Firrhill High School

Mathematics Department

Level 5

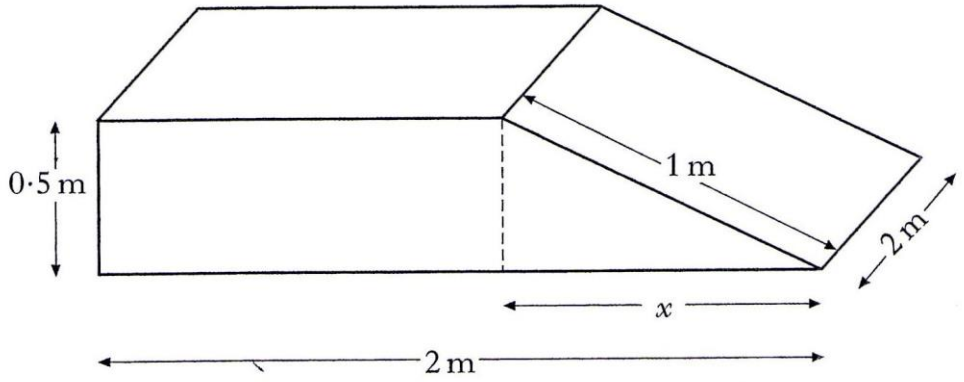
Assessment Questions

Volumes

(1) 2010 Paper 2 Q.5

A concrete ramp is to be built.

The ramp is in the shape of a cuboid and a triangular prism with dimensions as shown.

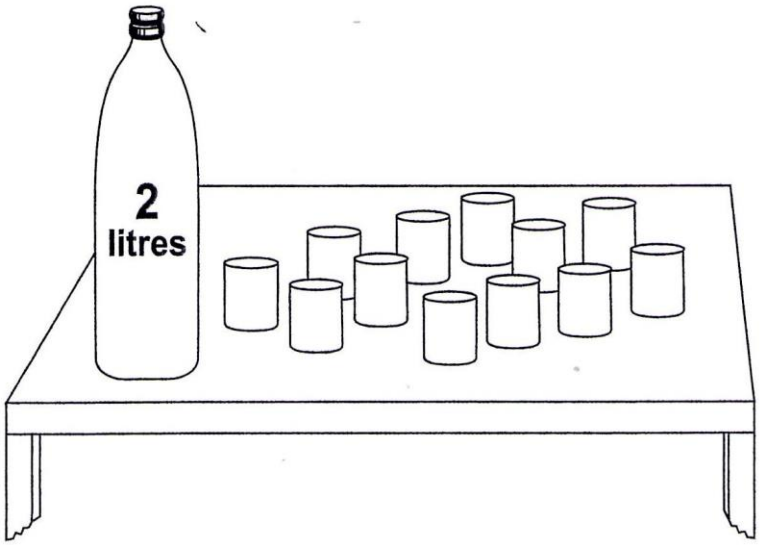


	KU	RE
(*a*) Calculate the value of x.		2
(*b*) Calculate the volume of concrete required to build the ramp.		3

(2) 2009 paper 2 Q.2

Lemonade is to be poured from a 2 litre bottle into glasses.

Each glass is in the shape of a cylinder of radius 3 centimetres and height 8 centimetres.

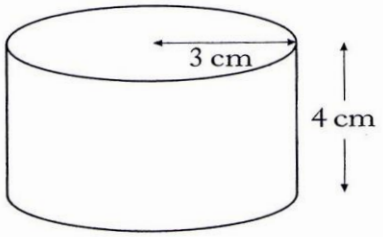


	KU	RE
How many full glasses can be poured from the bottle?		4

(3) 2007 Paper 2 Q.12

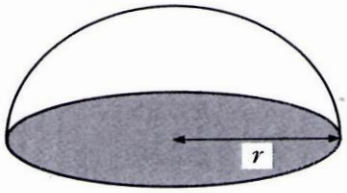
KU	RE

(*a*) A cylindrical paperweight of radius 3 centimetres and height 4 centimetres is filled with sand.



