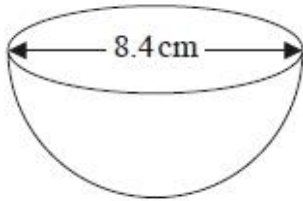


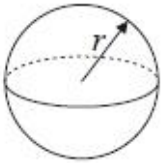
G095 Cones, pyramids and spheres

Q1.

The diagram shows a hemisphere with diameter 8.4 cm.



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

A diagram of a sphere. A horizontal line with arrows at both ends passes through the center of the sphere. A radius line is drawn from the center to the top surface of the sphere, labeled with the letter 'r'.

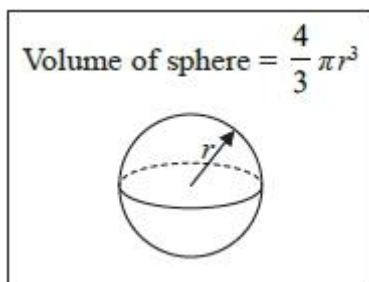
Work out the volume of the hemisphere.
Give your answer correct to 3 significant figures.

..... cm³

(Total for question = 2 marks)

Q2.

Jan has some metal that she is going to make into solid metal spheres.



Each sphere will have a radius of 2.15 cm.

Jan has 1490 cm³ of metal.

(a) Work out an estimate for the number of spheres that Jan can make.

.....

(3)

(b) If you calculate the number of spheres accurately, how do you think your answer to part (a) will change?

Give a reason for your answer.

.....
.....
.....

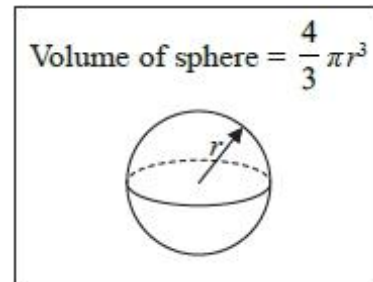
(1)

(Total for question = 4 marks)

Q3.

* Anne wants to fill 12 hanging baskets with compost.

Each hanging basket is a hemisphere of diameter 40 cm.



Anne has 4 bags of compost.

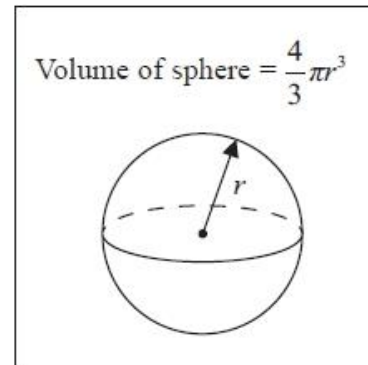
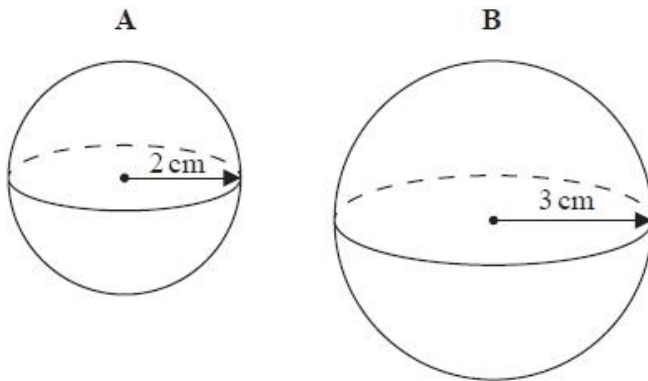
There are 50 litres of compost in each bag.

Has Anne got enough compost to fill the 12 hanging baskets?

(Total for question = 4 marks)

Q4.

Here are two solid spheres, **A** and **B**.



Sphere **A** is made of gold.
Sphere **B** is made of silver.

Sphere **A** has radius 2 cm.
Sphere **B** has radius 3 cm.

