SQA Past paper questions

FORMULAE LIST

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

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

Volume of a pyramid: $V = \frac{1}{3}Ah$

There are five main ways that this topic could be assessed in the final exam.

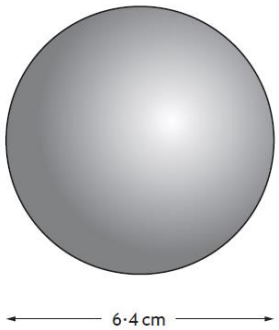
1. "Easy paper 2" calculating a volume
2. Non-calculator calculating a volume
3. Composite volumes
4. Working backwards to find a height or radius when given the volume
5. Problem solving questions

And remember, the formulas are given to you on the formula sheet! (Except cylinder: $V = \pi r^2 h$)

1. "Easy paper 2" calculating a volume

2018 - Paper 2 - Question 7

A toy company makes juggling balls in the shape of a sphere with a diameter of 6·4 centimetres.



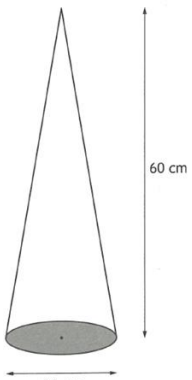
Calculate the volume of one juggling ball.
Give your answer correct to 2 significant figures. 3

Click here for video solution.

2. Non-calculator calculating a volume

2022 - Paper 1 - Question 3

The diagram below shows a cone with diameter 20 centimetres and height 60 centimetres.

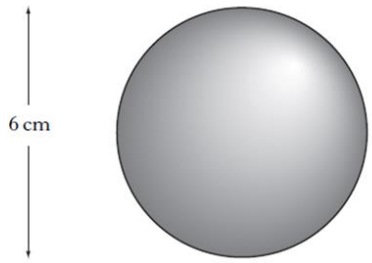


Calculate the volume of the cone.
Take $\pi = 3.14$. 2

Click here for video solution.

2010 - Paper 1 - Question 3

The diagram below represents a sphere.

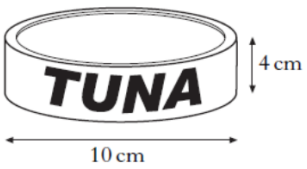


The sphere has a diameter of 6 centimetres.
Calculate its volume.
Take $\pi = 3{\cdot}14$. 2

Click here for video solution.

2007 - Paper 1 - Question 3

A tin of tuna is in the shape of a cylinder.

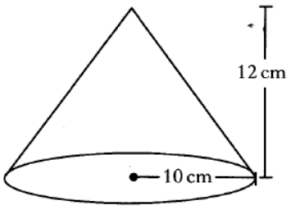


It has diameter 10 centimetres and height 4 centimetres.
Calculate its volume.
Take $\pi = 3{\cdot}14$.
2

Click here for video solution.

2003 - Paper 1 - Question 3

The diagram shows a cone.



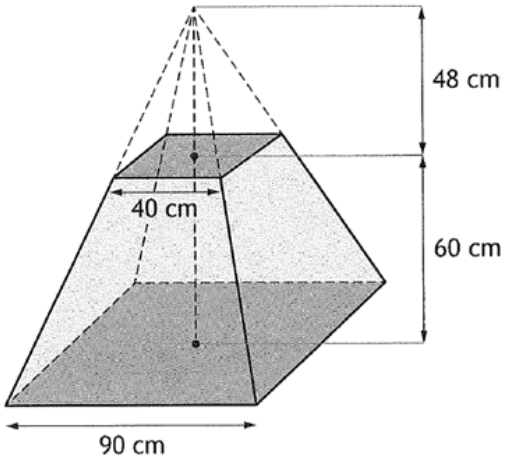
The height is 12 centimetres and the radius of the base 10 centimetres.
Calculate the volume of the cone.
Take $\pi = 3{\cdot}14$. 2

Click here for video solution.

3. Composite volumes

2023 - Paper 2 - Question 9

A concrete block is in the shape of a large pyramid with a small pyramid removed.



