

Calculate the Volume of Prisms, & Cylinders – SS8

The **volume** of a solid object is the amount of '3D space' it occupies.

A) The Volume of Prisms - 'Blobs', Cuboids and Cylinders

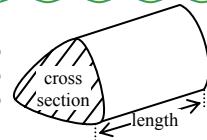
A prism is a solid (3D) object which has a constant area of cross-section. This means it has the same shape and size from one end to the other.

Strategy 1 for cuboids and cylinders

1. Identify the cross-sectional shape
2. Recall the appropriate area formula.
3. Recall/work out the appropriate volume formula.

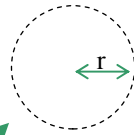
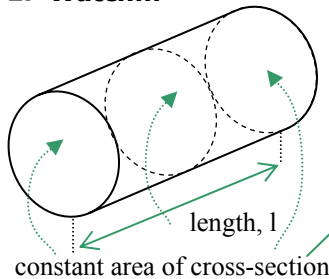
Volume of prism = Area of cross-section \times length

Your formulae sheet gives you this formula



Use the **V = Area of cross-section \times length** formula to remind you of the formula for cylinders and cuboids. This is **Strategy 1. Watch...**

A *cylinder* is a *prism* with a uniform **circular** cross-section



Remember...

$$\text{Area of a circle} = \pi r^2$$

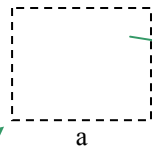
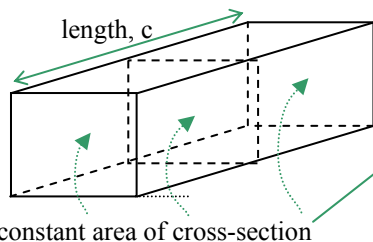
Therefore...

Volume of Cylinder

$$= \text{Area of cross-section} \times \text{length}$$

$$= \pi r^2 \times l = \pi r^2 l$$

A *cuboid* is a *prism* with a uniform **rectangular** cross-section



Remember...

$$\text{Area of a Rectangle} = ab$$

Therefore...

Volume of Cuboid

$$= ab \times c = abc$$

Exam style Question

A blob of ink marks an area of 0.2cm^2 on some paper. The blob penetrates the paper uniformly by 0.1cm . Calculate the volume of the blob of ink.

Solution (Strategy 2)

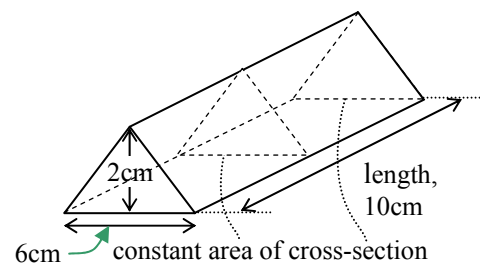
1. & 2. The cross section is a blob with an area of 0.2cm^2 .
3. $V = \text{Area of cross-section} \times \text{length} = 0.2 \times 0.1 = 0.02\text{cm}^3$.

Strategy 2 for blobs and other prisms

1. Identify the shape of the cross-section
2. Calculate the area of this cross-section.
3. Use Volume of prism = Area of cross-section \times length

Your Turn!!

- a) Use the above formula to work out the volume of a cuboid with dimensions 1cm by 2cm by 3cm .
- b) Use the above formula to work out the volume of a cylinder with radius 3cm and height 10cm . **Note:** the word 'height' in this question represents the length in the formula above.
- c) Calculate the volume of the following triangular prism using **Strategy 2**.



RAPID 'ACID' TEST – Blank out the page above before answering these!

1. Find the volume of a cuboid with dimensions 2cm by 3cm by 4cm .
2. Find the volume of a cylinder with radius 5cm and height 6cm .
3. Find the volume of an ink blob that marks an area of 0.4cm^2 on some paper and penetrates uniformly 0.2cm .