

## What do I need to be able to do?

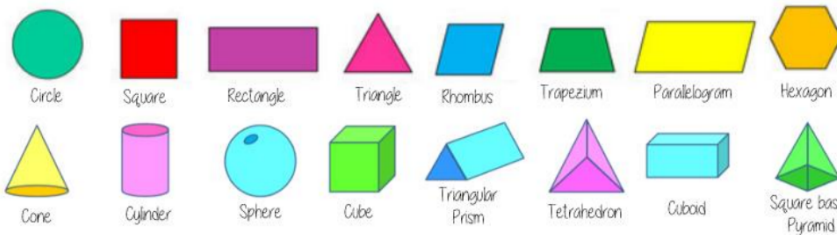
By the end of this unit you should be able to:

- Name 2D & 3D shapes
- Recognise Prisms
- Sketch and recognise nets
- Draw plans and elevations
- Find areas of 2D shapes
- Find Surface area for cubes, cuboids, triangular prisms and cylinders
- Find the volume of 3D shapes

## Keywords

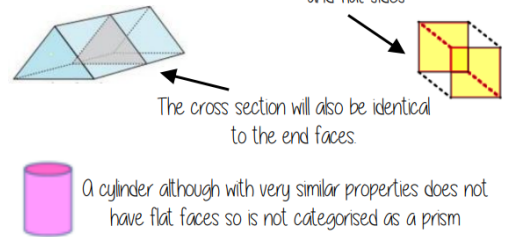
- 2D:** two dimensions to the shape e.g length and width
- 3D:** three dimensions to the shape e.g length, width and height
- Vertex:** a point where two or more line segments meet
- Edge:** a line on the boundary joining two vertex
- Face:** a flat surface on a solid object
- Cross-section:** a view inside a solid shape made by cutting through it
- Plan:** a drawing of something when drawn from above (sometimes birds eye view)
- Perspective:** a way to give illustration of a 3D shape when drawn on a flat surface.

## Name 2D & 3D shapes



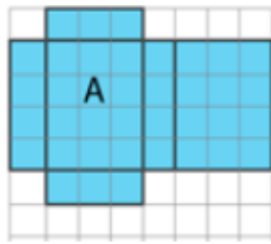
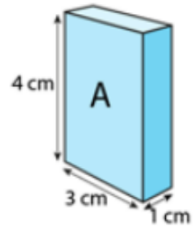
## Recognise prisms

A solid object with two identical ends and flat sides



A cylinder although with very similar properties does not have flat faces so is not categorised as a prism

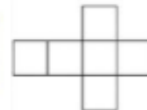
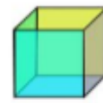
## Nets of cuboids



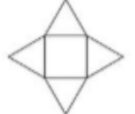
1cm grids help to draw accurately

Visualise the folding of the net. Will it make the cuboid with all sides touching

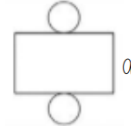
## Sketch and recognise nets



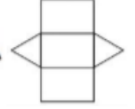
Do they have the same number of faces?



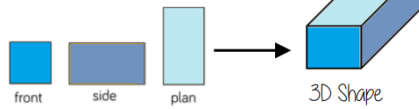
Where do the edges join?



Are the shapes of the faces correct?



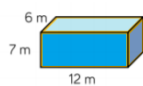
## Plans and elevations



The direction you are considering the shape from determines the front and side views

## Surface area

Sketching nets first helps you visualise all the sides that will form the overall surface area



Sides	$6 \times 7$	Sum of all sides is surface area
Front and back	$12 \times 7$	
Top and Bottom	$12 \times 6$	
	$6 \times 7$	
	$12 \times 7$	
	$12 \times 6$	

For cubes and cuboids you can also find one of each face and double it



For other shapes = not all the sides are the same, so calculate the individually

## Area of 2D shapes

Rectangle  
Base x Height



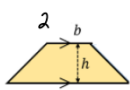
Triangle  
 $\frac{1}{2} \times \text{Base} \times \text{Perpendicular height}$



Parallelogram/ Rhombus  
Base x Perpendicular height



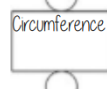
Area of a trapezium  
 $(a + b) \times h$



Area of a circle  
 $\pi \times \text{radius}^2$



## Surface area - cylinders



The area of the circle  
 $\pi \times \text{radius}^2$

The width of this face is the same as the circumference  
 $\pi \times \text{diameter} \times \text{height}$

$$2 \times \pi \times \text{radius}^2 + \pi \times \text{diameter} \times \text{height}$$

## Volumes

Volume is the 3D space it takes up — also known as capacity if using liquids to fill the space



Counting cubes

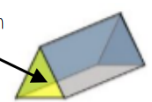
Some 3D shape volumes can be calculated by counting the number of cubes that fit inside the shape

$$\text{Cubes/ Cuboids} = \text{base} \times \text{width} \times \text{height}$$

Remember multiplication is commutative



Cross section



$$\text{Prisms and cylinders} = \text{area cross section} \times \text{height}$$

Height can also be described as depth

Areas — square units  
Volumes — cube units

Areas and volumes can be left in terms of  $\pi$