Calculate the volume of sand in the paperweight. **2**

(*b*) Another paperweight, in the shape of a hemisphere, is filled with sand.



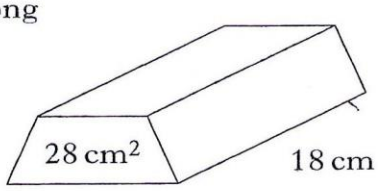
It contains the same volume of sand as the first paperweight.

Calculate the radius of the hemisphere.

[The volume of a hemisphere with radius r is given by the formula, $V = \frac{2}{3}\pi r^3$]. **3**

(4) 2006 Paper 2 Q.7

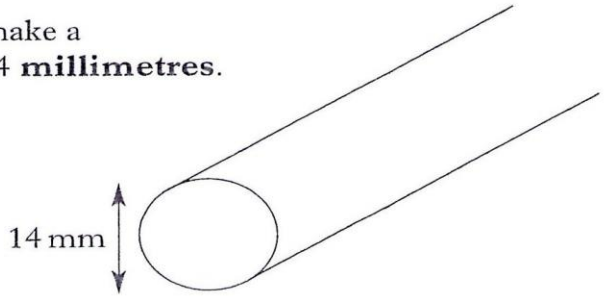
(*a*) A block of copper 18 centimetres long is prism shaped as shown.



The area of its cross section is 28 square centimetres.

Find the volume of the block. **1**

(*b*) The block is melted down to make a cylindrical cable of diameter 14 **millimetres**.

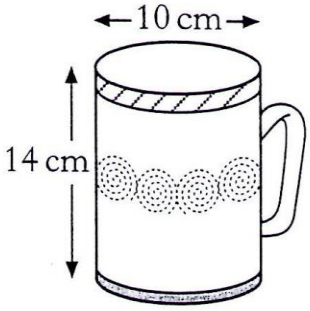


Calculate the length of the cable. **4**

(5) 2003 Paper 2 Q.4

KU	RE

A mug is in the shape of a cylinder with diameter 10 centimetres and height 14 centimetres.



(*a*) Calculate the volume of the mug. | 2 |

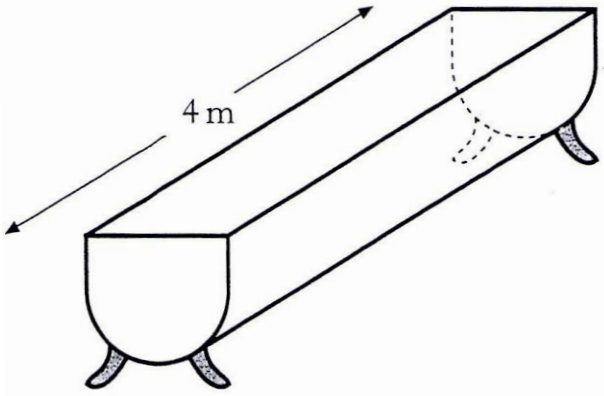
(*b*) 600 millilitres of coffee are poured in.

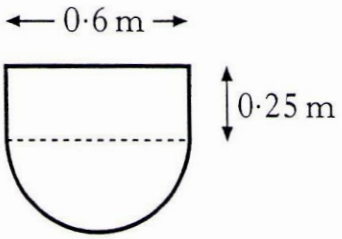
Calculate the depth of the coffee in the cup. | 3 |

(6) 2002 Paper 2 Q.5

A feeding trough, 4 metres long, is prism-shaped.

The uniform cross-section is made up of a rectangle and semi-circle as shown below.





Find the volume of the trough, **correct to 2 significant figures**. | 5 |

(7) 2001 Paper 2 Q.5

A cylindrical soft drinks can is 15 centimetres in height and 6·5 centimetres in diameter.