The large pyramid has a square base of length 90 centimetres.

The small pyramid has a square base of length 40 centimetres and a height of 48 centimetres.

The block has height 60 centimetres.

Calculate the volume of the block. 4

Click here for video solution.

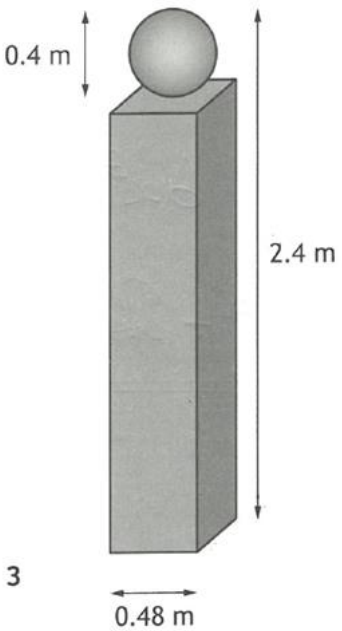
2022 - Paper 2 - Question 3

A concrete gatepost is made in the shape of a cuboid with a sphere on top.

The sphere has diameter 0.4 metres.

The cuboid has a square base of length 0.48 metres.

The total height of the gatepost is 2.4 metres.



Calculate the volume of concrete needed to make a gatepost. 3

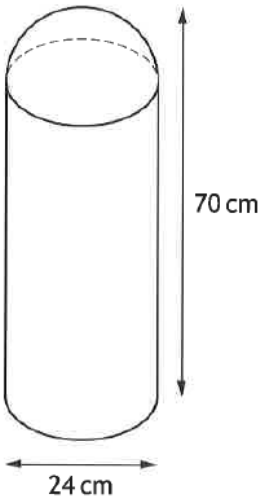
Click here for video solution.

2019 - Paper 2 - Question 8

A traffic bollard is in the shape of a cylinder with a hemisphere on top.

The bollard has

- diameter 24 centimetres
- height 70 centimetres.

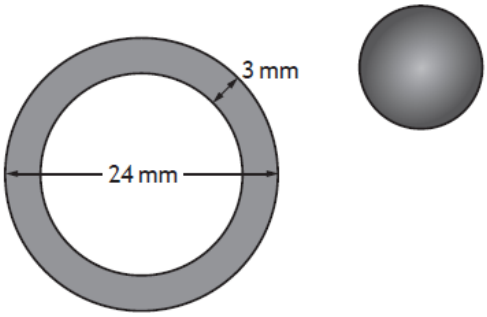


Calculate the volume of the bollard.
Give your answer correct to 3 significant figures. 5

Click here for video solution.

2017 - Paper 2 - Question 6

A spherical sweet is made by coating a caramel sphere evenly with chocolate.
A cross-section of the sweet is shown below.



The diameter of the sweet is 24 millimetres and the thickness of the chocolate coating is 3 millimetres.

Calculate the volume of the chocolate coating.
Give your answer correct to 3 significant figures. 5

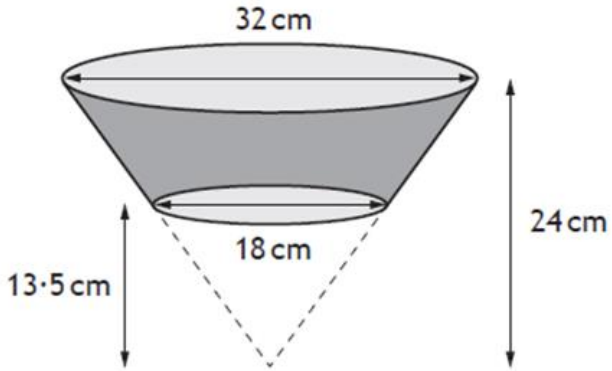
Click here for video solution.

2016 - Paper 2 - Question 7

A carton is in the shape of a large cone with a small cone removed.

The large cone has diameter of 32 cm and height 24 cm.

The small cone has diameter of 18 cm and height 13·5 cm.



