

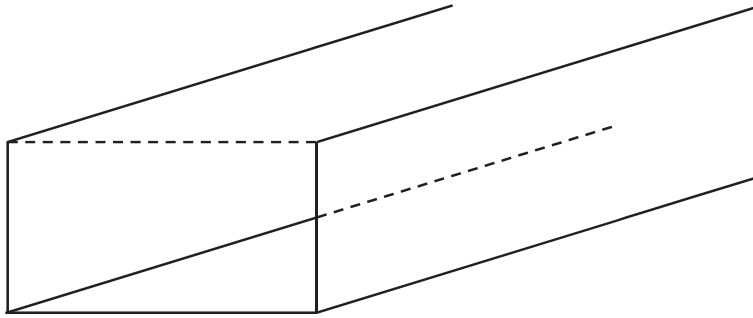


EXAM PAPERS PRACTICE

3D Areas & Volume

Question Paper

Question 1

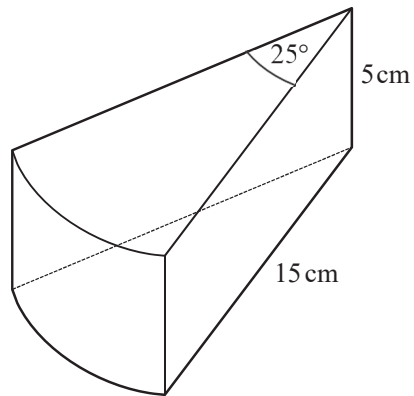


The diagram shows a channel for water.
The channel lies on horizontal ground.
This channel has a constant rectangular cross section with area 0.95 m^2 .
The channel is full and the water flows through the channel at a rate of 4 metres/**minute**.

Calculate the number of cubic metres of water that flow along the channel in **3 hours**.

[3]

Question 2



NOT TO
SCALE

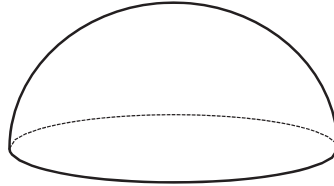
The diagram shows a wooden prism of height 5 cm .
The cross section of the prism is a sector of a circle with sector angle 25° .
The radius of the sector is 15 cm .

Calculate the **total** surface area of the prism.

[5]

Question 3

The diagram shows a solid hemisphere.



The **total** surface area of this hemisphere is 243π .

The volume of the hemisphere is $k\pi$.

Find the value of k .

[The surface area, A , of a sphere with radius r is $A = 4\pi r^2$.]

[The volume, V , of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

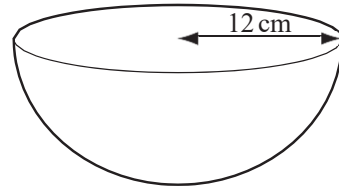
[4]

Question 4

A **hemisphere** has a radius of 12 cm.

Calculate its volume.

[The volume, V , of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]



[2]

