1

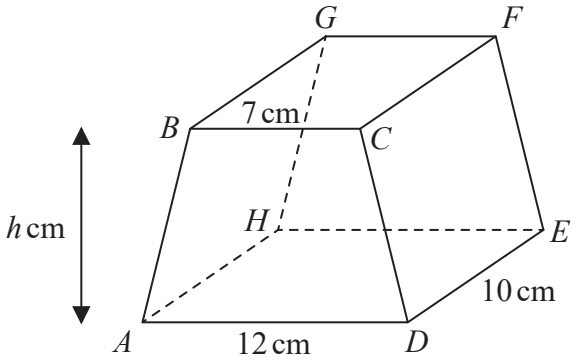


Diagram **NOT** accurately drawn

The diagram shows a prism *ABCDEFGH* in which *ABCD* is a trapezium with *BC* parallel to *AD* and *CDEF* is a rectangle.

BC = 7 cm *AD* = 12 cm *DE* = 10 cm

The height of trapezium *ABCD* is *h* cm
The volume of the prism is 608 cm^3

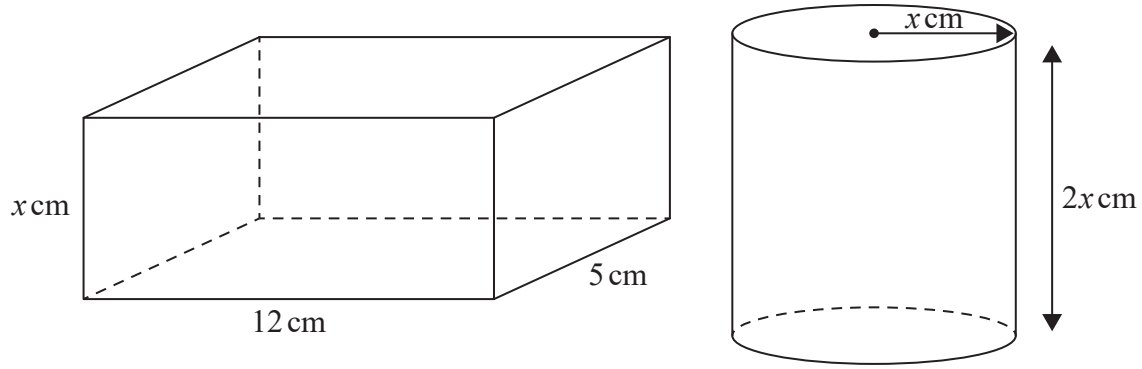
Work out the value of *h*.

h = ...

(Total for Question 1 is 3 marks)

2 The diagram shows a cuboid and a cylinder.

Diagram **NOT** accurately drawn



The dimensions of the cuboid are x cm by 12 cm by 5 cm.
The volume of the cuboid is 270 cm^3

The radius of the cylinder is x cm.
The height of the cylinder is $2x$ cm.

(a) Work out the volume of the cylinder.
Give your answer correct to the nearest whole number.

..... cm^3

(3)

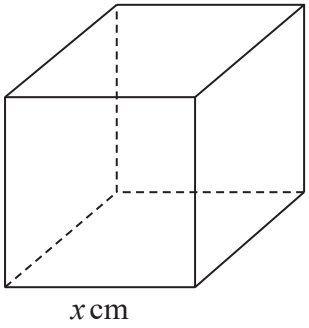
(b) Change 1 m^3 to cm^3

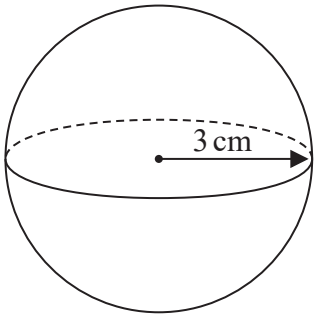
..... cm^3

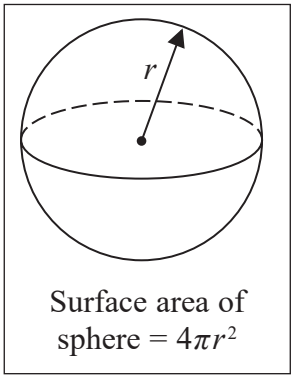
(1)

(Total for Question 2 is 4 marks)

3 The diagram shows a cube with edges of length x cm and a sphere of radius 3 cm.







The surface area of the cube is equal to the surface area of the sphere.