Calculate the volume of the carton.

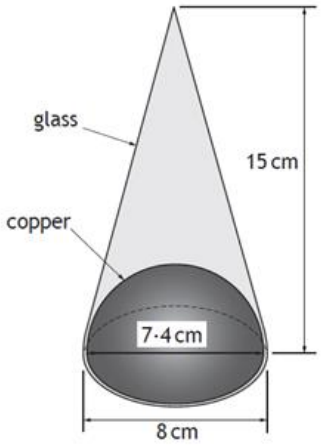
Give your answer correct to 2 significant figures. **5**

Click here for video solution.

2014 - Paper 2 - Question 7

An ornament is in the shape of a cone with diameter 8 centimetres and height 15 centimetres.

The bottom contains a hemisphere made of copper with diameter 7·4 centimetres. The rest is made of glass, as shown in the diagram below.



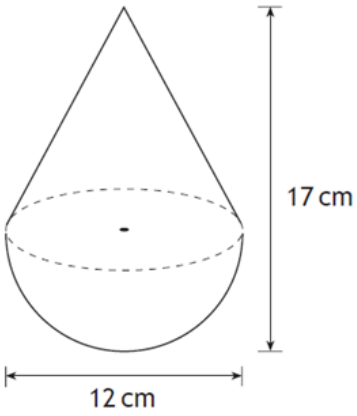
Calculate the volume of the glass part of the ornament.

Give your answer correct to 2 significant figures. **5**

Click here for video solution.

Specimen - Paper 2 - Question 6

A child's toy is in the shape of a hemisphere with a cone on top, as shown in the diagram.



The toy is 12 centimetres wide and 17 centimetres high.

Calculate the volume of the toy.

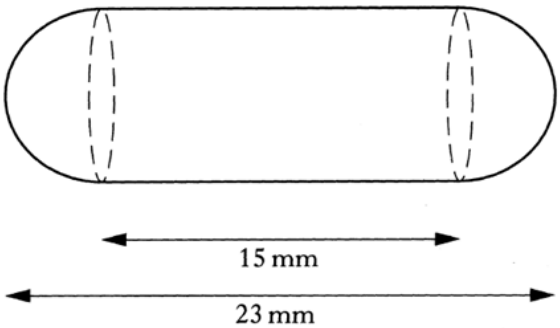
Give your answer correct to 2 significant figures. **5**

Click here for video solution.

2012 - Paper 2 - Question 3

A health food shop produces cod liver oil capsules for its customers.

Each capsule is in the shape of a cylinder with hemispherical ends as shown in the diagram below.



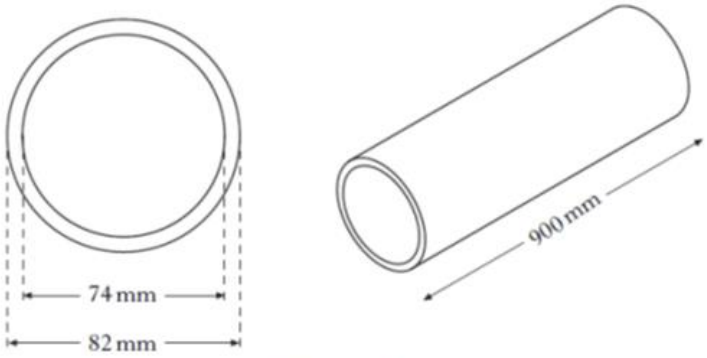
The total length of the capsule is 23 millimetres and the length of the cylinder is 15 millimetres.

Calculate the volume of one cod liver oil capsule. **4**

Click here for video solution.

2009 - Paper 2 - Question 3

A company manufactures aluminium tubes.
The cross-section of one of the tubes is shown in the diagram below.