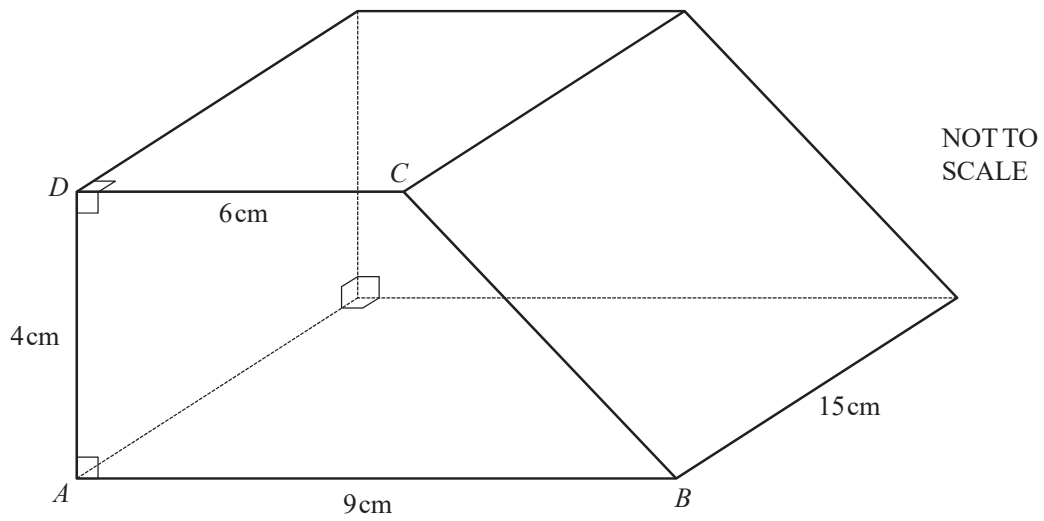
Question 5

A water pipe has a circular cross section of radius 0.75 cm.
Water flows through the pipe at a rate of 16 cm/s.

Calculate the time taken for 1 litre of water to flow through the pipe.

[3]

Question 6

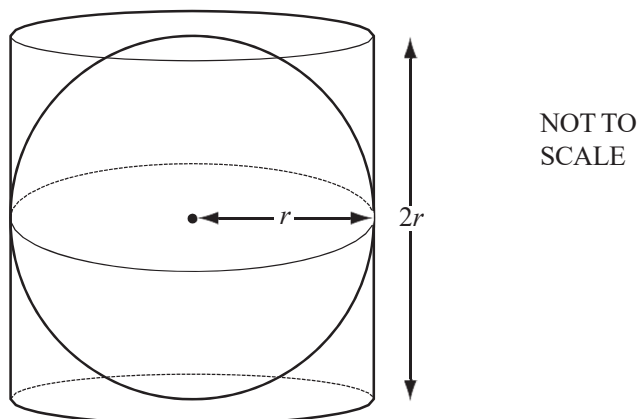


The diagram shows a solid prism of length 15 cm.
The cross section of the prism is the trapezium $ABCD$.
Angle $DAB = \text{angle } CDA = 90^\circ$.
 $AB = 9 \text{ cm}$, $DC = 6 \text{ cm}$ and $AD = 4 \text{ cm}$.

Calculate the **total** surface area of the prism.

[5]

Question 7

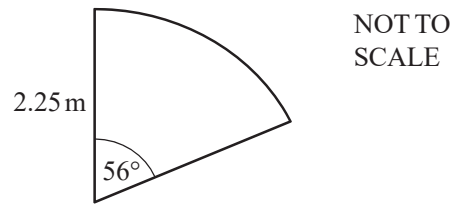


The sphere of radius r fits exactly inside the cylinder of radius r and height $2r$. Calculate the percentage of the cylinder occupied by the sphere.

[The volume, V , of a sphere with radius r is $V = \frac{4}{3} \pi r^3$.]

[3]

Question 8



The diagram shows a sand pit in a child's play area.
The shape of the sand pit is a sector of a circle of radius 2.25 m and sector angle 56° .

(a) Calculate the area of the sand pit.

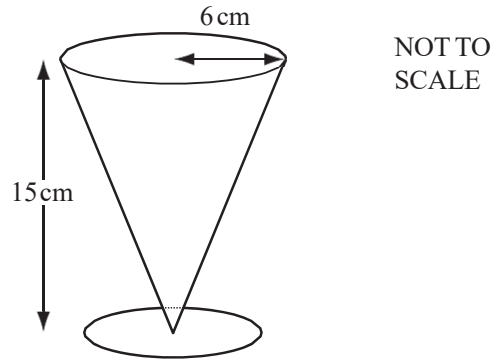
[2]

(b) The sand pit is filled with sand to a depth of 0.3 m.

Calculate the volume of sand in the sand pit.

[1]

Question 9



The diagram shows a glass, in the shape of a cone, for drinking milk.
The cone has a radius of 6 cm and height 15 cm.
A bottle of milk holds 2 litres.

