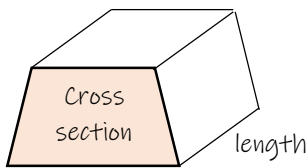


Y10 Maths Knowledge Organiser Foundation Tier: Volume and Surface Area of Prisms

What must I be able to do?	Key vocabulary						
<ul style="list-style-type: none"> Find the surface area of cubes, cuboids, prisms, cylinders, and composite solids <ul style="list-style-type: none"> Sparx M534, M661, M936 Find the volumes of cubes and cuboids, prisms, cylinders and composite solids <ul style="list-style-type: none"> Sparx M765, M697, M722 	<table border="1"> <tr> <td>Surface Area</td> <td>The <u>total area</u> of all <u>faces</u> on the outside of a 3D shape. This is also the total area of the net of the shape.</td> </tr> <tr> <td>Volume</td> <td>The <u>amount of space</u> that an object occupies.</td> </tr> <tr> <td>Composite solid</td> <td>A 3D shape created by <u>combining</u> other <u>3D shapes</u> together.</td> </tr> </table>	Surface Area	The <u>total area</u> of all <u>faces</u> on the outside of a 3D shape. This is also the total area of the net of the shape.	Volume	The <u>amount of space</u> that an object occupies.	Composite solid	A 3D shape created by <u>combining</u> other <u>3D shapes</u> together.
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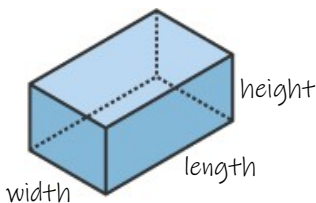
Volume of prisms

Volume of a prism = area of cross section x length



A **prism** has a consistent cross section that runs through the entire shape. It never changes size or shape e.g. a cylinder is a prism as it has a circle that goes all the way through.

Cubes/cuboids



$$\text{Volume} = \text{length} \times \text{width} \times \text{height}$$

Surface area:

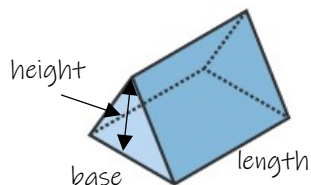
Front + back: length x height x 2 (rectangles)

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



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

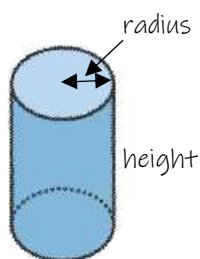
Surface area:

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



$$\begin{aligned} \text{Volume} &= \pi \times \text{radius squared} \times \text{height} \\ &= \pi r^2 h \end{aligned}$$

Surface area:

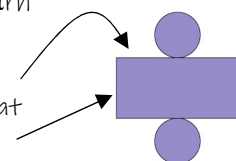
Top + bottom: Area of circle x 2

Curved surface area = area of rectangle

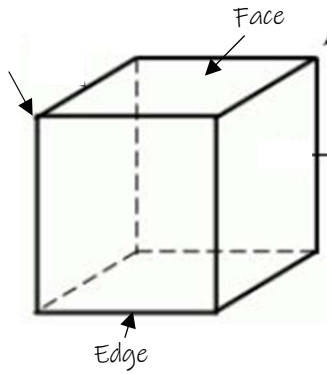
Total surface area is both added together.

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

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.



Properties of 3D Shapes



A cube has:

6 faces 12 edges 8 vertices

There is a famous formula known as Euler's formula (pronounced Oy-ler).

It states that for all 3D shapes which have flat faces and straight edges:

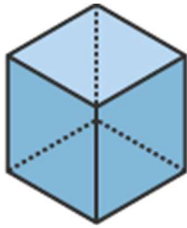
$$\text{Faces} + \text{Vertices} = \text{Edges} + 2$$

So for the cube, $6 + 8 = 12 + 2$

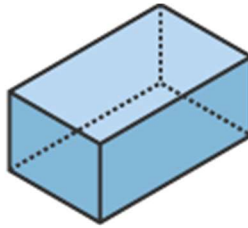
Names of 3D Shapes



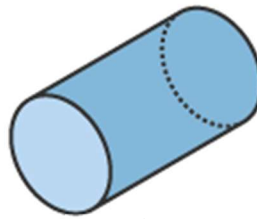
Sphere



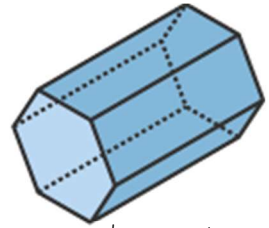
Cube



Cuboid



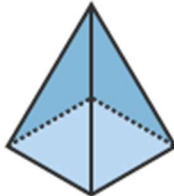
Cylinder



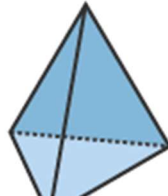
Hexagonal Prism



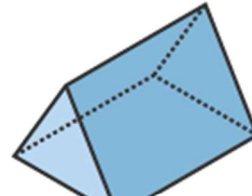
Cone



Square Based Pyramid



Tetrahedron



Triangular Prism

Cubes and cuboids are also examples of prisms

GLUE

HERE