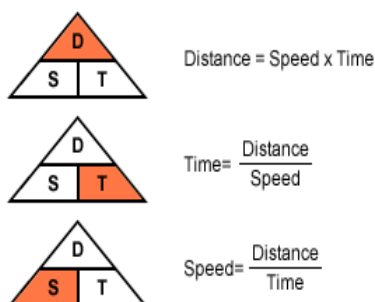
$$\therefore 2 \text{ L} \times 1000 = 2000 \text{ mL}$$



## SI Units

Measurement	Unit	Abbreviation
Length	Metre	m
Mass	Gram	g
Time	Second	s
Energy	Joule	J
Power	Watt	W
Volume	Litre	L

## Speed Calculations



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