

Volume of cones, spheres and pyramids

Grade 6 | Higher | 19 questions, 78 marks

GCSE Maths topic practice



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Name: _____ **Date:** _____ **Score:** _____ / 78

- 1** A cone has base radius 6 cm and vertical height 10 cm.

Work out the volume of the cone. Give your answer correct to 3 significant figures.

(2 marks)

Answer _____

- 2** A sphere has radius 3 cm.

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

b. Write your answer to part (a) as a number, correct to 3 significant figures.

(3 marks)

Answer _____

- 3** A pyramid has a square base of side 8 cm. Its perpendicular height is 9 cm.

Work out the volume of the pyramid.

(2 marks)

Answer _____

- 4** A solid hemisphere has radius 6 cm.

Work out the volume of the hemisphere.

Give your answer correct to 3 significant figures.

(2 marks)

Answer _____

5

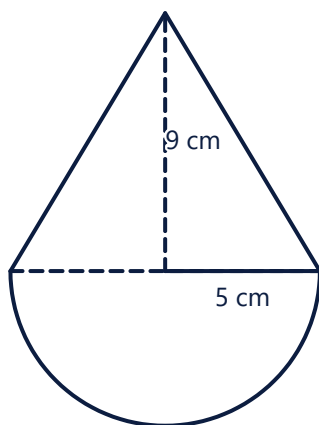
A solid is made from a cone and a hemisphere.

The cone has base radius 5 cm and vertical height 9 cm.

The flat face of the hemisphere, of radius 5 cm, is joined to the base of the cone.

Work out the total volume of the solid.

Give your answer correct to 3 significant figures.



Central vertical cross-section

Diagram NOT accurately drawn

(4 marks)

Answer _____

6

An ice cream cone has base radius 5 cm and volume $250\pi \text{ cm}^3$.

Work out the vertical height of the cone.

(3 marks)

Answer _____

7

A solid metal ball has radius 5 cm. The metal has density 7.8 g/cm^3 .

Work out the mass of the ball in kilograms. Give your answer correct to 3 significant figures.

(4 marks)

Answer

8

A solid is a quarter of a sphere. It is made by cutting a sphere in half, then cutting one hemisphere in half again.

The volume of the solid is $243\pi \text{ cm}^3$.

Work out the total surface area of the solid.

Give your answer in terms of π .

Both cuts pass through the centre of the original sphere, and the second cutting plane is perpendicular to the first.

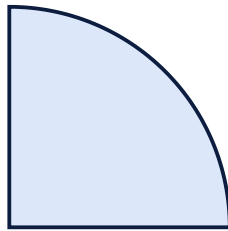


Diagram NOT accurately drawn

Section perpendicular to both cuts

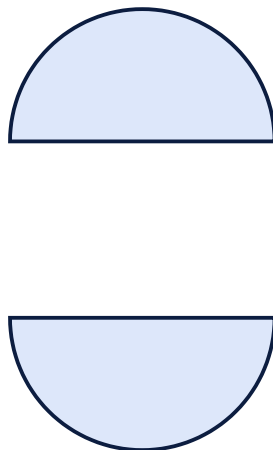


Diagram NOT accurately drawn

Flat faces, shown separately

(5 marks)

Answer _____

- 9 A solid cone has base radius 5 cm.
The curved surface area of the cone is $65\pi \text{ cm}^2$.
Work out the volume of the cone.
Give your answer correct to 3 significant figures.

(5 marks)

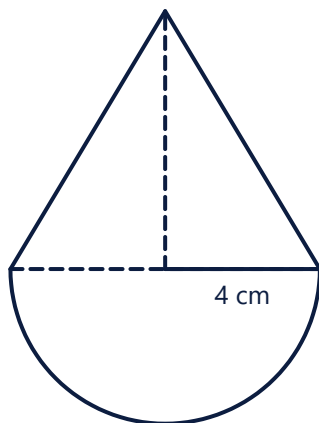
Answer _____

- 10 A solid hemisphere has volume $18\pi \text{ cm}^3$.
Work out the total surface area of the hemisphere. Give your answer in terms of π .

(4 marks)

Answer _____

- 11** A solid is made from a cone and a hemisphere, both of radius 4 cm. The flat face of the hemisphere is joined to the base of the cone.
The total volume of the solid is $96\pi \text{ cm}^3$.
Work out the total height of the solid.



Central vertical cross-section

Diagram NOT accurately drawn

(5 marks)

Answer _____

- 12** A solid is made from a cylinder and a cone. Both have radius 4 cm. The cylinder has height 10 cm. The cone sits on top of the cylinder and has vertical height h cm.
The total volume of the solid is $224\pi \text{ cm}^3$.
Work out the value of h .

(4 marks)

Answer _____

13 A cube has sides of length 6 cm.

A pyramid has a square base of side 9 cm and height h cm.

