FORMULAE LIST

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

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

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

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

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

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

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

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

Volume of Solids (Exam Type)

1. The Stockholm Globe Arena is the largest hemispherical building in the world.

The radius of the building is 110 m.

Calculate the volume of the building in cubic metres, giving your answer in scientific notation correct to 3 significant figures.
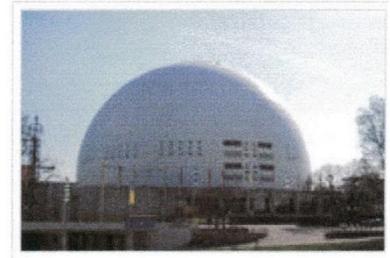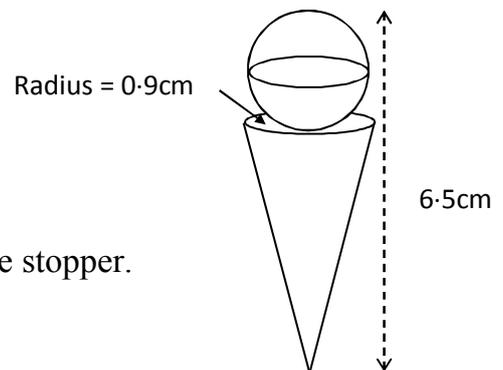
2. A metal bottle stopper is made up from a cone topped with a sphere.

The sphere has diameter 1·5cm.
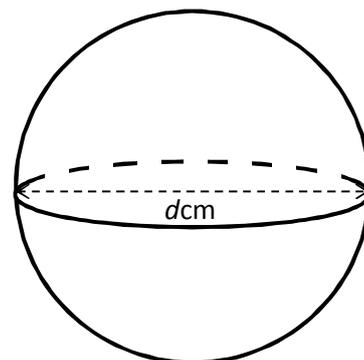
The cone has radius 0·9cm.

The overall length of the stopper is 6·5cm.

Calculate the volume of metal required to make the stopper. Give your answer correct to 3 significant figures.

Radius = 0·9cm

6·5cm

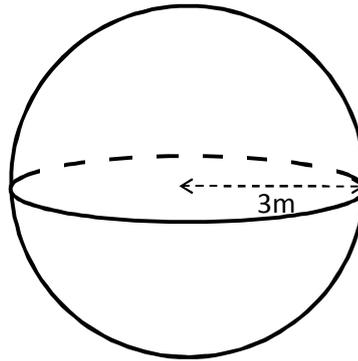**3.** The volume of this sphere is 524cm³.

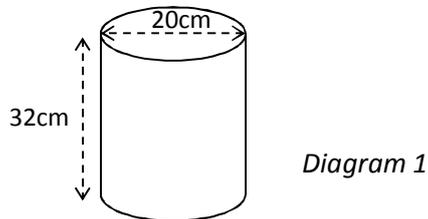Calculate the diameter, d cm.

$d$cm

4. **Non Calculator!**

Calculate the volume of this sphere which has radius 3m.

[Take $\pi = 3 \cdot 14$]

5. Sherbet in a sweet shop is stored in a cylindrical container like the one shown

in *diagram 1*.

Diagram 1

The volume of the cylinder, correct to the nearest 1000cm^3, is 10 000 cm^3.

The sherbet is sold in conical containers with diameter 5 cm
as shown in *diagram 2*.

250 of these cones can be filled from the contents of the cylinder.
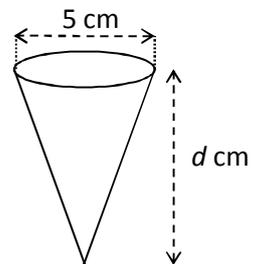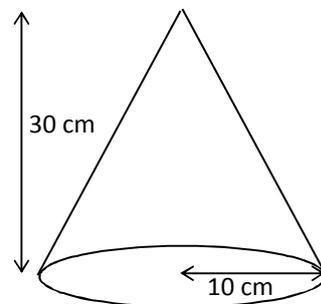

Calculate the depth, *d* cm, of a sherbet cone.

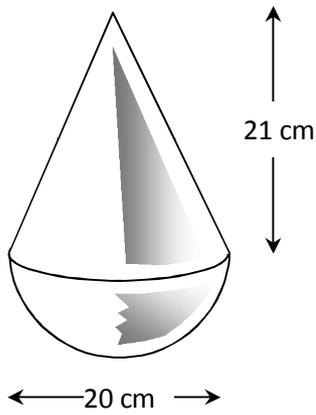*Diagram 2*

6. **Non Calculator!**

The diagram shows a cone with radius 10
centimetres and height 30 centimetres.

