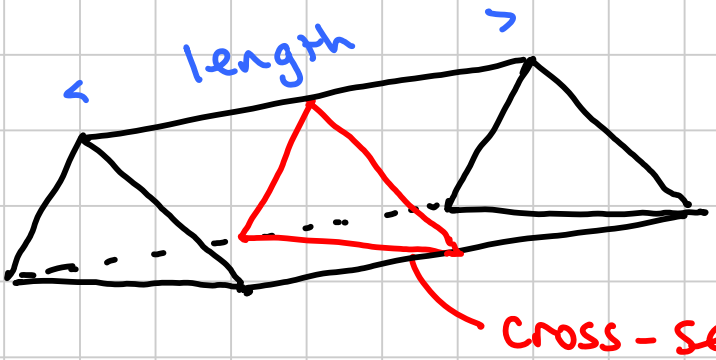
Volume of Prisms and Cylinders

Note Title 01/10/2008

A PRISM is a 3D shape (a solid) with a CONSTANT CROSS-SECTION
ie/ if we cut it anywhere along its length, the cut surface is the same.

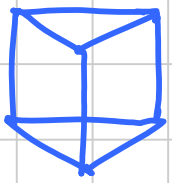
eg



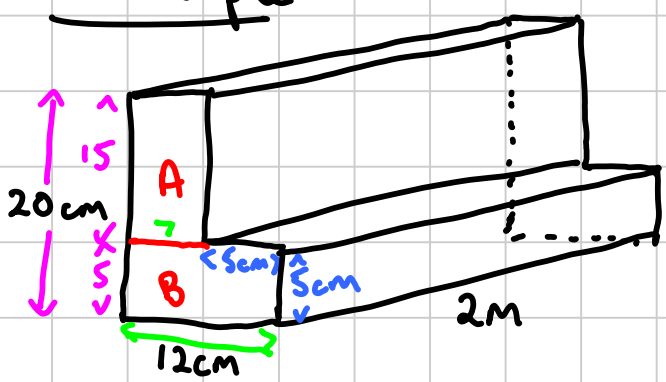
Triangular Prism

Volume of Prism = (Area of cross-section) × (length)

"length" may be "height" if the prism is standing on end



Example



Find the volume of this girder.

Area of A $= 15 \times 7 = 105\ cm^2$

Area of B $= 12 \times 5 = 60\ cm^2$

Area of cross-section $= 165\ cm^2$

Volume $= 165\ cm^2 \times 200\ cm$

$= 33000\ cm^3$

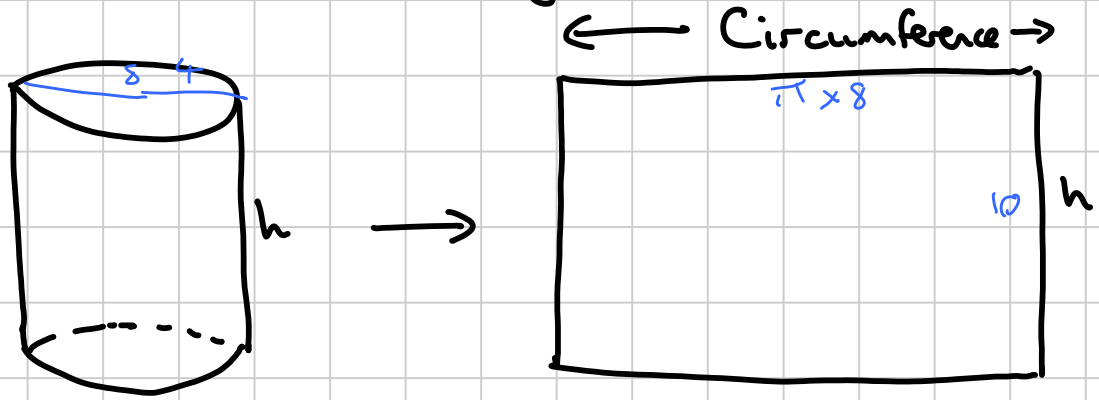
A CYLINDER is a prism with a circular cross-section.

So its volume is

(area of cross-section) $\times$ (height)

So $$V = \pi r^2 h$$

The curved surface area of a cylinder becomes a rectangle when unfolded.



Its area = Circumference $\times$ height

$= \pi d \times h$

or $2\pi r h$

Example A tin has a radius of 4cm and a height of 10cm.

(a) Find its volume

$$V = \pi \times 4^2 \times 10$$
$$= 502.7\,cm^3$$

(b) Find its **total** surface area

Curved SA $= \pi \times 8 \times 10 = 251.3\,cm^2$

Area of top $= \pi \times 4^2 = 50.3\,cm^2$

Area of bottom $= 50.3\,cm^2$

Total surface area $= 351.9\,cm^2$