

## Topic 17 Area and volume (Post-TT) [35]

### Surface area

$$\text{Sphere} = 4\pi r^2$$

where  $r$  is the radius

$$\text{Cone} = \pi r^2 + \pi r l$$

where  $l$  is the **slant** height and  $r$  is the base radius

### Volume

$$\text{Sphere} = \frac{4}{3}\pi r^3$$

where  $r$  is the radius

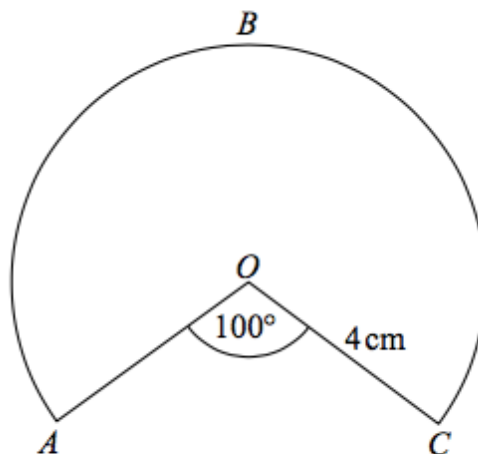
$$\text{Pyramid} = \frac{1}{3} \times \text{area of base} \times \text{perpendicular height}$$

$$\text{Cone} = \frac{1}{3}\pi r^2 h$$

where  $h$  is the **perpendicular** height and  $r$  is the base radius

1.

The diagram shows a sector of a circle of radius 4 cm.



Work out the length of the arc  $ABC$ .

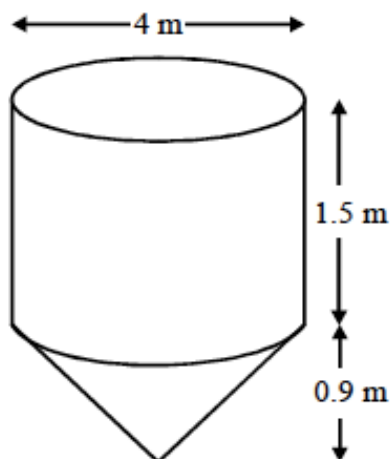
Give your answer correct to 3 significant figures.

(Total 2 marks)

2.

A container consists of a cylinder on top of a cone.

The container is full of oil.



The diameter of both the cylinder and the cone is 4 m.

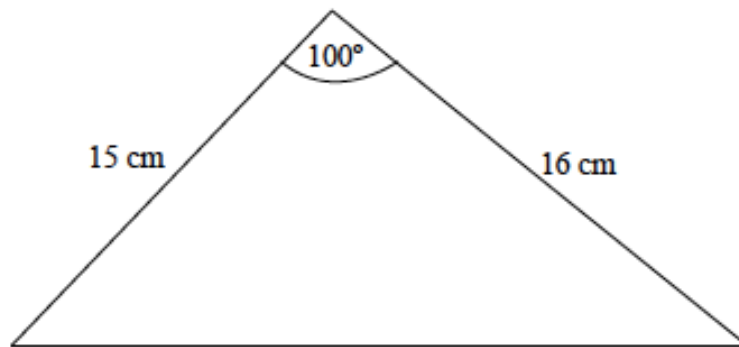
The height of the cone is 0.9 m and the height of the cylinder is 1.5 m.

Calculate the volume of oil in the container.

Give your answer in terms of  $\pi$ .

(Total 3 marks)

3.



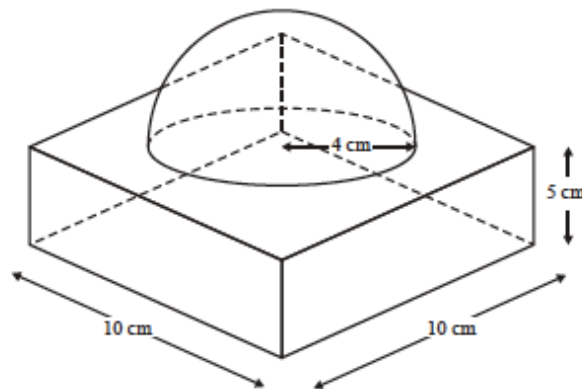
Work out the area of the triangle.  
Give your answer to 3 significant figures.

(Total 2 marks)

4.

A marble paperweight consists of a cuboid and a hemisphere as shown in the diagram.

The hemisphere has a radius of 4 cm.



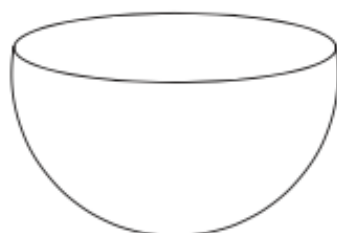
Not to scale

Calculate the volume of the paperweight.

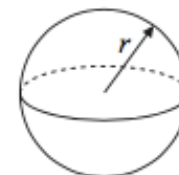
(Total 4 marks)

5. **Non-calculator**

The diagram shows a solid hemisphere.



Volume of sphere =  $\frac{4}{3}\pi r^3$   
Surface area of sphere =  $4\pi r^2$

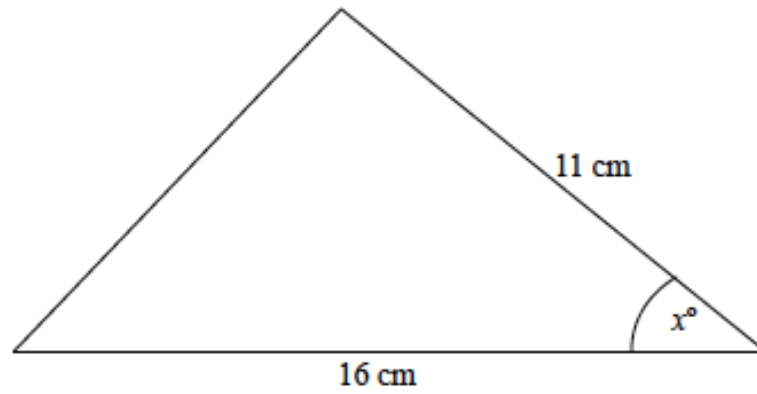


The volume of the hemisphere is  $\frac{250}{3}\pi$

Work out the exact total surface area of the solid hemisphere.  
Give your answer as a multiple of  $\pi$ .

