The diagram shows a solid shape made from a cone on top of a cylinder.
The cone has a radius of 10 cm and a height of 10 cm.
The cylinder has a radius of 10 cm and a height of 10 cm.
The centre of the base of the cone coincides with the centre of the top face of the cylinder.

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

Show that $A = (300 + 100\sqrt{2})\pi$
15. A solid is made from a cylinder and a hemisphere. The cylinder has radius 1.5 cm and height 4 cm. The hemisphere has radius 1.5 cm.

Diagram NOT accurately drawn

Work out the total volume of the solid. Give your answer correct to 3 significant figures.
19. A cone has slant height 4 cm and base radius $r$ cm.

The total surface area of the cone is $\frac{33}{4} \pi$ cm$^2$.

Calculate the value of $r$. 

Diagram NOT accurately drawn
16. A solid cone, $P$, has a base radius of 4 cm and a slant height of 9 cm.

(a) Calculate the total surface area of the cone.
Give your answer correct to 3 significant figures.

Another solid cone, $Q$, is similar to $P$.
The base radius of $Q$ is 6 cm.
The volume of $Q$ is $k$ times the volume of $P$.

(b) Calculate the value of $k$. 

Diagram NOT accurately drawn
Cone Cylinders Spheres IGCSE Higher Tier Exam Questions

Nov 2007 4H Paper

26.

The diagram shows a solid made from a cone and a cylinder.
The cylinder has radius \( r \) and height \( r \).
The cone has base radius \( r \) and height \( r \).

(a) Show that the total volume of the solid is equal to the volume of a sphere of radius \( r \).

The curved surface area of a cylinder with base radius \( r \) and height \( h \) is \( 2\pi rh \).
The curved surface area of a cone with base radius \( r \) and slant height \( l \) is \( \pi rl \).

(b) Show that the total surface area of the above solid is greater than the surface area of a sphere of radius \( r \).

June 2007 3H Paper

7. A tunnel is 38.5 km long.

(a) A train travels the 38.5 km in 21 minutes.

Work out the average speed of the train.
Give your answer in km/h.

(b) To make the tunnel, a cylindrical hole 38.5 km long was drilled.
The radius of the cylindrical hole was 4.19 m.

Work out the volume of earth, in m\(^3\), which was removed to make the hole.
Give your answer correct to 3 significant figures.
A solid cylinder has a diameter of 9.4 cm and a height of 8.3 cm.

Work out the volume of the cylinder.
Give your answer correct to 3 significant figures.
A cylindrical tank has a radius of 30 cm and a height of 45 cm. The tank contains water to a depth of 36 cm.

A metal sphere is dropped into the water and is completely covered. The water level rises by 5 cm.

Calculate the radius of the sphere.
Nov 2005 3H Paper

18. The outer diameter of a hollow spherical ball is 10 cm. The ball is made from rubber which is 0.4 cm thick.

Calculate the volume of rubber needed to make the ball. Give your answer correct to 3 significant figures.

May 2005 4H Paper

9. The formula for the curved surface area, $A$, of a cylinder is

$$A = 2\pi rh$$

where $r$ is the radius and $h$ is the height.

Calculate the value of $r$ when $A = 19.8$ and $h = 2.1$.
Give your answer correct to one decimal place.
14. Oil is stored in either small drums or large drums.
The shapes of the drums are mathematically similar.

A small drum has a volume of 0.006 m³ and a surface area of 0.2 m².

The height of a large drum is 3 times the height of a small drum.

(a) Calculate the volume of a large drum.

(b) The cost of making a drum is $1.20 for each m² of surface area.
A company wants to store 3240 m³ of oil in large drums.
Calculate the cost of making enough large drums to store this oil.
20. The diagram shows a solid cone.
The radius of its base is 3.7 cm and the slant height is 8.3 cm.

(a) Calculate the total surface area of the cone.
   Give your answer correct to 3 significant figures.

(b) Calculate the volume of the cone.
   Give your answer correct to 3 significant figures.
Two solid spheres, each of radius \( r \) cm, fit exactly inside a hollow cylinder. The radius of the cylinder is \( r \) cm. The height of the cylinder is equal to \( 4r \) cm.

