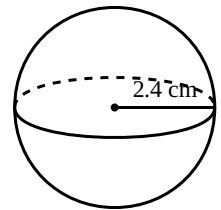

GEOMETRY: DENSITY, MASS & VOLUME (3D SHAPES)**Best Guess Mastery Worksheet (Target Grade 5/6)****I Do**

A solid metal sphere has a radius of 2.4 cm.

Diagram NOT accurately drawn

The mass of the sphere is 385 grams.



Work out the density of the sphere.

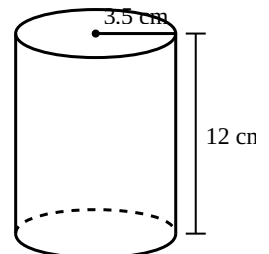
Give your answer correct to 3 significant figures.

Density = g/cm³

We Do

A solid metal cylinder has a radius of 3.5 cm and a height of 12 cm.

Diagram NOT accurately drawn



The mass of the cylinder is 4.1 kg.

Work out the density of the cylinder in g/cm³.

Give your answer correct to 3 significant figures.

Density = g/cm³

GEOMETRY: DENSITY, MASS & VOLUME (3D SHAPES)**Best Guess Mastery Worksheet (Target Grade 5/6)****You Do 1**

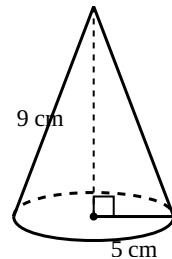
A solid wooden cone has a base radius of 5 cm and a height of 9 cm.

The mass of the cone is 145 grams.

Work out the density of the wood.

Give your answer correct to 3 significant figures.

Diagram NOT accurately drawn



Density = g/cm³

You Do 2

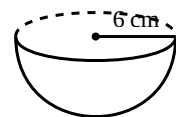
A solid glass hemisphere has a radius of 6 cm.

The density of the glass is 2.5 g/cm³.

Work out the mass of the hemisphere.

Give your answer correct to 3 significant figures.

Diagram NOT accurately drawn



Mass = g

GEOMETRY: DENSITY, MASS & VOLUME (3D SHAPES)**Best Guess Mastery Worksheet (Target Grade 6/7)****Challenge 1**

A solid steel sphere has a mass of 2.5 kg.

The density of the steel is 7.85 g/cm^3 .

Work out the radius of the sphere.

Give your answer correct to 3 significant figures.

Radius = cm

Challenge 2

A solid shape is made by attaching a hemisphere to the top of a cylinder.

Both the hemisphere and the cylinder have a radius of 4 cm.

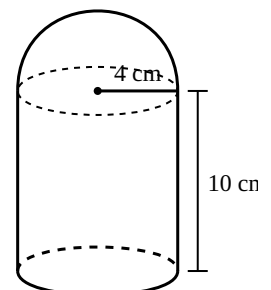
The height of the cylinder portion is 10 cm.

The density of the material is 8.4 g/cm^3 .

Work out the total mass of the shape.

Give your answer in kilograms (kg), correct to 3 significant figures.

Diagram NOT accurately drawn



Total Mass = kg

Answers & Worked Solutions

Note: IGCSE formulae required: Sphere Volume = $\frac{4}{3}\pi r^3$ | Cone Volume = $\frac{1}{3}\pi r^2 h$ | Cylinder Volume = $\pi r^2 h$

I Do:

- Find the volume of the sphere: $V = \frac{4}{3} \times \pi \times (2.4)^3 = 57.9058... \text{ cm}^3$.
- Use Density = Mass $\div$ Volume: $D = 385 \div 57.9058...$
- $D = 6.6487... \rightarrow$ **6.65 g/cm³** (to 3 s.f.)

We Do:

- Find the volume of the cylinder: $V = \pi \times (3.5)^2 \times 12 = 147\pi = 461.814... \text{ cm}^3$.
- Convert mass to grams: 4.1 kg = 4100 g.
- Use Density = Mass $\div$ Volume: $D = 4100 \div 461.814...$
- $D = 8.8780... \rightarrow$ **8.88 g/cm³** (to 3 s.f.)

You Do 1:

- Find the volume of the cone: $V = \frac{1}{3} \times \pi \times (5)^2 \times 9 = 75\pi = 235.619... \text{ cm}^3$.
- Use Density = Mass $\div$ Volume: $D = 145 \div 235.619...$
- $D = 0.61539... \rightarrow$ **0.615 g/cm³** (to 3 s.f.)

You Do 2:

- Find the volume of the hemisphere (half a sphere): $V = \frac{2}{3} \times \pi \times (6)^3 = 144\pi = 452.389... \text{ cm}^3$.
- Use Mass = Density $\times$ Volume: $M = 2.5 \times 452.389...$
- $M = 1130.97... \rightarrow$ **1130 g** (to 3 s.f.)

Challenge 1:

- Convert mass to grams: 2.5 kg = 2500 g.
- Find Volume = Mass $\div$ Density = $2500 \div 7.85 = 318.471... \text{ cm}^3$.
- Set up the sphere volume formula: $\frac{4}{3} \times \pi \times r^3 = 318.471...$
- Solve for r^3 : $r^3 = (318.471... \times 3) \div 4\pi = 76.029...$
- Cube root to find r : $r = \sqrt[3]{76.029...} = 4.236... \rightarrow$ **4.24 cm** (to 3 s.f.)

Answers & Worked Solutions (continued)

Challenge 2:

1. Volume of hemisphere: $V = \frac{2}{3} \times \pi \times (4)^3 = 134.041... \text{ cm}^3$.
2. Volume of cylinder: $V = \pi \times (4)^2 \times 10 = 502.654... \text{ cm}^3$.
3. Total Volume = $134.041... + 502.654... = 636.696... \text{ cm}^3$.
4. Find Total Mass in grams: $M = 8.4 \times 636.696... = 5348.247... \text{ g}$.
5. Convert to kg: $5.348... \text{ kg} \rightarrow \mathbf{5.35 \text{ kg}}$ (to 3 s.f.)