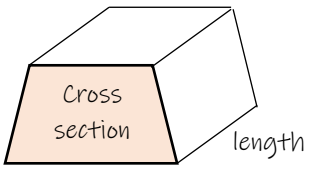
Y8 Maths Knowledge Organiser Topic 13: Volume and Surface Area

What must I be able to do?	Key vocabulary	
New content: ☐ Find the surface area of cubes, cuboids, prisms, cylinders, and composite solids ➢ Mathswatch G21b and G25b ☐ Find the volumes of cubes and cuboids, prisms, cylinders and composite solids ➢ Mathswatch G21a and G25a ☐ Convert between cm^3 and m^3	**Surface Area**	The total area of all faces on the outside of a 3D shape. This is also the total area of the net of the shape.
	Volume	The amount of space that an object occupies.
	Composite solid	A 3D shape created by combining other 3D shapes together.

Volume of prisms

Volume of a prism = area of cross section x length



Converting units of volume

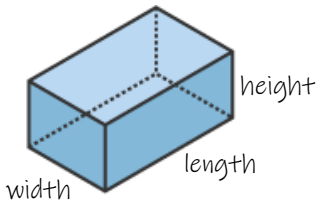
Do the length conversion 3 times, once for each dimension.

$1\ m^3 = 1m \times 1m \times 1m = 100cm \times 100cm \times 100cm = 1{,}000{,}000\ cm^3$

$1\ cm^3 = 1cm \times 1cm \times 1cm = 10mm \times 10mm \times 10mm = 1{,}000\ mm^3$

$1000\ cm^3 = 1$ litre so $1\ m^3 = 1000$ litres

Cubes/cuboids



Volume = length x width x depth

Surface area:

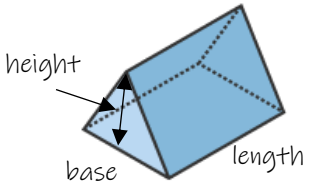
Front + back: length x height x 2 (rectangles)

Side + side = width x height x 2 (rectangles)

Top + bottom = length x width x 2 (rectangles)

Total surface area is these 3 added together.

Triangular prisms



$$\text{Volume} = \frac{\text{base} \times \text{perpendicular height}}{2} \times \text{length}$$

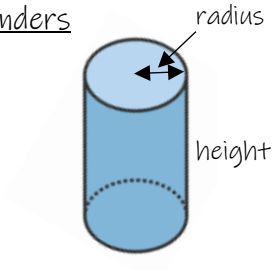
Surface area:

Area of the 2 triangles ($\frac{b \times h}{2}$ for each one)

Area of the three rectangles (note that they may all be different!)

Total surface area is all 5 faces added together.

Cylinders



Volume = π x radius squared x height

$= \pi r^2 h$

Surface area:

Top + bottom: Area of circle x 2

Curved surface area = area of rectangle

Total surface area is both added together.

$S.A = 2\pi r^2 + 2\pi rh$

The curved surface area is the rectangular part of the net of a cylinder. It has a length equal to the circumference of the circle at the top of the cylinder and a height equal to that of the cylinder.