

Spheres, Cones, Pyramids and Frustums

For AQA GCSE Mathematics (8300) • Higher tier

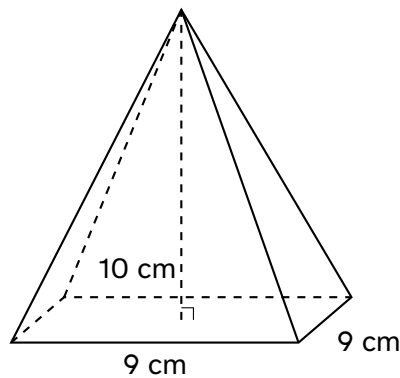
Name _____

Total marks: **29**

Answer **all** questions in the spaces provided. Show your working: marks are given for correct method. You may use a calculator. Diagrams are not drawn accurately.

Volume of a pyramid = $\frac{1}{3} \times \text{area of base} \times h$; volume of a cone = $\frac{1}{3} \pi r^2 h$; curved surface area of a cone = $\pi r l$; volume of a sphere = $\frac{4}{3} \pi r^3$; surface area of a sphere = $4 \pi r^2$

- 1 Here is a square-based pyramid.



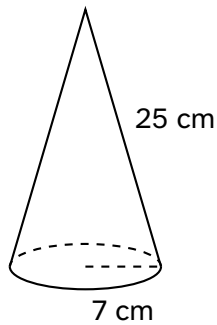
Not drawn accurately

The base is a square of side 9 cm.
The perpendicular height of the pyramid is 10 cm.
Work out the volume of the pyramid.

[2 marks]

Answer _____ cm³

- 2** Here is a solid cone.
The radius of the base is 7 cm.
The slant height is 25 cm.



Not drawn accurately

- (a) Show that the total surface area of the cone is $224\pi \text{ cm}^2$

[2 marks]

- (b) Work out the volume of the cone.
Give your answer in terms of π .

[3 marks]

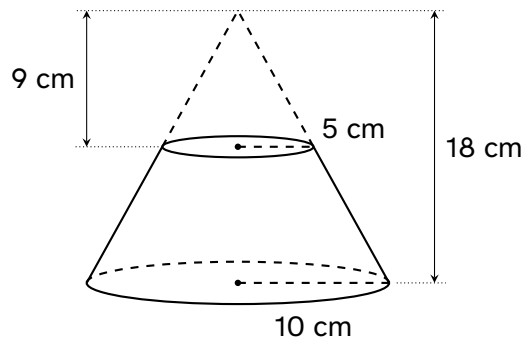
Answer _____ cm^3

- 3** A sphere has volume 500 cm^3 .
Work out its radius.
Give your answer to 3 significant figures.

[2 marks]

Answer _____ cm

- 4 The diagram shows a frustum.
It is a cone of radius 10 cm and height 18 cm with a cone of radius 5 cm and height 9 cm removed from the top.



Not drawn accurately

Work out the volume of the frustum.
Give your answer in terms of π .

[3 marks]

Answer _____ cm^3

- 5 A solid is made from a cylinder of radius 3 cm and height 10 cm with a hemisphere of radius 3 cm on top.
Work out the volume of the solid.
Give your answer to 3 significant figures.

[3 marks]

Answer _____ cm^3

- 6** A container is a hollow cone with its vertex at the bottom.
The top of the cone is a horizontal circle of radius 8 cm.
The height of the cone is 20 cm.
Water is poured into the empty container at a constant rate of 20 cm^3 per second.
How long does it take for the depth of the water to reach 15 cm?
Give your answer to the nearest second.

[4 marks]

Answer _____ seconds

- 7** A cylinder has radius r and height h .
A hemisphere has radius r .
The volume of the cylinder is equal to the volume of the hemisphere.
Work out the ratio $r:h$
You must show your working.

[3 marks]

Answer _____

- 8** A solid cone has base radius $3x$ and slant height $5x$.
A sphere has radius r .
The total surface area of the cone is equal to the surface area of the sphere.
Work out r in terms of x .
Give your answer in its simplest form.

[3 marks]

Answer $r =$ _____

- 9 A solid sphere fits exactly inside a hollow cube.
The sphere touches all six faces of the cube.
What percentage of the space inside the cube is **not** filled by the sphere?
Give your answer to 1 decimal place.
You must show your working.

[4 marks]

Answer _____ %