The volume of the space inside the cylinder, not occupied by the spheres, is \( \frac{125}{6} \pi \) cm\(^3\).

Calculate the value of \( r \).

Show your working clearly.
The diagram shows a solid cylinder and a solid sphere.
The cylinder has radius \( r \).
The sphere has radius \( r \).

**Given that** \[
\frac{\text{Total surface area of cylinder}}{\text{Surface area of sphere}} = 2
\]

**find the value of** \[
\frac{\text{Volume of cylinder}}{\text{Volume of sphere}}
\]
A cylinder has a diameter of 15 cm and a height of 26 cm.

Work out the volume of the cylinder.
Give your answer correct to 3 significant figures.
Jan 2012 4H Paper

20

Diagram NOT accurately drawn

A solid cone has a slant height of 9 cm. The curved surface area of the cone is 100 cm².

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

May 2013 3H Paper

8

Diagram NOT accurately drawn

A solid cylinder has a radius of 5.1 cm and a height of 3.7 cm.

Work out the total surface area of the cylinder.
Give your answer correct to 3 significant figures.
May 2013 4HR Paper

19

The diagram shows a shape made from a solid cylinder and a solid hemisphere. The cylinder has a radius of 3.4 cm and a length of 8.3 cm. The hemisphere has a radius of 3.4 cm.

Calculate the total surface area of the solid shape. Give your answer correct to 3 significant figures.

May 2014 3HR Paper

9 A cylinder has diameter 12 cm and length 30 cm.

Work out the curved surface area of the cylinder. Give your answer correct to 3 significant figures.
20 The diagram shows a solid cone.

The diameter of the base of the cone is $10a$ cm.
The height of the cone is $12a$ cm.

The total surface area of the cone is $360\pi$ cm$^2$
The volume of the cone is $k\pi$ cm$^3$, where $k$ is an integer.

Find the value of $k$. 

Diagram NOT accurately drawn
A solid cone has a height of 15 cm. 
The volume of the cone is $320\pi$ cm$^3$ 

Work out the curved surface area of the cone. 
Give your answer correct to 3 significant figures.

May 2014 4H Paper

A sphere has a surface area of $81\pi$ cm$^2$.

Work out the volume of the sphere. 
Give your answer correct to 3 significant figures.
The diagram shows a hemisphere with a diameter of 18.6 cm.

Work out the volume of the hemisphere.
Give your answer correct to 3 significant figures.
21 The diagram shows a cylinder and a sphere.

Diagram NOT accurately drawn

The cylinder has radius $r$ cm and height $h$ cm.
The sphere has radius $2r$ cm.

The volume of the cylinder is equal to the volume of the sphere.
Find an expression for $h$ in terms of $r$.
Give your answer in its simplest form.
A solid cylinder has radius 3.5 cm and height 8.2 cm.
Work out the total surface area of the cylinder.
Give your answer correct to 3 significant figures.

The cone has height $h$ cm.
The radius of the base of the cone is 3 times the radius of the sphere.

Given that the volume of the sphere is equal to the volume of the cone,
find an expression for the radius of the sphere in terms of $h$.
Give your expression in its simplest form.
The diagram shows a cylinder inside a cone on a horizontal base.
The cone and the cylinder have the same vertical axis.
The base of the cylinder lies on the base of the cone.
The circumference of the top face of the cylinder touches the curved surface of the cone.

The height of the cone is 12cm and the radius of the base of the cone is 4cm.

(a) Work out the curved surface area of the cone.
   Give your answer correct to 3 significant figures.

The cylinder has radius $r$ cm and volume $V$ cm$^3$

(b) Show that $V = 12\pi r^2 - 3\pi r^3$

(c) $V = 12\pi r^2 - 3\pi r^3$
   Find the value of $r$ for which $V$ is a maximum.
A solid cylinder has a diameter of 4.3 cm and a height of 7.6 cm.

Work out the volume of the cylinder.
Give your answer correct to 3 significant figures.
A Maxicool consists of a cone full of ice cream with a hemisphere of ice cream on top. The radius of the hemisphere is 3 cm. The radius of the base of the cone is 3 cm. The height of the cone is 10 cm.

Calculate the total volume of ice cream in a Maxicool. Give your answer correct to 3 significant figures.