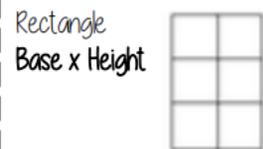
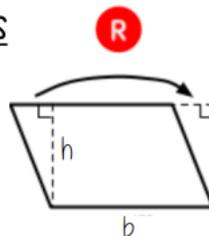


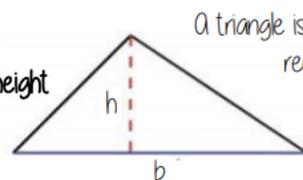
Area – rectangles, triangles, parallelograms



Parallelogram/ Rhombus
Base x Perpendicular height



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

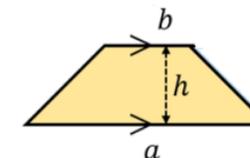


A triangle is half the size of the rectangle it would fit in

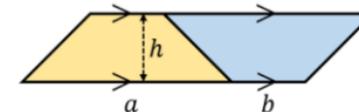
R

Area of a trapezium

Area of a trapezium
 $\frac{(a+b) \times h}{2}$



Why?



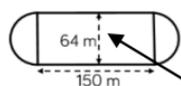
- Two congruent trapeziums make a parallelogram
- New length (a + b) x height
- Divide by 2 to find area of one

Compound shapes including circles

Circumference $\pi \times \text{diameter}$

Compound shapes are not always area questions
For Perimeter you will need to use the circumference

Spotting diameters and radii



This dimension is also the diameter of the semi circles

Arc lengths = $\pi \times 64$
= 64π

Don't need to halve this because there are 2 ends which make the whole circle

Arc lengths + Straight lengths = total perimeter

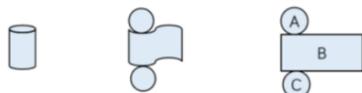
= $64\pi + 150 + 150$
= $(300 + 64\pi) \text{ m}$
OR = 5011 m

Still remember to split up the compound shape into smaller more manageable individual shapes first

Surface area of cones and cylinders

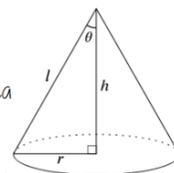
Surface area cylinder = $2\pi r^2 + \pi dh$

Curved surface area Cone = πrl



The area of two circles (top and bottom face) + the area of the curved face

The length of shape B is the circumference of the circles

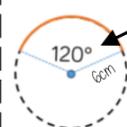


Look out for the use of Pythagoras to calculate the length l

Total surface area = curved face + circle face (area of base)

Sector area

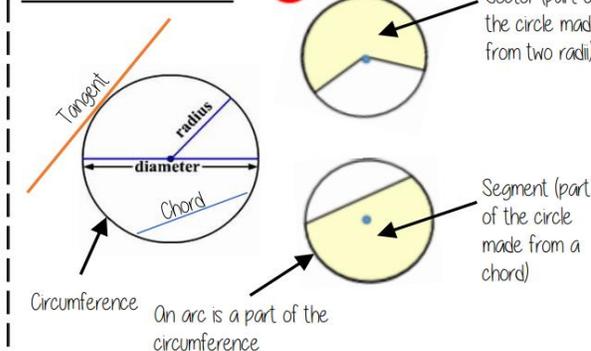
Remember a sector is part of a circle
Area of the whole circle = $\pi r^2 = \pi \times 6^2 = 36\pi$



Sector area = $\frac{\theta}{360} \times \text{area of circle}$

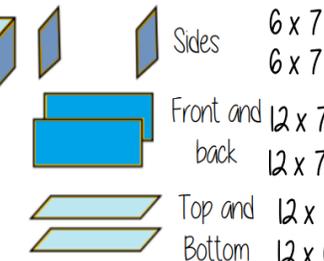
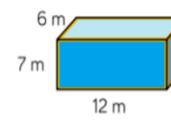
= $\frac{120}{360} \times 36\pi$
= $\frac{1}{3} \times 36\pi = 12\pi$

Parts of a circle



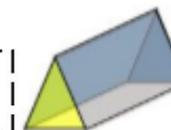
Surface area

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



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

Sum of all sides is surface area

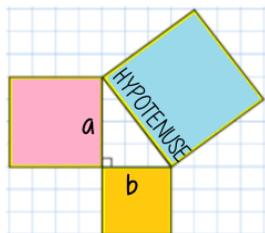


For other shapes = not all the sides are the same, so calculate the individually

Pythagoras theorem

R

Hypotenuse² = a² + b²



This is commutative – the square of the hypotenuse is equal to the sum of the squares of the two shorter sides

Places to look out for Pythagoras

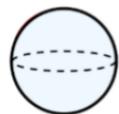
- Perpendicular heights in isosceles triangles
- Diagonals on right angled shapes
- Distance between coordinates
- Any length made from a right angles



Keywords

- Circumference:** the length around the outside of the circle – the perimeter
- Area:** the size of the 2D surface
- Diameter:** the distance from one side of a circle to another through the centre
- Radius:** the distance from the centre to the circumference of the circle
- Tangent:** a straight line that touches the circumference of a circle
- Chord:** a line segment connecting two points on the curve
- Frustrum:** a pyramid or cone with the top cut off
- Hemisphere:** half a sphere
- Surface area:** the total area of the surface of a 3D shape

Surface area of a sphere



Radius = 5cm

$$\begin{aligned} \text{Surface area} &= 4\pi r^2 \\ &= 4 \times \pi \times 5^2 \\ &= 4 \times \pi \times 25 \\ &= 100\pi \end{aligned}$$

The curved surface area of a sphere

Surface area = $4\pi r^2$

A hemisphere has the curved surface AND a flat circular face



$$\begin{aligned} &= 100\pi \div 2 = 50\pi \\ &= 50\pi + \pi \times 5^2 \\ \text{Hemisphere} &\equiv 75\pi \end{aligned}$$

Volume of a cone and a cylinder

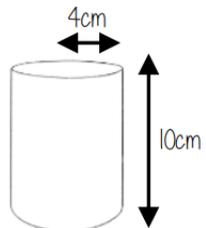
Volume Cylinder = $\pi r^2 h$



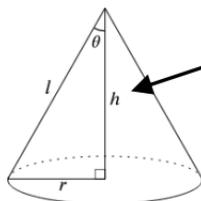
Volume Cone = $\frac{1}{3} \pi r^2 h$

A cylinder is a prism – cross section is a circle

A cone is a pyramid with a circular base



$$\begin{aligned} V &= \pi r^2 h \\ &= \pi \times 4^2 \times 10 \\ &= \pi \times 160 \\ &\equiv 160\pi \text{ cm}^2 \end{aligned}$$



The height of a cone is the perpendicular height from the vertex to the base

Look out for trigonometry or Pythagoras theorem – the radius forms the base of a right-angled triangle

Give your answer in terms of π means NOT in terms of pi $\equiv 502.7 \text{ cm}^2$

Volumes

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



Counting cubes

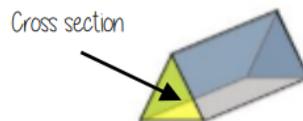
Some 3D shape volumes can be calculated by counting the number of cubes that fit inside the shape

Cubes/ Cuboids = base x width x height

Remember multiplication is commutative



Cross section



Prisms and cylinders = area cross section x height

Height can also be described as depth