- (a) How many times can the glass be completely filled from the bottle?

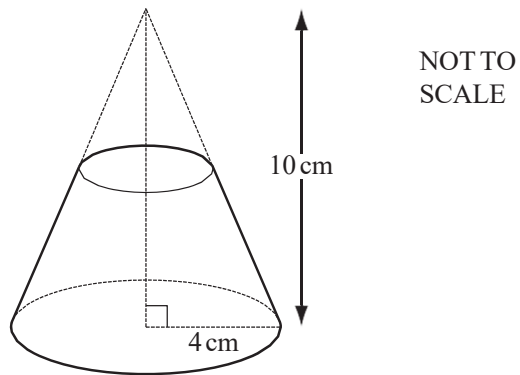
[The volume, V , of a cone with radius r and height h is $V = \frac{1}{3}\pi r^2 h$.]

[4]

- (b) Calculate the volume of milk left in the bottle.
Give your answer in cm^3 .

[3]

Question 10



A **solid** cone has base radius 4 cm and height 10 cm.

A mathematically similar cone is removed from the top as shown in the diagram.

The volume of the cone that is removed is $\frac{1}{8}$ of the volume of the original cone.

(a) Explain why the cone that is removed has radius 2 cm and height 5 cm.

[2]

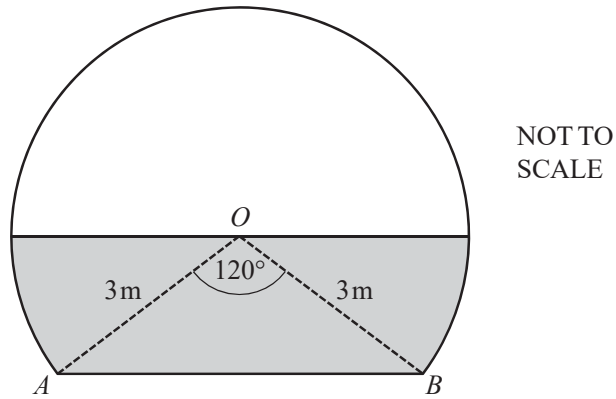
(b) Calculate the volume of the remaining solid.

[The volume, V , of a cone with radius r and height h is $V = \frac{1}{3}\pi r^2 h$.]

[4]

Question 11

The diagram shows the entrance to a tunnel.
The circular arc has a radius of 3m and centre O .
 AB is horizontal and angle $AOB = 120^\circ$.



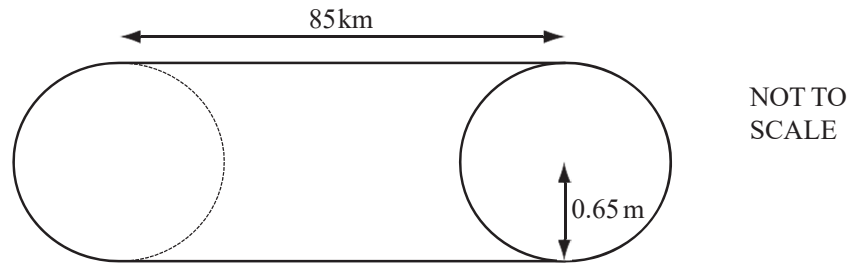
During a storm the tunnel filled with water, to the level shown by the shaded area in the diagram.

(a) Calculate the shaded area. [4]

(b) The tunnel is 50 m long.

Calculate the volume of water in the tunnel. [1]

Question 12



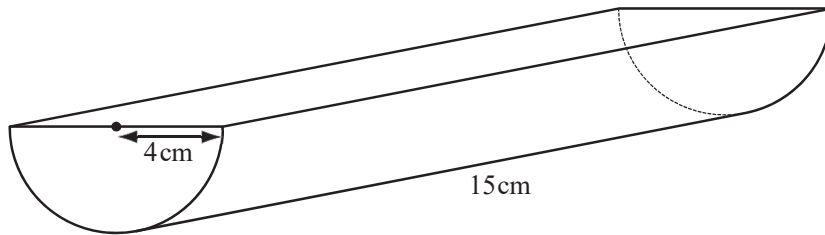
A water pipeline in Australia is a cylinder with **radius 0.65 metres** and length **85 kilometres**.

