

- 1 A solid aluminium cylinder has radius 10 cm and height h cm.

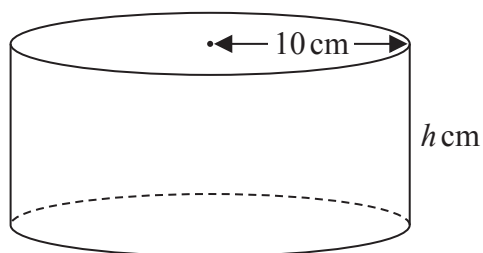


Diagram **NOT**
accurately drawn

The mass of the cylinder is 5.4 kg.

The density of aluminium is 0.0027 kg/cm^3

Calculate the value of h .

Give your answer correct to one decimal place.

$h = \dots\dots\dots$

(Total for Question 1 is 5 marks)

- 2 The diagram shows a solid made from a cylinder and a hemisphere.
The cylinder and the hemisphere are both made from the same metal.

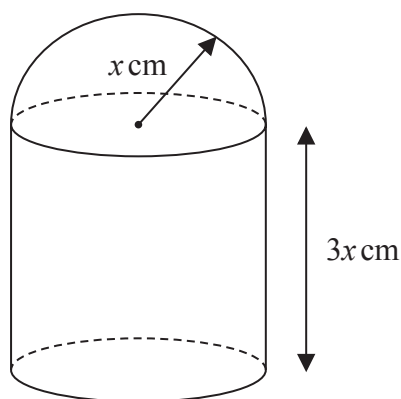


Diagram **NOT**
accurately drawn

The plane face of the hemisphere coincides with the upper plane face of the cylinder.

The radius of the cylinder and the radius of the hemisphere are both x cm.

The height of the cylinder is $3x$ cm.

The total surface area of the solid is $81\pi\text{ cm}^2$

The mass of the solid is 840 grams.

The following table gives the density of each of four metals.

Metal	Density (g/cm^3)
Aluminium	2.7
Nickel	8.9
Gold	19.3
Silver	10.5

The metal used to make the solid is one of the metals in the table.

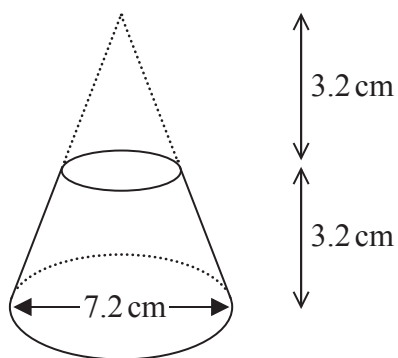
Determine the metal used to make the solid.

Show your working clearly.

.....

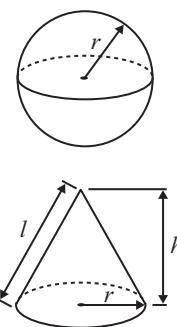
(Total for Question 2 is 6 marks)

3 Here is a frustum of a cone.



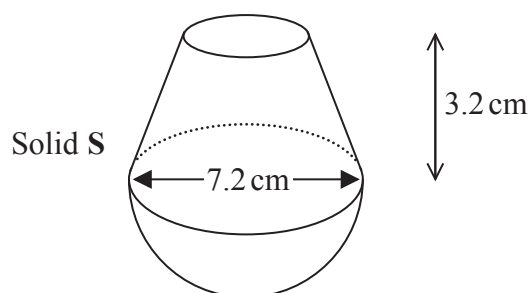
$$\text{Volume of sphere} = \frac{4}{3} \pi r^3$$

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



The diagram shows that the frustum is made by removing a cone with height 3.2 cm from a solid cone with height 6.4 cm and base diameter 7.2 cm.

The frustum is joined to a solid hemisphere of diameter 7.2 cm to form the solid S shown below.



The density of the frustum is 2.4 g/cm^3

The density of the hemisphere is 4.8 g/cm^3

Calculate the average density of solid S.

.....g/cm³

(Total for Question 3 is 5 marks)

4 A 3-D shape consists of a hollow sphere made of metal.



The diagram shows a cross section drawn through the centre, O , of the sphere.

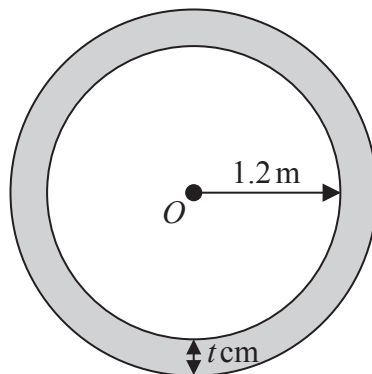


Diagram **NOT**
accurately drawn

The internal radius of the sphere is 1.2 m .

The thickness of the metal is $t\text{ cm}$.

The density of the metal is 2700 kg per m^3

The mass of the 3-D shape is 1980 kg .

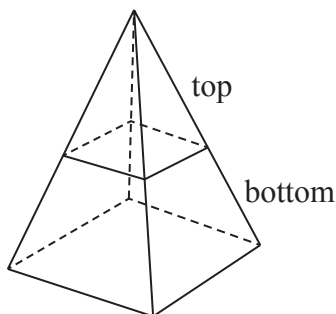
Work out the value of t .

Give your answer correct to 2 significant figures.

$t = \dots\dots\dots$

(Total for Question 4 is 5 marks)

5 The pyramid **P** is formed from two parts made of different materials.



The top part of **P** has a mass of 92.8 g and is made from material with a density of 2.9 g/cm^3

The bottom part of **P** has a mass of 972.8 g

The average density of **P** is 4.7 g/cm^3

Calculate the volume of the top part of **P** as a percentage of the total volume of **P**.

Give your answer correct to 1 decimal place.

You must show all your working.

.....%

(Total for Question 5 is 5 marks)