A new cylindrical can holds the same volume but has a reduced height of 12 centimetres.

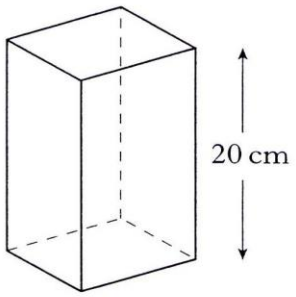
What is the diameter of the new can?

Give your answer **to 1 decimal place**.

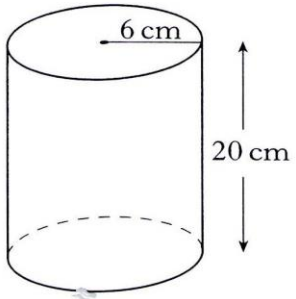
4

(8) 2000 Paper 2 Q.10

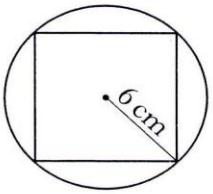
A glass vase, in the shape of a cuboid with a square base, is 20 centimetres high.



It is packed in a cardboard cylinder with radius 6 centimetres and height 20 centimetres.



The corners of the vase touch the inside of the cylinder as shown.



Show that the volume of the space between the vase and the cylinder is $720\,(\pi - 2)$ cubic centimetres.

5

(9) 1999 Paper 2 Q.7

A wooden toy box is prism-shaped as shown in figure 1.

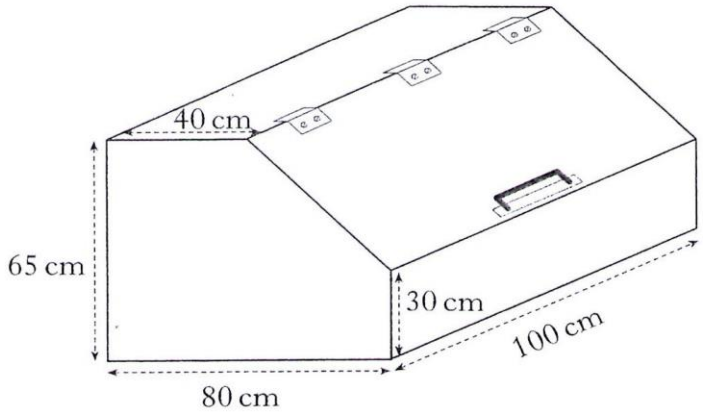


figure 1

The uniform cross-section of the box is shown in figure 2.

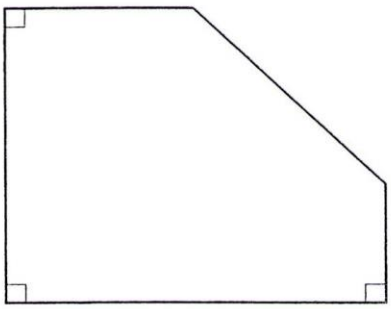


figure 2

Calculate the volume of the box in **cubic metres**. 4

(10) 1998 Paper 2 Q.2

A skip is prism shaped as shown in figure 1.

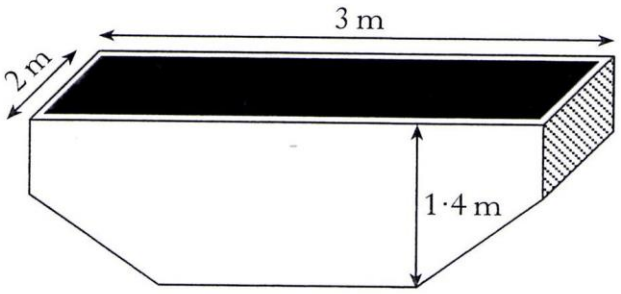


figure 1

The cross-section of the skip, with measurements in metres, is shown in figure 2.

