

## FORMULAE LIST

The roots of  $ax^2 + bx + c = 0$  are  $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

Sine rule:  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule:  $a^2 = b^2 + c^2 - 2bc \cos A$  or  $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$

Area of a triangle:  $\text{Area} = \frac{1}{2} ab \sin C$

Volume of a sphere:  $\text{Volume} = \frac{4}{3} \pi r^3$

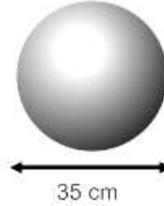
Volume of a cone:  $\text{Volume} = \frac{1}{3} \pi r^2 h$

Volume of a Pyramid:  $\text{Volume} = \frac{1}{3} Ah$

Standard deviation:  $s = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}} = \sqrt{\frac{\sum x^2 - (\sum x)^2 / n}{n-1}}$ , where  $n$  is the sample size.

# Volume

1. Calculate the volume of the sphere opposite which has a diameter of 35 cm.  
Give your answer to 3 significant figures.



2. The Battle of Largs in 1263 is commemorated by a monument known as The Pencil.  
This monument is shaped like a cylinder with a cone on top.

The cylinder has diameter 3 metres and a height 15 metres.

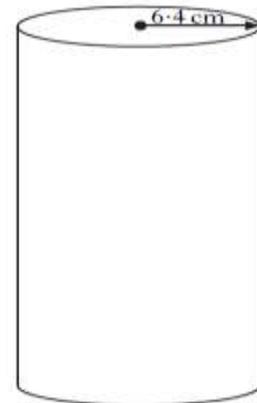
- a) Calculate the volume of the **cylinder part** of The Pencil.

The volume of the **cone** part of The Pencil is 5.7 cubic metres.

- b) Calculate the total **height** of The Pencil.

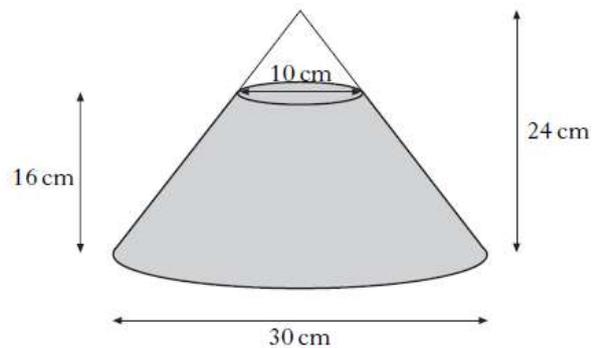


3. A cylindrical container has a volume of 3260 cubic centimetres.  
The radius of the cross-section is 6.4 centimetres.  
Calculate the height of the cylinder.

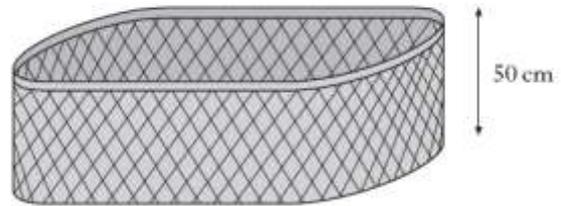


4. A glass ornament in the shape of a cone is partly filled with coloured water.

The cone is 24 centimetres high and has a base of diameter 30 centimetres.  
The water is 16 centimetres deep and measures 10 centimetres across the top.  
What is the volume of the water?  
Give your answer to 2 significant figures.

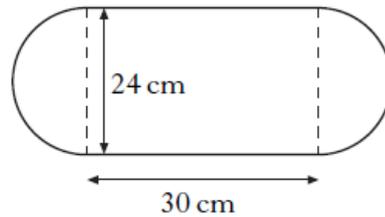


5. Jim Reid keeps his washing in a basket. The basket is in the shape of a prism.



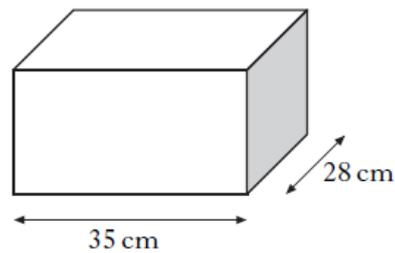
The height of the basket is 50 centimetres.

The cross section of the basket consists of a rectangle and two semi-circles as shown.



- a) Find the volume of the basket in cubic centimetres.  
Give your answer correct to 3 significant figures.

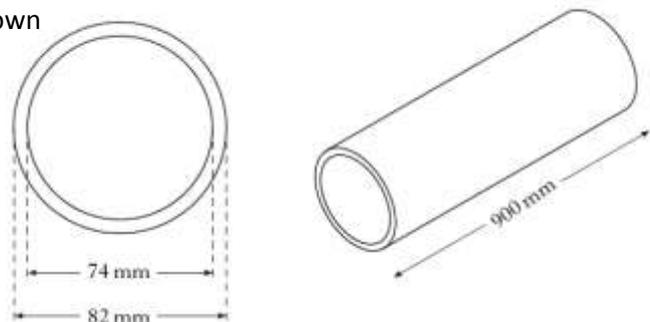
Jim keeps his ironing in a storage box which has a volume **half** of that of the basket.



The storage box is in the shape of a cuboid, 36 centimetres long and 28 centimetres broad.

- b) Find the height of the storage box.

6. A company manufactures aluminium tubes.  
The cross-section of one of the tubes is shown in the diagram below.



The inner diameter is 74 millimetres

The outer diameter is 82 millimetres

The tube is 900 millimetres long

Calculate the volume of aluminium used to make the tube

Give your answer to 3 significant figures.