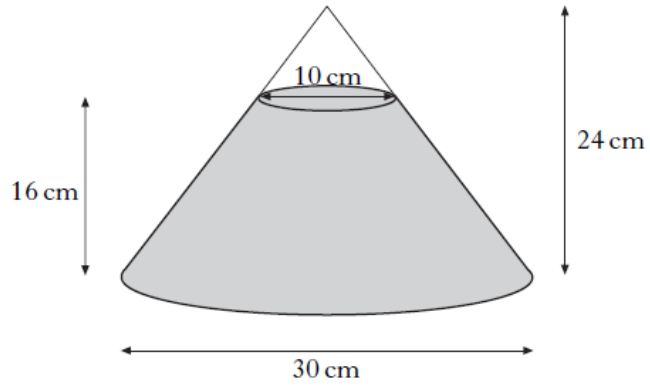
The inner diameter is 74 millimetres.
The outer diameter is 82 millimetres.
The tube is 900 millimetres long.

Calculate the volume of aluminium used to make the tube.
Give your answer correct to three significant figures. **5**

Click here for video solution.

2007 - Paper 2 - Question 5

A glass ornament in the shape of a cone is partly filled with coloured water.



The cone is 24 centimetres high and has a base of diameter 30 centimetres.
The water is 16 centimetres deep and measures 10 centimetres across the top.
What is the volume of the water?
Give your answer correct to 2 significant figures. **5**

Click here for video solution.

2006 - Paper 2 - Question 3

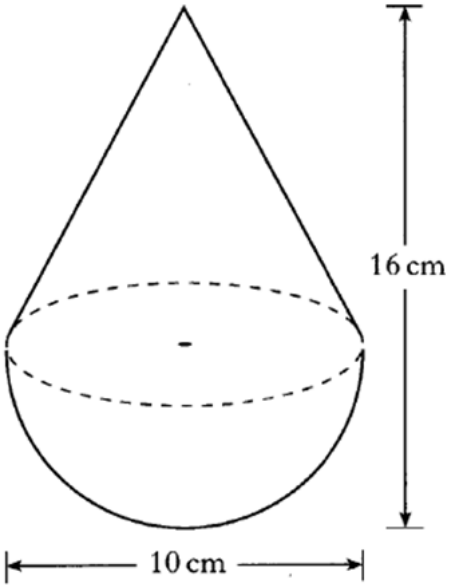
A child's toy is in the shape of a hemisphere with a cone on top, as shown in the diagram.

The toy is 10 centimetres wide and 16 centimetres high.

Calculate the volume of the toy.

Give your answer correct to 2 significant figures.

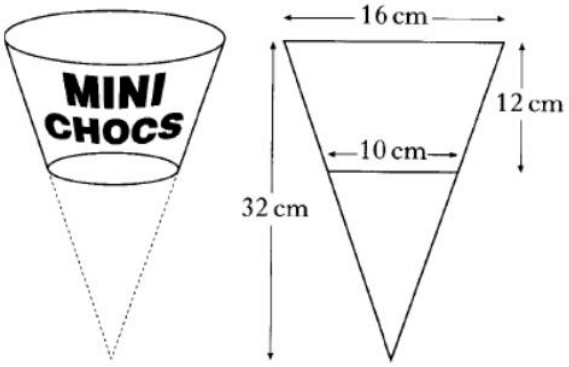
5



Click here for video solution.

2002 - Paper 2 - Question 6

A container to hold chocolates is in the shape of part of a cone with dimensions as shown below.



Calculate the volume of the container.

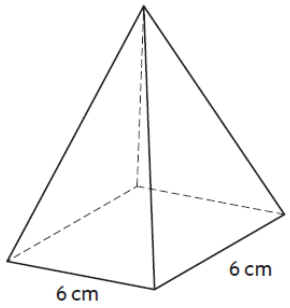
Give your answer correct to one significant figure. **5**

Click here for video solution.

4. Working backwards to find the height or radius

2018 - Paper 1 - Question 17

A square based pyramid is shown in the diagram below.



The square base has length 6 centimetres.

The volume is 138 cubic centimetres.

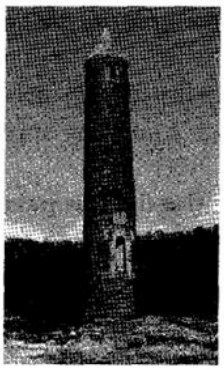
Calculate the height of the pyramid. 3

Click here for video solution.