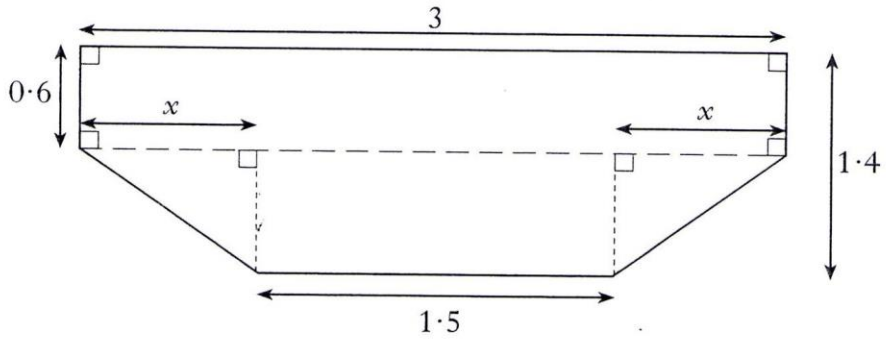


figure 2

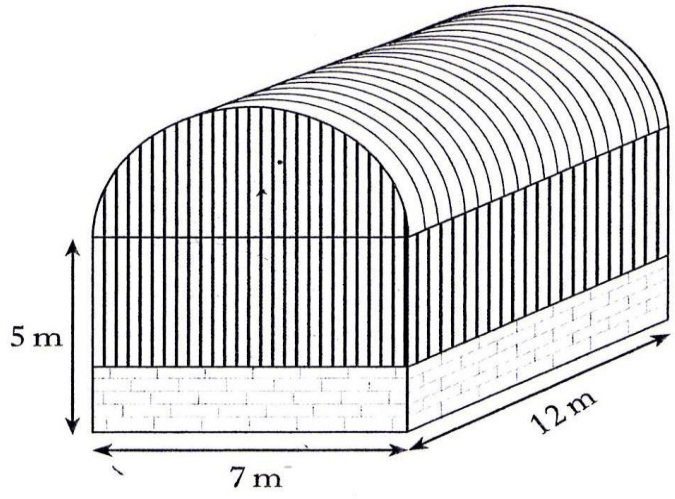
(*a*) Find the value of x. **1**

(*b*) Find the volume of the skip in cubic metres. **3**

(11) 1997 Q.2

KU	RA

A storage barn is prism shaped, as shown below.

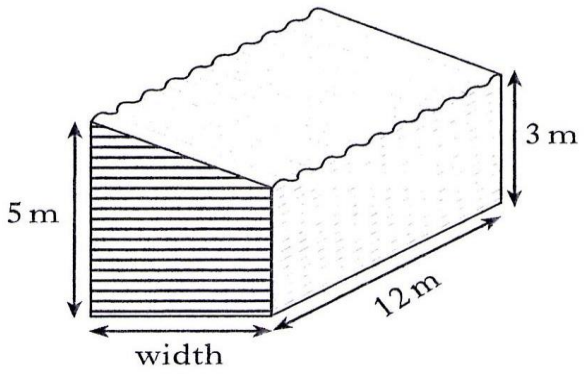


The cross-section of the storage barn consists of a rectangle measuring 7 metres by 5 metres and a semi-circle of radius 3·5 metres.

(*a*) Find the volume of the storage barn.

Give your answer in cubic metres, **correct to 2 significant figures**. 4

(*b*) An extension to the barn is planned to increase the volume by 200 cubic metres.

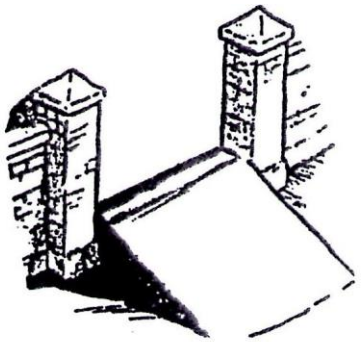


The uniform cross-section of the extension consists of a rectangle and a right-angled triangle.