Taking $\pi = 3 \cdot 14$, calculate the volume of the
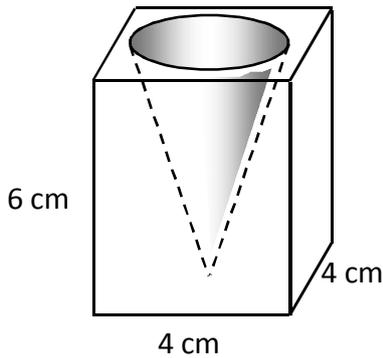cone.

7.

21 cm

20 cm

A children's wobbly toy is made from a cone, 21 cm high, on top of a hemispherical base of diameter 20 cm.

The toy has to be filled with liquid foam.

Calculate the volume of foam which will be required.

8.

6 cm

4 cm

4 cm

A glass candle holder is in the shape of a cuboid with a cone removed. The cuboid measures 4cm by 4cm by 6cm.

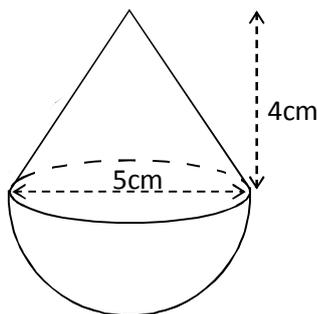The cone has a diameter of 3cm and a height of 5cm.

Calculate the volume of glass in the candle holder.

9. For the Christmas market a confectioner has created a chocolate Santa.

It consists of a solid hemisphere topped by a solid cone.

Both have diameter 5cm and the height of the cone is 4cm as shown in the diagram.

4cm

5cm

Calculate the volume of chocolate required to make one chocolate

Santa, giving your answer correct to 3 significant figures.

10. The diameter of an ordinary snooker ball is 5·25cm.

Calculate the volume of a snooker ball giving your answer correct to 3 significant figures.

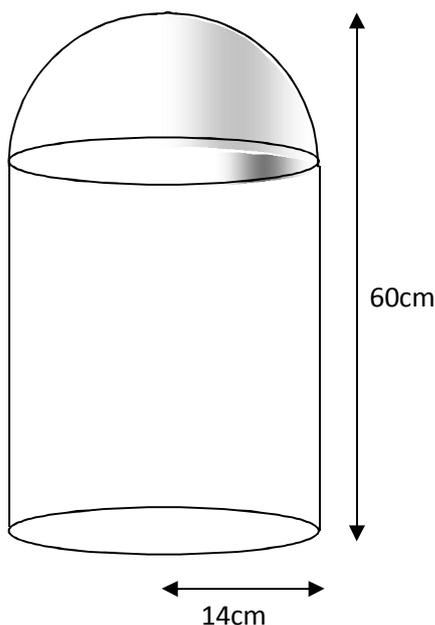**11.** A dessert is in the shape of a truncated cone [a cone with a 'slice' taken from the top].

The radius of the base is 4·1cm and is 1·6 cm at the top.

The other dimensions are shown in the diagram.
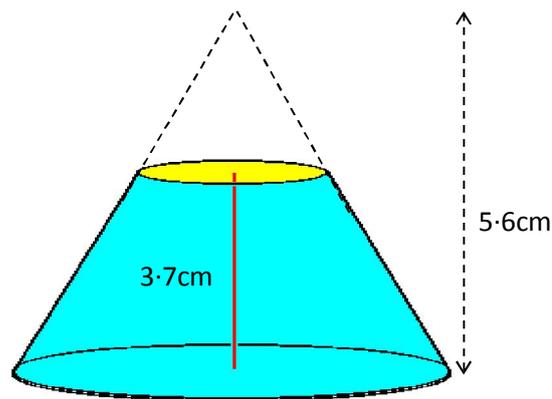
Calculate the volume of the dessert.

12. A company that produces bins uses the design of a cylindrical base with a hemispherical lid.

If the total height of the bin is 60cm and the radius of the bin is 14cm, calculate the total volume of the bin in litres correct to 3 significant figures.

(Volume of cylinder $= \pi r^2 h$;

Volume of sphere $= \frac{4}{3}\pi r^3$)