Show that $x = \sqrt{k\pi}$ where k is an integer.

(Total for Question 3 is 4 marks)

4 The diagram shows a solid cylinder with radius 3 m.

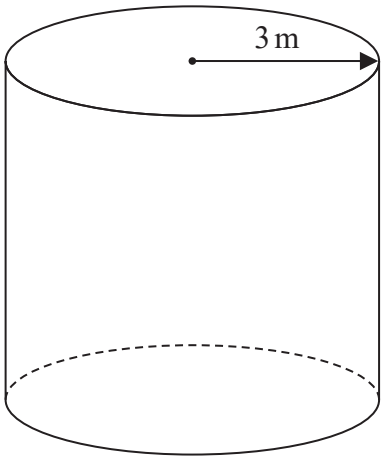


Diagram **NOT** accurately drawn

The volume of the cylinder is 72π m^3

Calculate the **total** surface area of the cylinder.
Give your answer correct to 3 significant figures.

.....m^2

(Total for Question 4 is 5 marks)

5

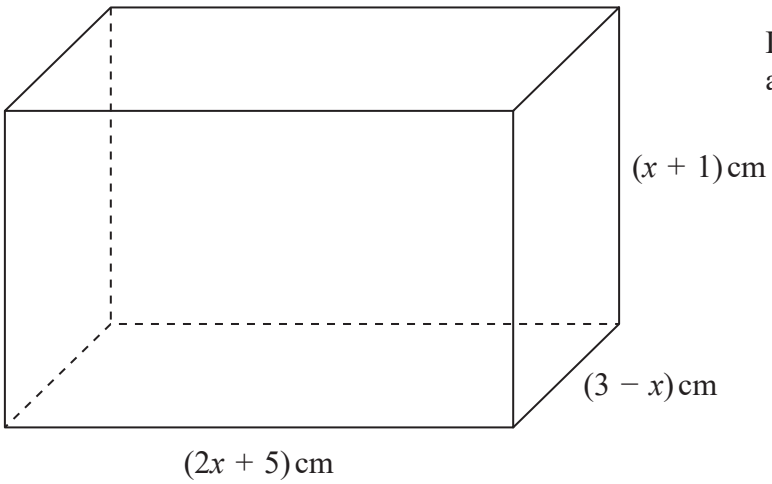


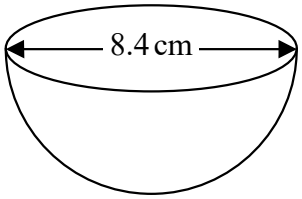
Diagram **NOT** accurately drawn

The diagram shows a cuboid of volume $V\,\text{cm}^3$

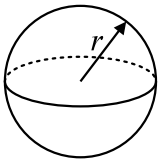
Show that $V = 15 + 16x - x^2 - 2x^3$

(Total for Question 5 is 3 marks)

6 The diagram shows a hemisphere with diameter 8.4 cm.



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

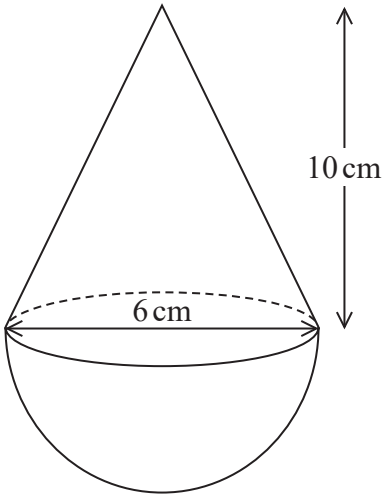


Work out the volume of the hemisphere.
Give your answer correct to 3 significant figures.