Calculate the volume of water the pipeline contains when it is full.

Give your answer in cubic metres.

[3]

Question 13



NOT TO
SCALE

The diagram shows a solid prism of length 15 cm.
The cross-section of the prism is a semi-circle of radius 4 cm.

Calculate the total surface area of the prism.

[4]

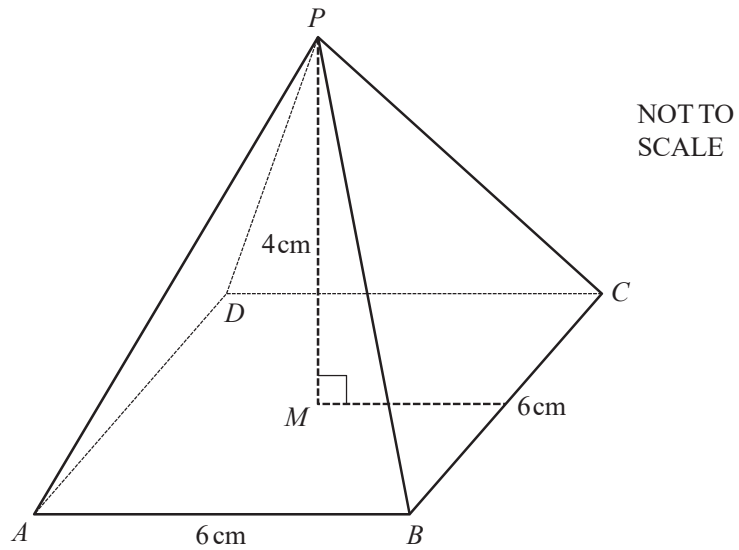
Question 14

A cylinder has a height of 12 cm and a volume of 920cm^3 .

Calculate the radius of the base of the cylinder.

[3]

Question 15



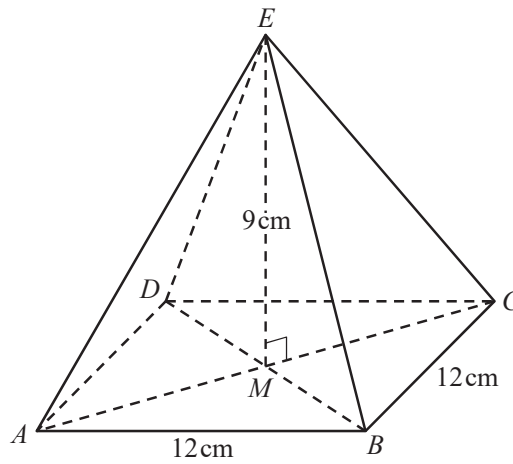
The diagram shows a pyramid with a square base $ABCD$ of side 6 cm.

The height of the pyramid, PM , is 4 cm, where M is the centre of the base.

Calculate the total surface area of the pyramid.

[5]

Question 16



NOT TO
SCALE

The diagram shows a square-based pyramid $ABCDE$.
The diagonals of the square meet at M .
 E is vertically above M .
 $AB = BC = 12$ cm and $EM = 9$ cm.

Calculate the angle between the edge EC and the base, $ABCD$, of the pyramid.

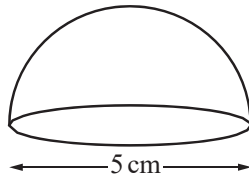
[4]

Question 17

Calculate the volume of a **hemisphere** with radius 3.2 cm.