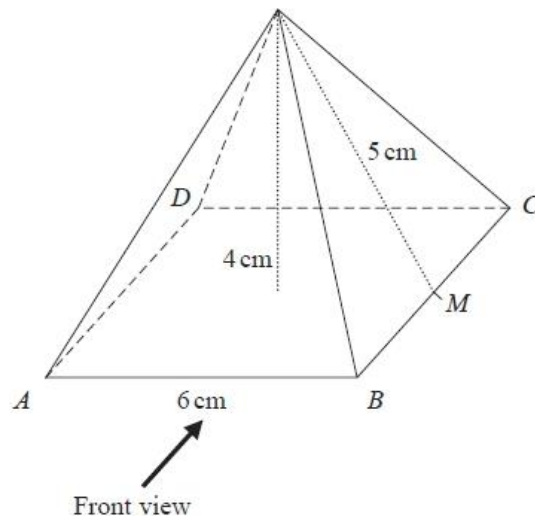
Gold has a density of 19 000 kg/m³
Silver has a density of 10 000 kg/m³

Which sphere has the greater mass?
You must show how you get your answer.

(Total for question = 4 marks)

Q5.

Here is a solid square-based pyramid, $VABCD$.



The base of the pyramid is a square of side 6 cm.

The height of the pyramid is 4 cm. M is the midpoint of BC and $VM = 5$

(a) Draw an accurate front elevation of the pyramid, assume below is a cm grid.



(2)

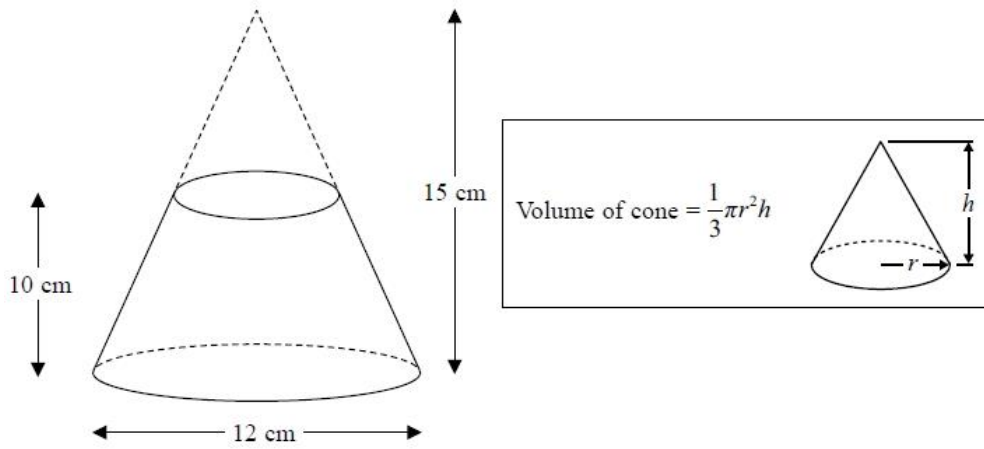
(b) Work out the total surface area of the pyramid.

.....
(4)

(Total for question = 6 marks)

Q6.

A frustum is made by removing a small cone from a large cone as shown in the diagram.



The frustum is made from glass.
The glass has a density of 2.5 g / cm^3

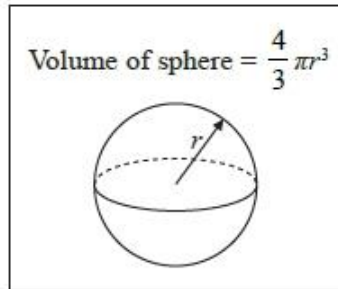
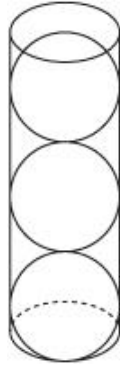
Work out the mass of the frustum.
Give your answer to an appropriate degree of accuracy.

..... 9

(Total for question = 5 marks)

Q7.

A hollow cylinder has radius r cm and height $6r$ cm.
3 spheres, also of radius r cm, are put into the cylinder.



(a) Work out the proportion of the cylinder that is **not** filled by the spheres.

.....
(3)

The height of the cylinder is increased by $2r$ cm.
Another sphere of radius r cm is put into the cylinder.

Malcolm says,

"There is no change in the proportion of the cylinder **not** filled by the spheres."

(b) Is Malcolm correct?

Justify your answer.