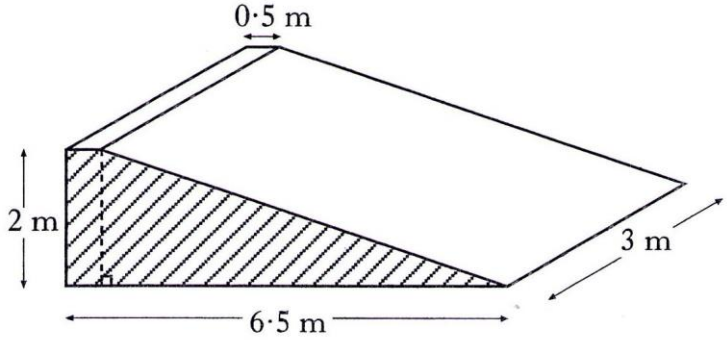
Find the width of the extension. 3

(12) 1996 Paper 2 Q.2

A ramp is being made from concrete.



The uniform cross-section of the ramp consists of a right-angled triangle and a rectangle as shaded in the diagram below.



Find the volume of concrete required to make the ramp. **2**

(13) 1994 Q.14

A bottle bank is prism shaped, as shown in figure 1.

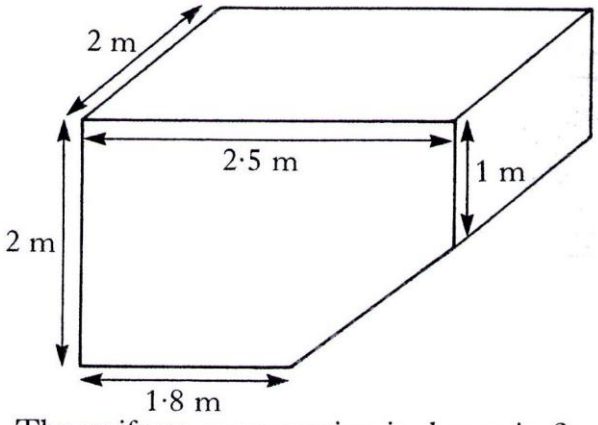


figure 1

The uniform cross-section is shown in figure 2.

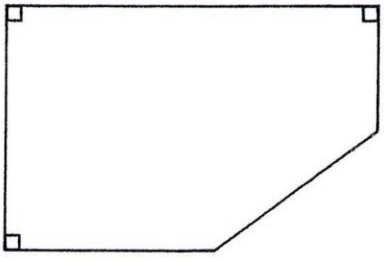


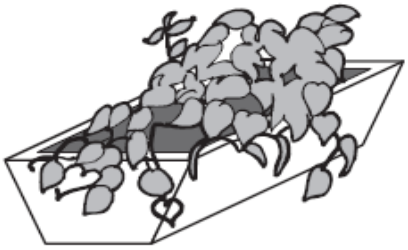
figure 2

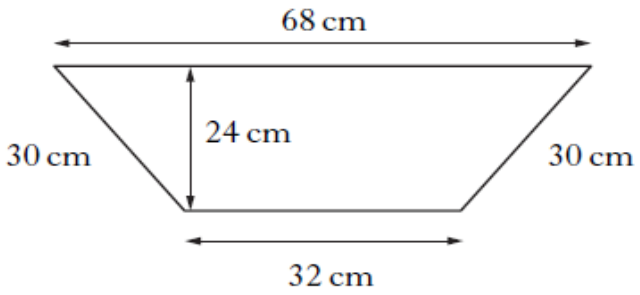
Find the volume of the bottle bank. **4**

(14) Question 9 2011 Credit Paper 2

A flower planter is in the shape of a prism.