[The volume, V , of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.] [2]

Question 18



NOT TO
SCALE

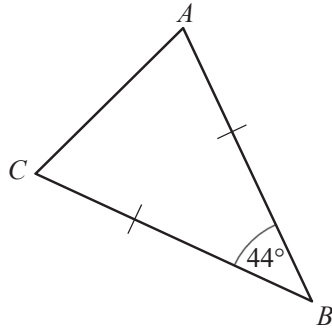
The diagram shows a hemisphere with diameter 5 cm.

Calculate the volume of this hemisphere.

[The volume, V , of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.] [2]

Question 19

(a)



NOT TO
SCALE

Triangle ABC is an isosceles triangle with $AB = CB$.
Angle $ABC = 44^\circ$.

Find angle ACB .

[1]

(b) A regular polygon has an exterior angle of 40° .

Work out the number of sides of this polygon.

[2]

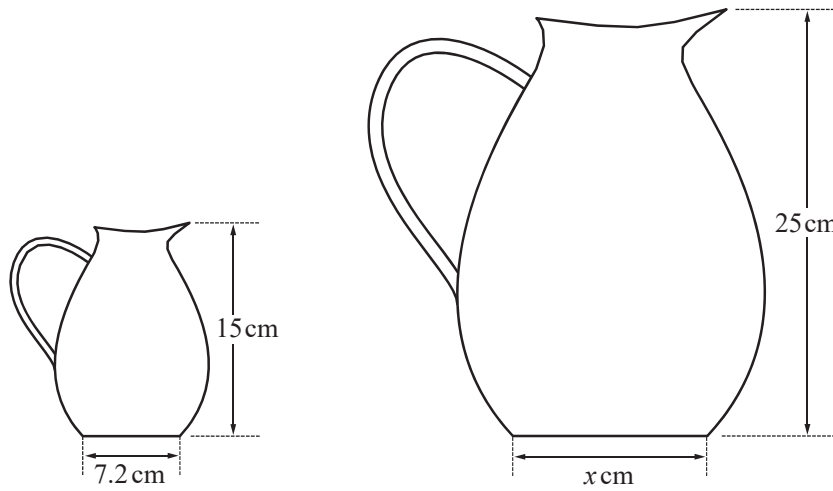
Question 20

Calculate the volume of a hemisphere with radius 5 cm.

[The volume, V , of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.] [2]

Question 21

(a)



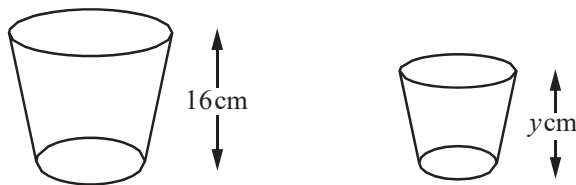
NOT TO
SCALE

The diagram shows two jugs that are mathematically similar.

Find the value of x .

[2]

(b)



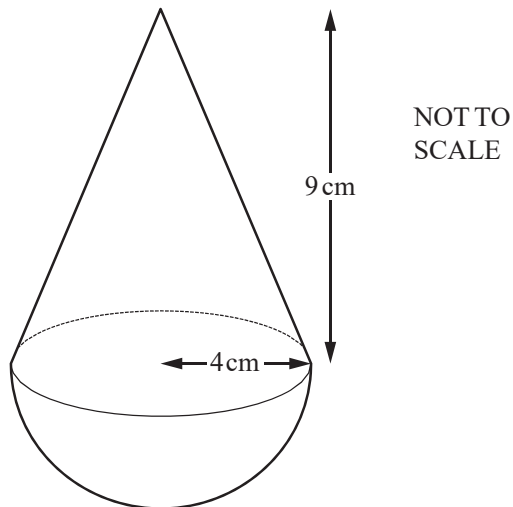
NOT TO
SCALE

The diagram shows two glasses that are mathematically similar.
The height of the larger glass is 16 cm and its volume is 375 cm^3 .
The height of the smaller glass is $y \text{ cm}$ and its volume is 192 cm^3 .

Find the value of y .