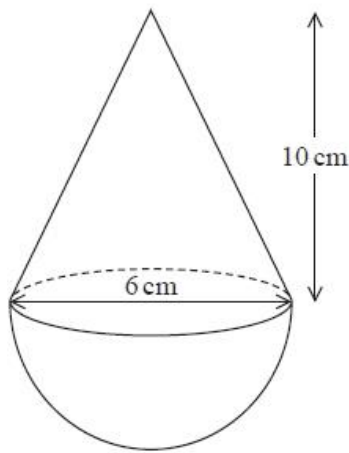
.....
.....

(1)

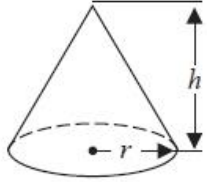
(Total for question = 4 marks)

Q8.

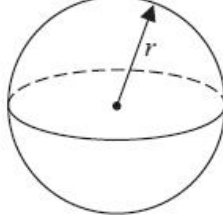
The diagram shows a solid shape.
The shape is a cone on top of a hemisphere.



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 $k\pi \text{ cm}^3$, where k is an integer.

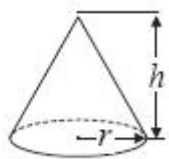
Work out the value of k .

$k = \dots\dots\dots$

(Total for question = 4 marks)

Q9.

A cone has a volume of 98 cm^3 .
The radius of the cone is 5.13 cm .

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

(a) Work out an estimate for the height of the cone.

..... cm

(3)

John uses a calculator to work out the height of the cone to 2 decimal places.

(b) Will your estimate be more than John's answer or less than John's answer?

Give reasons for your answer.

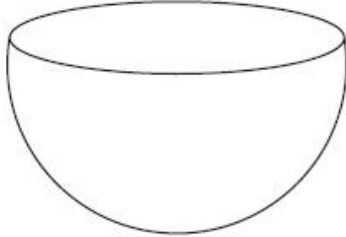
.....
.....
.....

(1)

(Total for question = 4 marks)

Q10.

The diagram shows a solid hemisphere.



Volume of sphere = $\frac{4}{3}\pi r^3$
Surface area of sphere = $4\pi r^2$

The volume of the hemisphere is $\frac{250}{3}\pi$

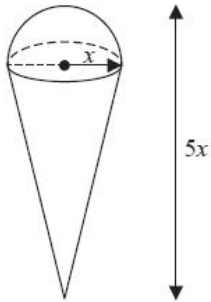
Work out the exact total surface area of the solid hemisphere.
Give your answer as a multiple of π .

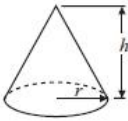
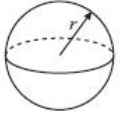
..... cm²

(Total for question is 4 marks)

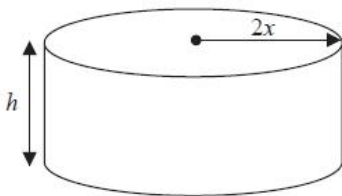
Q11.

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

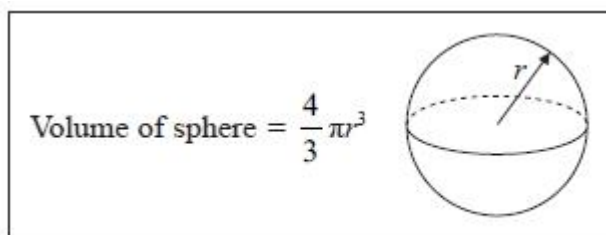
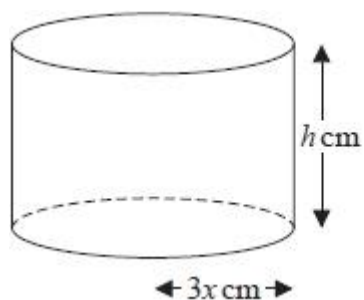


A cylinder has the same volume as the solid.
The cylinder has radius $2x$ and height h
All measurements are in centimetres.
Find a formula for h in terms of x
Give your answer in its simplest form.

.....
(Total for question = 5 marks)

Q12.

The diagram shows a solid metal cylinder.



The cylinder has base radius $3x$ cm and height h cm.

The metal cylinder is melted.

All the metal is then used to make 270 spheres.

Each sphere has a radius of $\frac{1}{2}x$ cm.

Find an expression, in its simplest form, for h in terms of x .

.....
(Total for question = 3 marks)