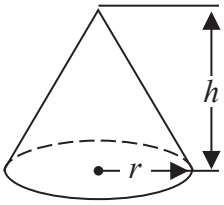
..... cm^3

(Total for Question 6 is 2 marks)

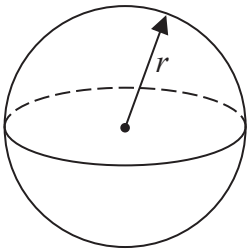
7 The diagram shows a solid shape.
The shape is a cone on top of a hemisphere.



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



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



The height of the cone is 10 cm.
The base of the cone has a diameter of 6 cm.
The hemisphere has a diameter of 6 cm.

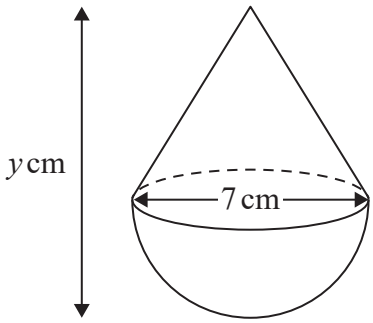
The total volume of the shape is $k\pi$ cm^3, where k is an integer.

Work out the value of k.

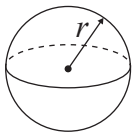
$k =$ .....

(Total for Question 7 is 4 marks)

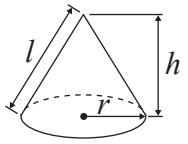
8 A solid cone is joined to a solid hemisphere to make the solid **T** shown below.



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



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



The diameter of the base of the cone is 7 cm.
The diameter of the hemisphere is 7 cm.

The total volume of **T** is 120π cm^3
The total height of **T** is y cm.

(a) Calculate the value of y.
Give your answer correct to 3 significant figures.

$y =$ .....

(4)

The diameter of the base of the cone and the diameter of the hemisphere are both increased by the same amount.
Assuming the total volume of **T** does not change,

(b) explain the effect this would have on your answer to part (a).

.....

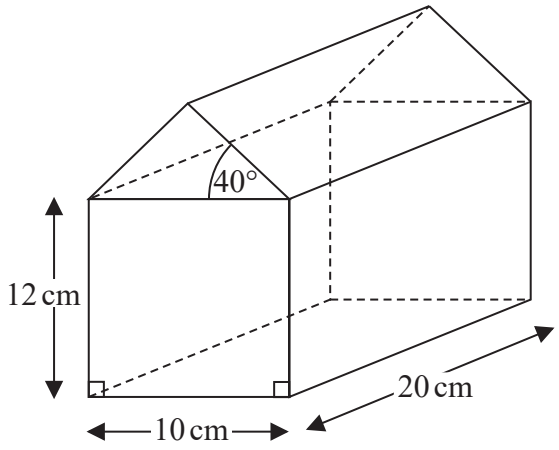
.....

.....

(1)

(Total for Question 8 is 5 marks)

9 The diagram shows a prism.



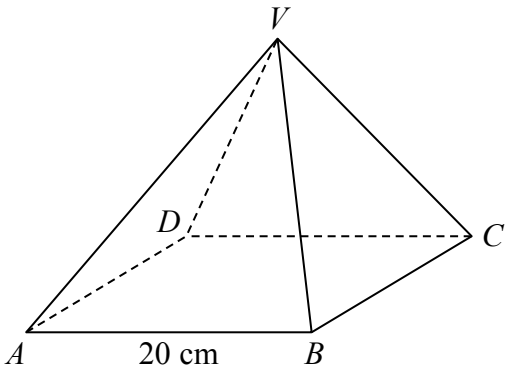
The cross section of the prism has exactly one line of symmetry.

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

..... cm^3

(Total for Question 9 is 5 marks)

10 *VABCD* is a solid pyramid.



ABCD is a square of side 20 cm.

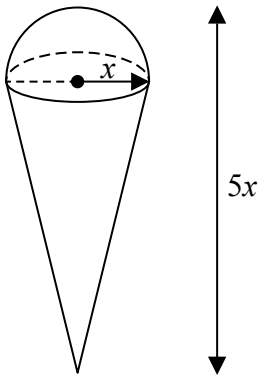
The angle between any sloping edge and the plane *ABCD* is 55°

Calculate the surface area of the pyramid.
Give your answer correct to 2 significant figures.