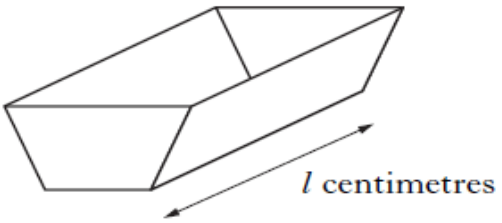
The cross-section is a trapezium with dimensions as shown.





(*a*) Calculate the area of the cross-section of the planter. **2**

(*b*) The volume of the planter is 156 litres.

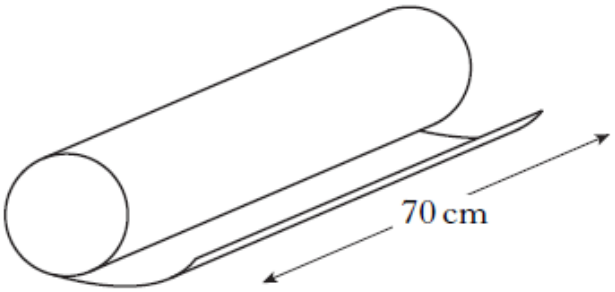


Calculate the length, *l* centimetres, of the planter. **3**

(15) Question 11 2011 Credit Paper 2

Paper is wrapped round a cardboard cylinder **exactly** 3 times.

The cylinder is 70 centimetres long.



The area of the paper is 3000 square centimetres.

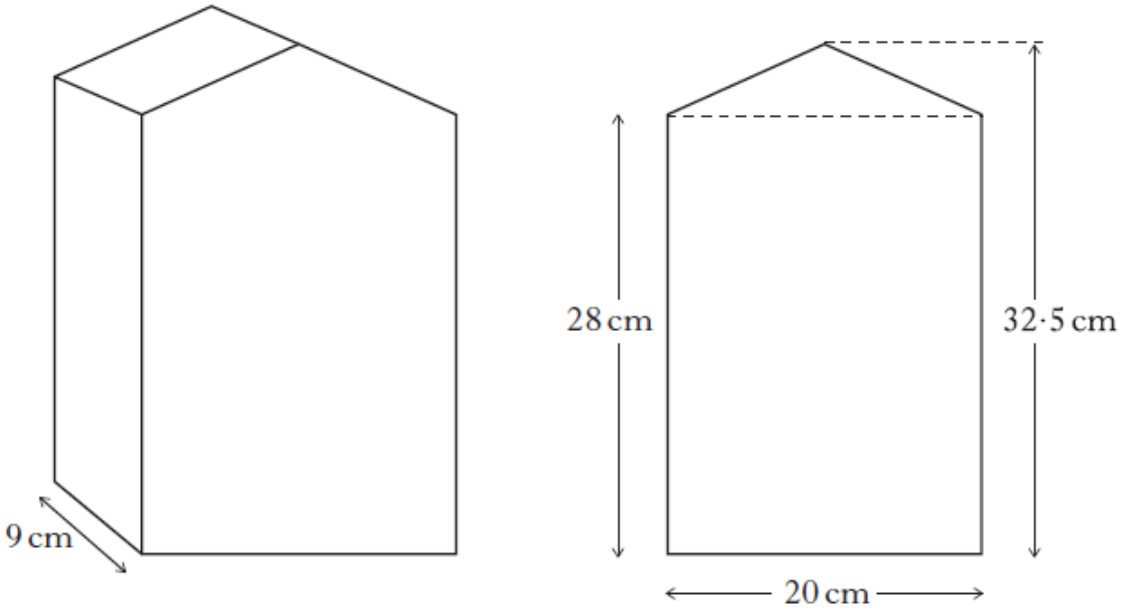
Calculate the diameter of the cylinder. **4**

(16) Question 3 Paper 2 2012 Credit

A container for oil is in the shape of a prism.

The width of the container is 9 centimetres.

