

# FluidMaths

GCSE Mathematics (Grade 9-1)

Problem Solving

Surface Area and Volume Set 2

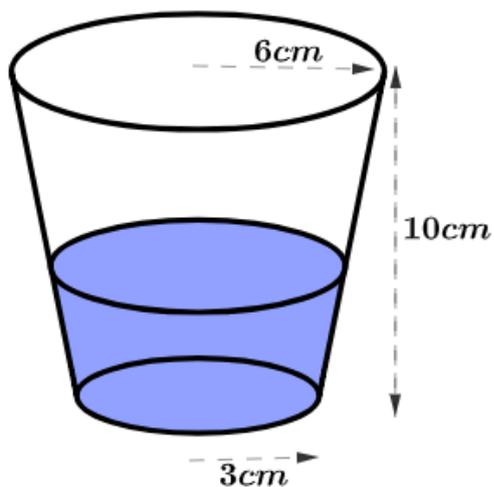
Spheres and Cones

Questions

## Some useful strategies in problem-solving

- Read the question carefully
- Sketch a diagram where applicable
- Take note of key information
- Write down any formulae you may need
- Tackle the problem in bite-size rather than as a whole
- Concentrate on the part of the problem you understand and start from there
- Collaborate with a partner and share ideas
- Use a dictionary to find the meaning of any confusing words
- Check that your answers make sense in the context of the question

1 A bucket of height 10 cm is filled with water.

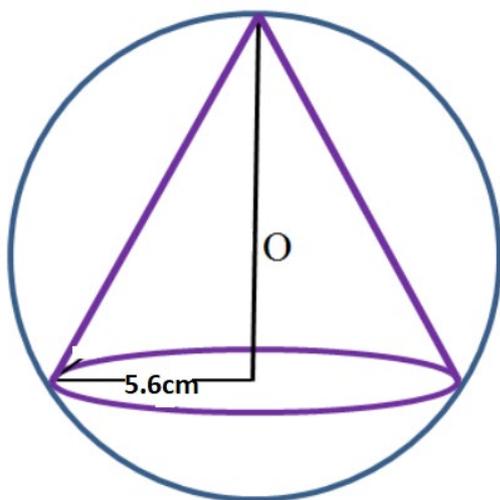


$$\left\{ \text{Volume of Cone} = \frac{1}{3} \pi r^2 h \right\}$$

The water takes up 30% of the capacity of the bucket.  
Calculate the volume of water in the bucket in terms of  $\pi$ .

[5marks]

2 The diagram below shows a sphere of center O.  
A cone is placed inside the sphere as shown.



$$\text{The volume of a sphere} = \frac{4}{3} \pi r^3$$

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

The radius of the base of the cone is 5.6 cm.  
The volume of the sphere is 7200 cm<sup>3</sup>.

a) Calculate the radius of the sphere.

Give your answer to the nearest whole number [2marks]

b) Find the volume of the cone.

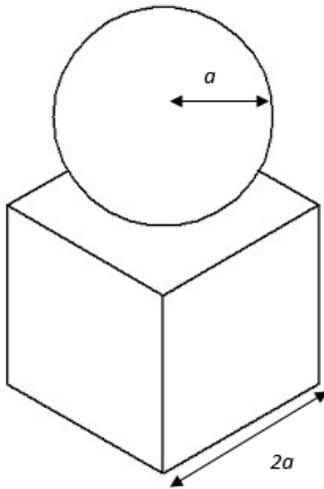
Give your answer to 3 significant figures [3marks]

- 3 The surface area of a sphere is  $20 \text{ cm}^2$   
 Calculate the volume of the sphere  
 Give your answer to 2 significant figures.

$$\left\{ \begin{array}{l} \text{The surface area of a sphere} = 4\pi r^2 \\ \text{The volume of a sphere} = \frac{4}{3}\pi r^3 \end{array} \right\}$$

[4marks]

- 4 A sphere is placed on a cube as shown below

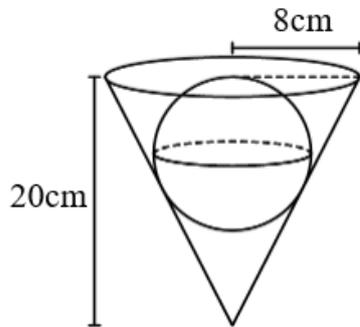


$$\left\{ \text{The volume of a sphere} = \frac{4}{3}\pi r^3 \right\}$$

The radius of the sphere is  $a$   
 The side length of the cube is  $2a$

Show that the volume  $V$  of the solid is equal to  $4a^3 \left( 2 + \frac{\pi}{3} \right)$   
 [4marks]

- 5 The diagram below shows a cone of height 20 cm  
The radius of the cone is 8 cm



$$\text{The volume of a sphere} = \frac{4}{3}\pi r^3$$

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

The cone is filled with water.

When a sphere of radius  $r$  is placed inside the cone, some of the water is spilled.

Given that the amount of water left in the cone is  $550 \text{ cm}^3$ , calculate the radius of the sphere.

Give your answer to 3 significant figures.

**[5marks]**