

3D Shapes

Volumes & Surface Areas

Question Paper 5

Level	IGCSE
Subject	Maths (0580)
Exam Board	Cambridge International Examinations (CIE)
Paper Type	Extended
Topic	Mensuration (Perimeters, Areas & Volumes)
Sub-Topic	3D Shapes: Volumes & Surface Areas
Booklet	Question Paper 5

Time Allowed: 64 minutes

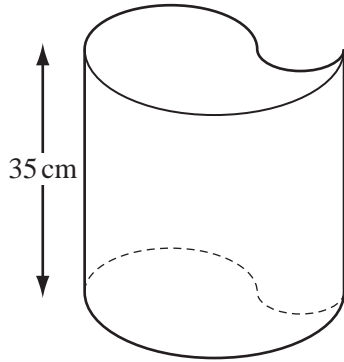
Score: /53

Percentage: /100

Grade Boundaries:

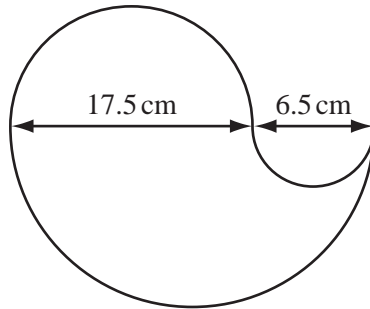
A*	A	B	C	D	E	U
>85%	75%	60%	45%	35%	25%	<25%

- 1 Sandra has designed this open container.
The height of the container is 35 cm.



NOT TO SCALE

The cross section of the container is designed from three semi-circles with diameters 17.5 cm, 6.5 cm and 24 cm.



NOT TO SCALE

- (a) Calculate the area of the cross section of the container.

Answer(a) cm² [3]

- (b) Calculate the external surface area of the container, including the base.

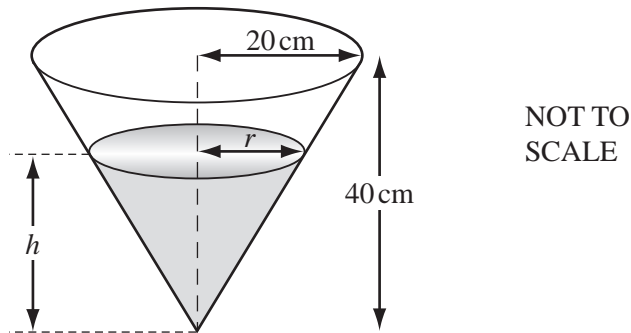
Answer(b) cm² [4]

- (c) The container has a height of 35 cm.

Calculate the capacity of the container.
Give your answer in litres.

Answer(c) litres [3]

- (d) Sandra’s container is completely filled with water.
All the water is then poured into another container in the shape of a cone.
The cone has radius 20 cm and height 40 cm.



- (i) The diagram shows the water in the cone.

Show that $r = \frac{h}{2}$.

Answer(d)(i)

[1]

- (ii) Find the height, h , of the water in the cone.

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

Answer(d)(ii) $h =$ cm [3]

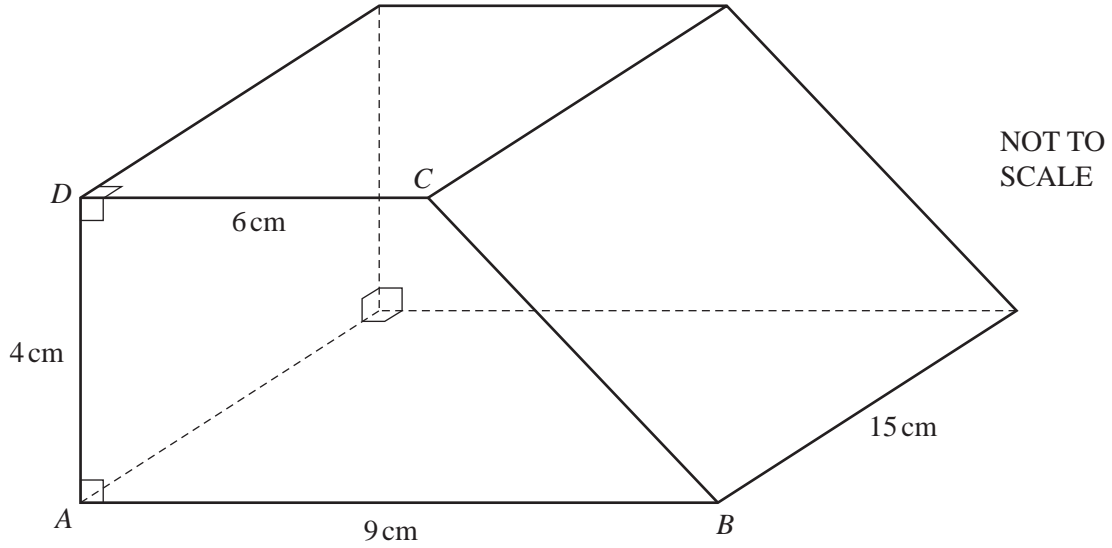
2 A water pipe has a circular cross section of radius 0.75 cm.

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.