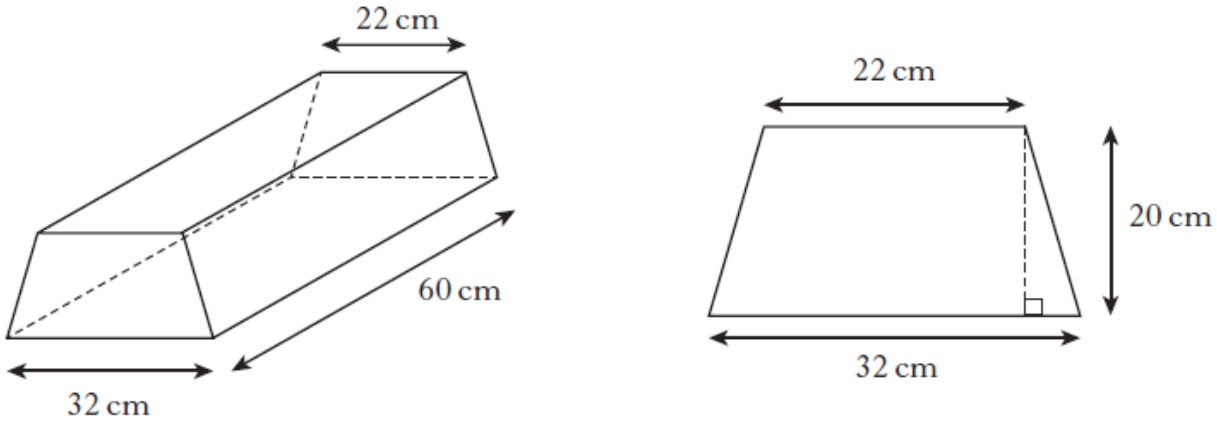
The uniform cross section of the container consists of a rectangle and a triangle with dimensions as shown.



Calculate the volume of the container, **correct to the nearest litre.** 4

(17) Question 3 2013 Paper 2 Credit

3. A concrete block is in the shape of a prism.



The cross section of the prism is a trapezium with dimensions as shown.

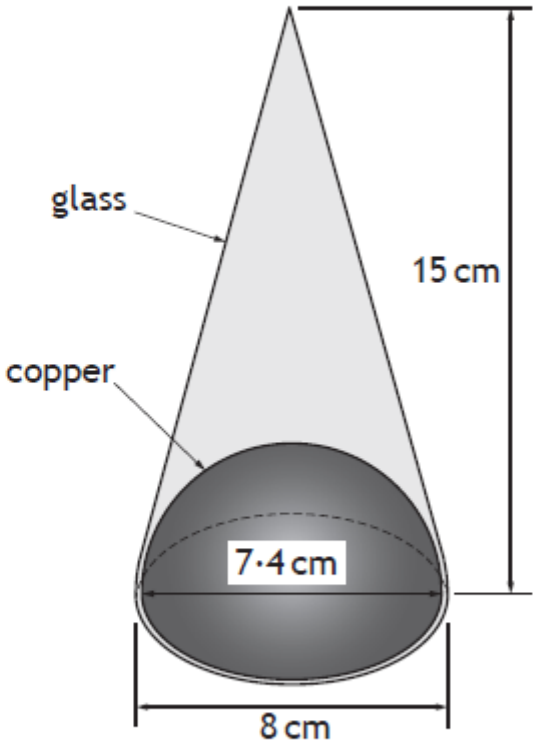
(*a*) Calculate the area of the cross section. 3