2011 - Paper 2 - Question 3

The Battle of Largs in 1263 is commemorated by a monument known as The Pencil.

This monument is in the shape of a cylinder with a cone on top.



The cylinder part has diameter 3 metres and height 15 metres.

(*a*) Calculate the volume of the **cylinder** part of The Pencil. **2**

The volume of the **cone** part of The Pencil is 5·7 cubic metres.

(*b*) Calculate the **total** height of The Pencil. **3**

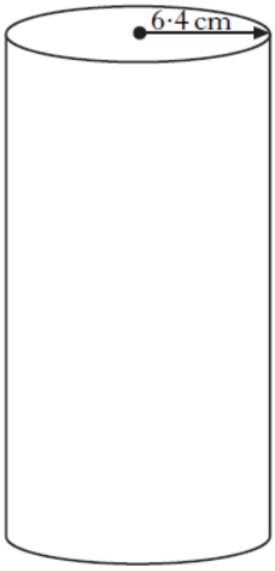
Click here for video solution.

2010 - Paper 2 - Question 3

A cylindrical container has a volume of 3260 cubic centimetres.

The radius of the cross section is 6·4 centimetres.

Calculate the height of the cylinder. 3



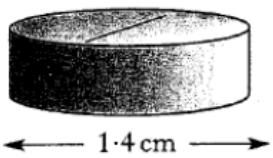
Click here for video solution.

2005 - Paper 2 - Question 7

A pharmaceutical company makes vitamin pills in the shape of spheres of radius 0·5 centimetres.

(a) Calculate the volume of **one** pill.
Give your answer correct to two significant figures. 3

The company decides to change the shape of each pill to a cylinder.



(b) The new pill has the **same** volume as the original and its diameter is 1·4 centimetres.
Calculate the height of the new pill. 3

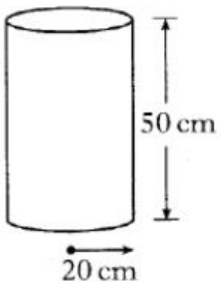
Click here for video solution.

2001 - Paper 2 - Question 6

A drinks container is in the shape of a cylinder with radius 20 centimetres and height 50 centimetres.

(*a*) Calculate the volume of the drinks container.

Give your answer in cubic centimetres, correct to two significant figures.



3

(*b*) Liquid from the full container can fill 800 cups, in the shape of cones, each of radius 3 centimetres.

What will be the height of liquid in each cup? **4**

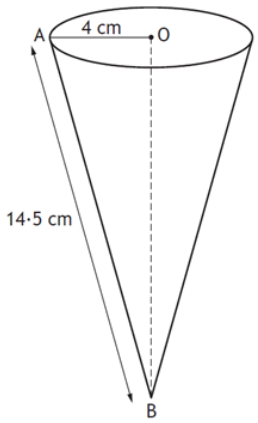
Click here for video solution.

5. Problem solving

2021 - Paper 2 - Question 11

The base of an ice cream cone has centre O and radius 4 centimetres.

The length of AB is 14·5 centimetres.



Calculate the volume of the cone.

Give your answer correct to 2 significant figures. **5**

Click here for video solution.

2015 - Paper 2 - Question 6

(a) The Earth is approximately spherical with a radius of 6400 kilometres.

Calculate the volume of the Earth giving your answer in scientific notation, correct to 2 significant figures. 3

(b) The approximate volume of the Moon is $2{\cdot}2 \times 10^{10}$ cubic kilometres.

Calculate how many times the Earth's volume is greater than the Moon's. 2

Click here for video solution.

2013 - Paper 2 - Question 7

A lead **cube**, of side 10 centimetres, is melted down.

During this process 8% of the metal is lost.

The remaining metal is then made into a **cone**, with radius 8 centimetres.

Calculate the height of this cone.

Give your answer correct to 2 significant figures. 5

Click here for video solution.