Answer s [3]

3

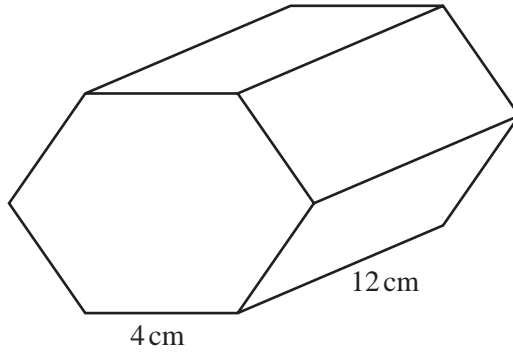


The diagram shows a solid prism of length 15 cm.
 The cross section of the prism is the trapezium $ABCD$.
 Angle $DAB = \text{angle } CDA = 90^\circ$.
 $AB = 9 \text{ cm}$, $DC = 6 \text{ cm}$ and $AD = 4 \text{ cm}$.

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

Answer cm^2 [5]

4 (a)



NOT TO
SCALE

The diagram shows a prism of length 12 cm.
The cross section is a regular hexagon of side 4 cm.

Calculate the total surface area of the prism.

Answer(a) cm² [4]

(b) Water flows through a cylindrical pipe of radius 0.74 cm.
It fills a 12 litre bucket in 4 minutes.

(i) Calculate the speed of the water through the pipe in centimetres per minute.

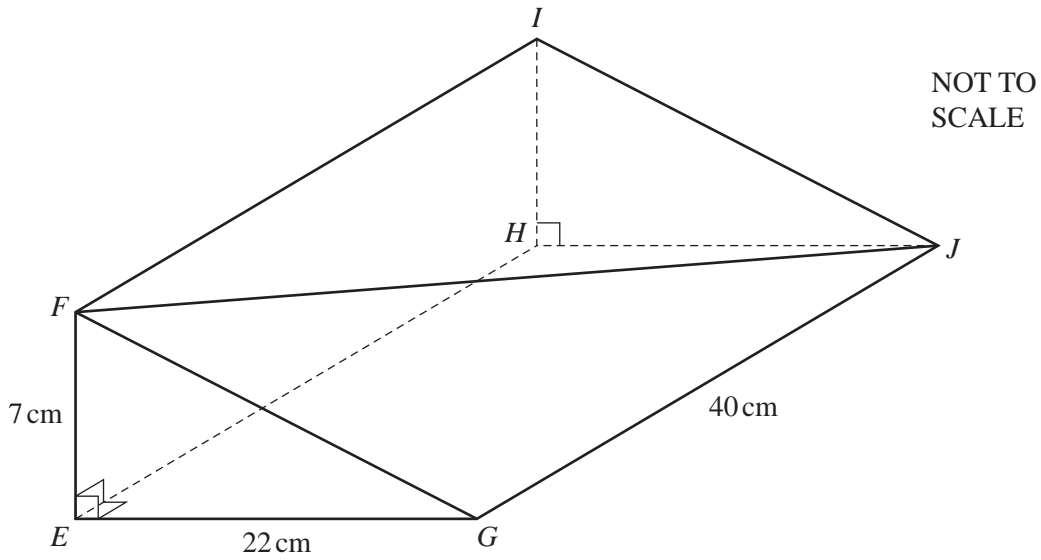
Answer(b)(i) cm/min [4]

- (ii) When the 12 litre bucket is emptied into a circular pool, the water level rises by **5 millimetres**.

Calculate the radius of the pool correct to the nearest centimetre.

Answer(b)(ii) cm [5]

5



$EFGHIJ$ is a solid metal prism of length 40 cm.
 The cross section EFG is a right-angled triangle.
 $EF = 7$ cm and $EG = 22$ cm.

(a) Calculate the volume of the prism.

Answer(a) cm³ [2]

(b) Calculate the length FJ .

Answer(b) $FJ =$ cm [4]

- (c) Calculate the angle between FJ and the base $EGJH$ of the prism.

Answer(c) [3]

- (d) The prism is melted and made into spheres.
Each sphere has a radius 1.5 cm.

Work out the greatest number of spheres that can be made.

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

Answer(d) [3]

- (e) (i) A right-angled triangle is the cross section of another prism.
This triangle has height 4.5 cm and base 11.0 cm.
Both measurements are correct to 1 decimal place.

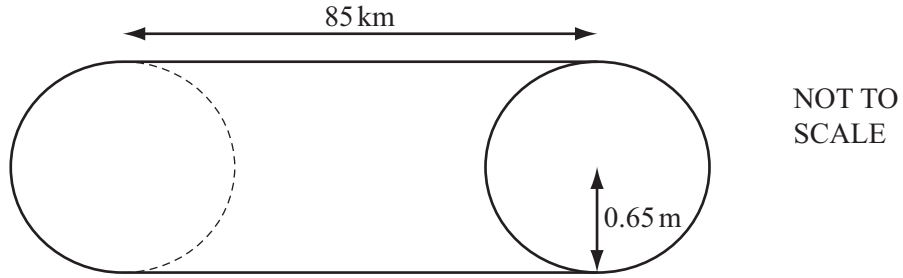
Calculate the upper bound for the area of this triangle.

Answer(e)(i) cm^2 [2]

- (ii) Write your answer to **part (e)(i)** correct to 4 significant figures.

Answer(e)(ii) cm^2 [1]

6



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.

Answer m³ [3]