(Total 3 marks)

6.

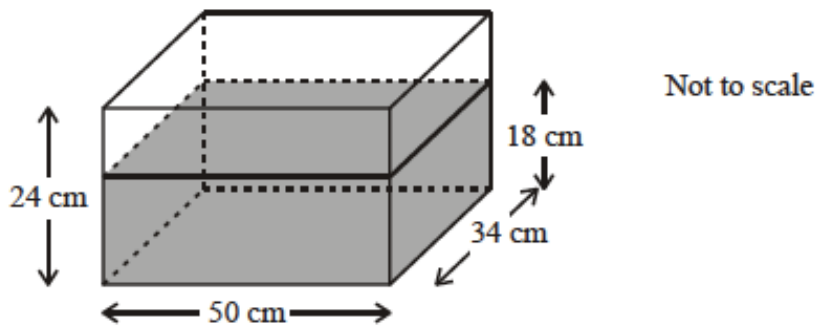


The area of the triangle is  $70\text{cm}^2$   
Work out the value of  $x$ .  
Give your answer to 1 decimal place.

(Total 3 marks)

7.

A water tank is 50 cm long, 34 cm wide and 24 cm high.  
It contains water to a depth of 18 cm.



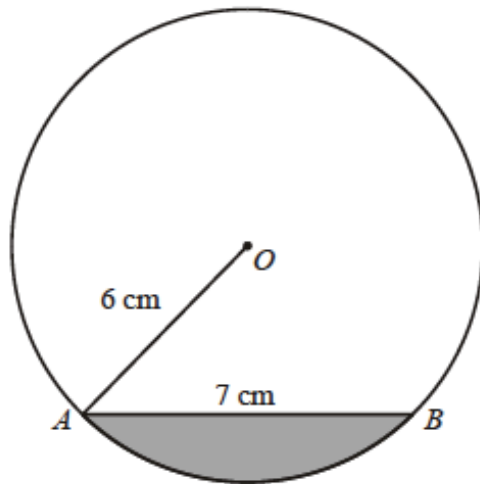
Four identical spheres are placed in the tank and are fully submerged.  
The water level rises by 4.5 cm.

Calculate the radius of the spheres.

(Total 5 marks)

8.

$AB$  is a chord of a circle, centre  $O$ , radius 6 cm.  
 $AB = 7$  cm



Not drawn accurately

Calculate the area of the shaded segment.

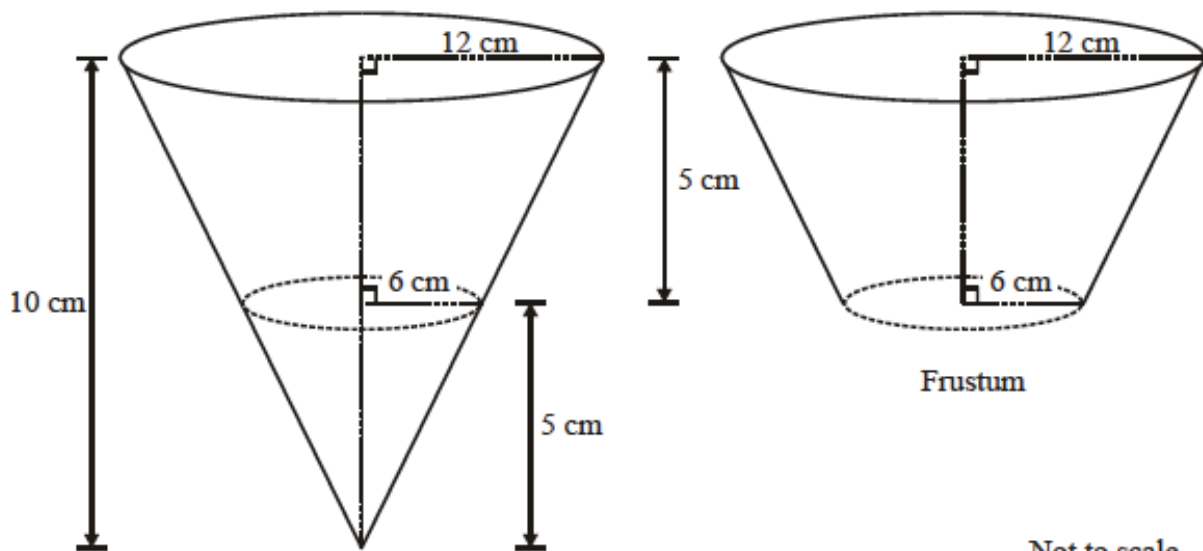
(Total 6 marks)

9.

The first diagram shows a cone of base radius 12 cm and perpendicular height 10 cm.

A small cone of base radius 6 cm and perpendicular height 5 cm is cut off the bottom to leave a frustum.

The frustum has a lower radius of 6 cm, an upper radius of 12 cm and a perpendicular height of 5 cm (see second diagram).



Not to scale

(a) Find the volume of the frustum, giving your answer in terms of  $\pi$ .

(4)

(b) The frustum has the same volume as another cone of perpendicular height 35 cm.

Calculate the radius of this cone.

(3)

(Total 7 marks)