Volume of a pyramid = $\frac{1}{3} \times \text{base area} \times \text{height}$

The volume of the pyramid is equal to the volume of the cube.

Work out the value of h .

(5 marks)

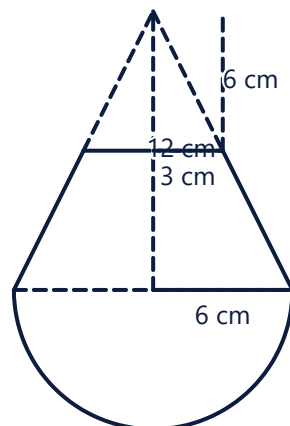
Answer _____

14 A frustum is made by removing a cone of base radius 3 cm and vertical height 6 cm from a similar cone of base radius 6 cm and vertical height 12 cm.

A solid hemisphere of radius 6 cm is attached to the larger face of the frustum to make a solid.

Calculate the total volume of the solid.

Give your answer correct to 3 significant figures.



Central vertical cross-section

Diagram NOT accurately drawn

(5 marks)

Answer _____

- 15 A cone has base radius 9 cm and vertical height 15 cm.

A smaller cone of vertical height 5 cm is cut off the top, using a cut parallel to the base. The solid left is a frustum.

Work out the volume of the frustum. Give your answer correct to 3 significant figures.

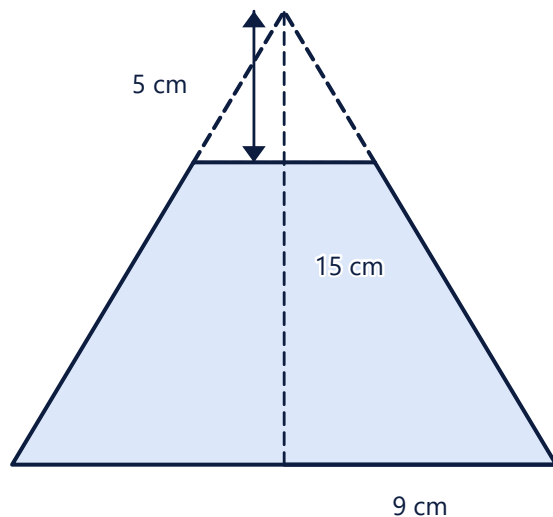


Diagram NOT accurately drawn

(5 marks)

Answer _____

- 16 A solid cone has base radius 6 cm and volume $96\pi \text{ cm}^3$.

The curved surface of the cone is made from a sector of a circle.

Work out the angle of the sector.

(5 marks)

Answer _____

- 17 A solid sphere has radius r . A solid cone has base radius r and vertical height h .

The volume of the cone is equal to the volume of the sphere.

- Show that $h = 4r$.
- Find the ratio of the curved surface area of the cone to the surface area of the sphere.
Give your answer in the form $\sqrt{k} : m$.

(6 marks)

Answer _____

- 18 A flower pot is in the shape of a frustum. The diagram shows its cross-section. The top is a circle of radius 9 cm, the bottom is a circle of radius 3 cm and the height is 8 cm.

The pot is a frustum, so it is a large cone with a small cone cut off the bottom.

- Show that the cone that was cut off has height 4 cm.
- Work out the volume of the pot. Give your answer correct to 3 significant figures.

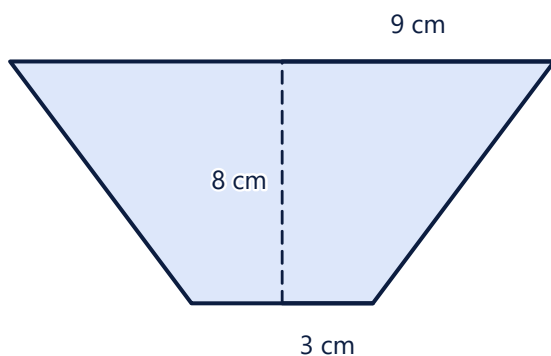


Diagram NOT accurately drawn

(4 marks)

Answer _____

19

A toy is made from a solid cylinder of wood with a solid hemisphere of plastic stuck on top. The diagram shows its cross-section. The cylinder and the hemisphere both have radius 4 cm. The cylinder has height 10 cm.

The wood has density 0.6 g/cm^3 . The plastic has density 1.2 g/cm^3 .

Work out the average density of the whole toy. Give your answer in g/cm^3 correct to 3 significant figures.

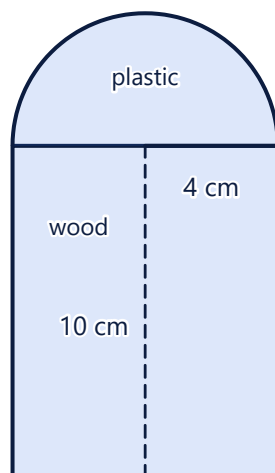


Diagram NOT accurately drawn

(5 marks)

Answer _____

End of questions | Total 78 marks