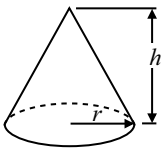
.....cm^2

(Total for Question 10 is 5 marks)

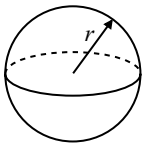
11 A solid is made by putting a hemisphere on top of a cone.



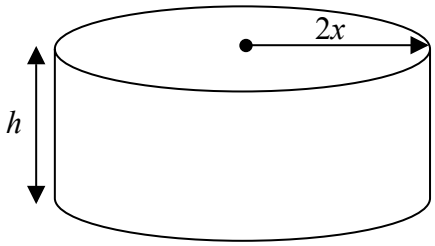
Volume of cone = $\frac{1}{3}\pi r^2 h$



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



The total height of the solid is $5x$
The radius of the base of the cone is x
The radius of the hemisphere is x



A cylinder has the same volume as the solid.
The cylinder has radius $2x$ and height h
All measurements are in centimetres.

Find a formula for h in terms of x
Give your answer in its simplest form.

.....

(Total for Question 11 is 5 marks)

12 Here are a solid sphere and a solid cylinder.

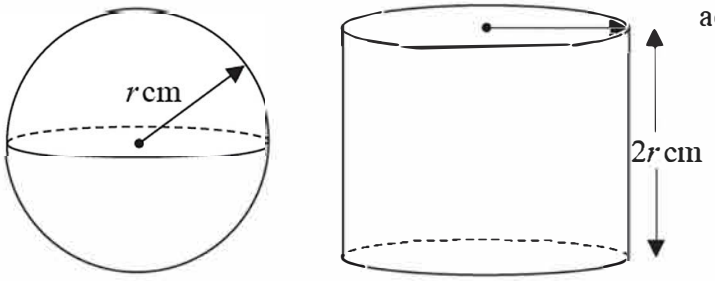


Diagram **NOT** accurately drawn

The radius of the sphere is r cm.
The radius of the cylinder is r cm.
The height of the cylinder is $2r$ cm.

The total surface area of the cylinder is $k\pi$ cm^2

(a) Find an expression for k in terms of r.

(2)

(b) Show that the ratio

total surface area of the cylinder : total surface area of the sphere

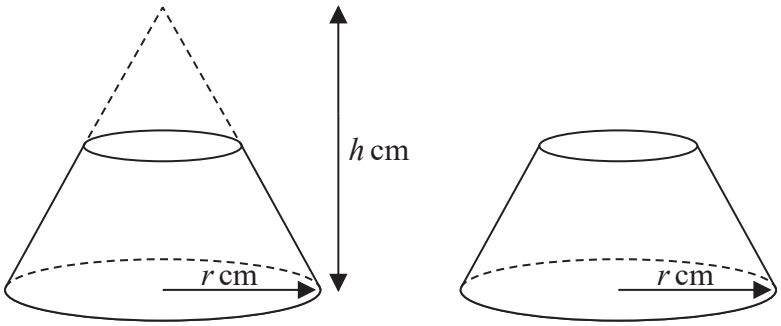
is the same as the ratio

volume of the cylinder : volume of the sphere

(3)

(Total for Question 12 is 5 marks)

13 A frustum is made by removing a small cone from a large cone.
The cones are mathematically similar.



Frustum

Diagram **NOT** accurately drawn

The large cone has base radius r cm and height h cm.

Given that

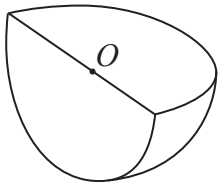
$$\frac{\text{volume of frustum}}{\text{volume of large cone}} = \frac{98}{125}$$

find an expression, in terms of h, for the height of the frustum.

..... cm

(Total for Question 13 is 4 marks)

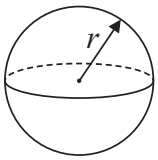
14 Shape **S** is one quarter of a solid sphere, centre O.



Shape **S**

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

Surface area of sphere $= 4\pi r^2$



The volume of **S** is 576π cm^3

Find the surface area of **S**.
Give your answer correct to 3 significant figures.
You must show your working.

..... cm^2

(Total for Question 14 is 5 marks)