(*b*) Calculate the volume of the concrete block. 1

(18) Question 7 Paper 2 2014 N5

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

(19) Question 6 Paper 2 2015 N5

(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

(20) Question 4 Paper 2 Int 2 2011

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**

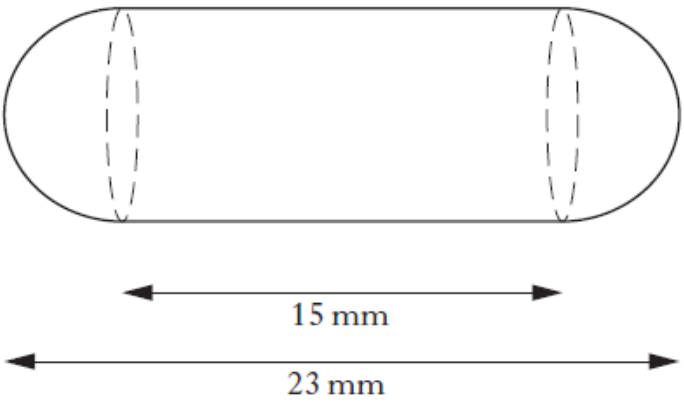
The volume of the **cone** part of The Pencil is 5·7 cubic metres.

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

(21) Question 3 Paper 2 Int 2 2012

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**

(22) Question 7 Paper 2 Int 2 2013

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**

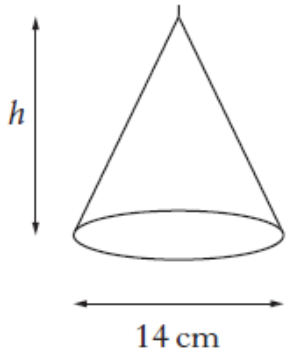
(23) Question 2 Paper 2 Int 2 2014

(*a*) A candle is in the shape of a cylinder with diameter 10 centimetres and height 15 centimetres.

Calculate the volume of the candle.

Give your answer correct to 3 significant figures. **3**

(*b*) A second candle is in the shape of a cone with a circular base of diameter 14 centimetres and height h centimetres.

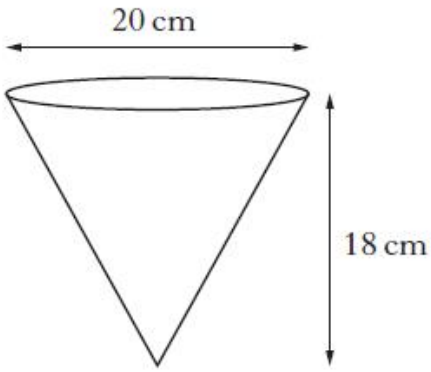


It has the same volume as the first candle.

Calculate h. **3**

(24) Question 2 Paper 1 Int 2 2015

A hanging basket is in the shape of a cone.



The diameter is 20 centimetres and the height is 18 centimetres.

Calculate the volume of the hanging basket.

Take $\pi = 3{\cdot}14$. 2

(25) Question 10 Paper 2 Int 2 2015

A mug in the shape of a cylinder has a volume of 400 cubic centimetres.

Its diameter is 7·6 centimetres.

Calculate the height of the mug, giving your answer correct to one decimal place. 3

Answers

1. (a) 0.866m (b) 1.567m^3 (any rounding)
2. 8 full glasses
3. (a) 113.10 cm^3 (b) 3.78cm
4. (a) 504 cm^3 (b) 327.4cm
5. (a) 1099.56cm^3 (b) 7.6cm
6. 1.2m^3 (2 sig figs)
7. Diameter = 7.3cm (1dp)
8. Vol of cylinder = 720π Width of square = $\sqrt{72}$

   Vol of Cuboid = 1440 Hence Vol. of space = $720\pi - 1440...$
9. 0.59m^3
10. (a) 0.75m (b) 7.2m^3
11. (a) 650m^3 (b) 4.2m
12. 21m^3
13. 9.3m^3
14. (a) 1200cm^3 (b) 130cm
15. 4.55cm
16. 5litres
17. (a) 540cm^2 (b) 32400
18. 150cm^3
19. (a) 1.1×10^{12} km^3 (b) 50
20. 106m^3
21. 1022mm^3
22. 14cm
23. (a) 1180cm^3 (b) 23cm
24. 1884cm^3
25. 8.8cm