[3]

Question 22



The diagram shows a toy.

The shape of the toy is a cone, with radius 4 cm and height 9 cm, on top of a hemisphere with radius 4 cm.

Calculate the volume of the toy.

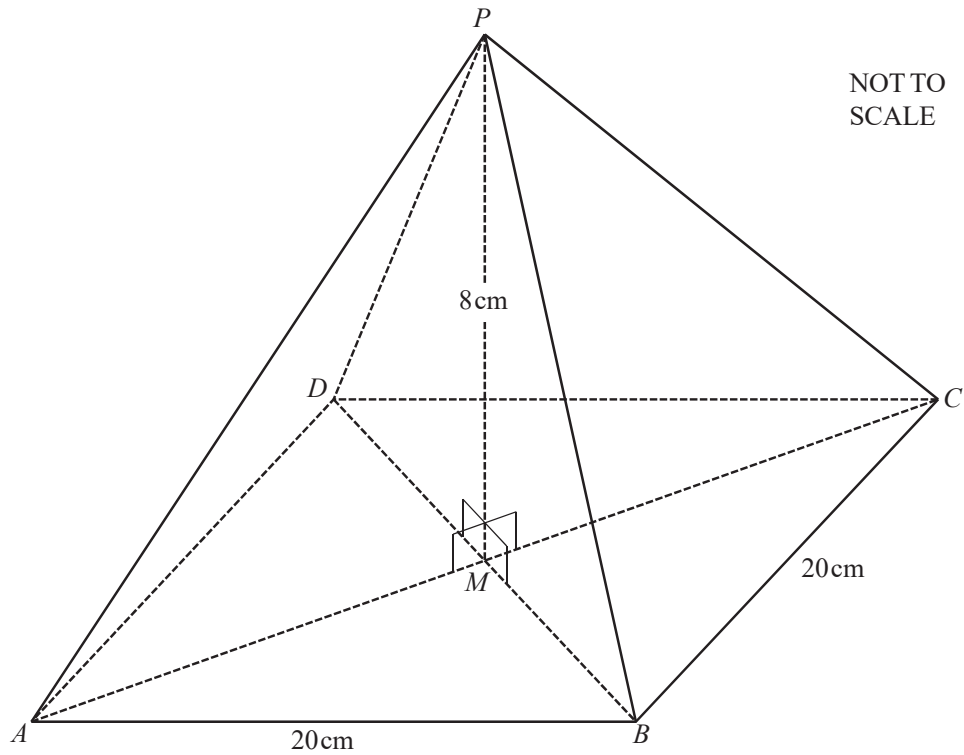
Give your answer correct to the nearest cubic centimetre.

[The volume, V , of a cone with radius r and height h is $V = \frac{1}{3}\pi r^2 h$.]

[The volume, V , of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

[4]

Question 23



The diagram shows a solid pyramid on a square horizontal base $ABCD$.
The diagonals AC and BD intersect at M .
 P is vertically above M .
 $AB = 20\text{ cm}$ and $PM = 8\text{ cm}$.

Calculate the total surface area of the pyramid.

[5]

Question 24

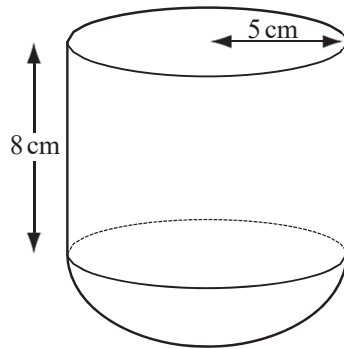
The base of a rectangular tank is 1.2 metres by 0.9 metres.
The water in the tank is 53 **centimetres** deep.

Calculate the number of litres of water in the tank.

[2]

Question 25

The diagram shows a child's toy.



NOT TO
SCALE

The shape of the toy is a cylinder of radius 5 cm and height 8 cm on top of a hemisphere of radius 5 cm.

Calculate the volume of the toy.

[The volume, V , of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

[5]