

# Perimeters, Area and Volumes

## Difficulty: Medium

### Question Paper 1

Level	IGCSE
Subject	Maths (0580/0980)
Exam Board	CIE
Topic	Perimeters, Area and Volumes
Paper	Paper 4
Difficulty	Medium
Booklet	Question Paper 1

**Time allowed:** 107 minutes

**Score:** /93

**Percentage:** /100

#### Grade Boundaries:

##### CIE IGCSE Maths (0580)

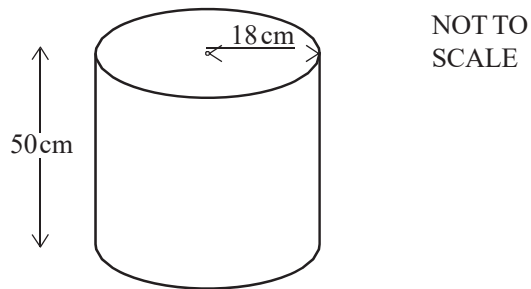
A*	A	B	C	D
>83%	67%	51%	41%	31%

##### CIE IGCSE Maths (0980)

9	8	7	6	5	4
>95%	87%	80%	69%	58%	46%

## Question 1

- (a) The diagram shows a cylindrical container used to serve coffee in a hotel.

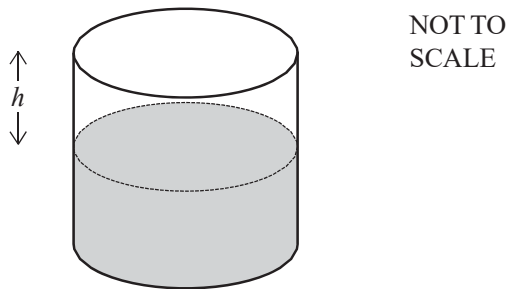


The container has a height of 50 cm and a radius of 18 cm.

- (i) Calculate the volume of the cylinder and show that it rounds to  $50\,900\text{ cm}^3$ , correct to 3 significant figures. [2]

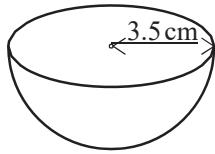
- (ii) 30 litres of coffee are poured into the container.

Work out the height,  $h$ , of the empty space in the container.



[3]

- (iii) Cups in the shape of a hemisphere are filled with coffee from the container.  
The radius of a cup is 3.5 cm.

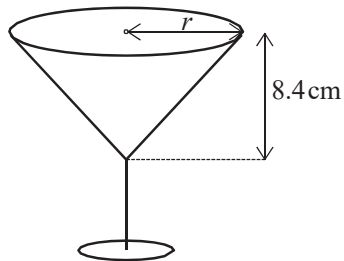


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Work out the maximum number of these cups that can be completely filled from the 30 litres of coffee in the container.

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

- (b) The hotel also uses glasses in the shape of a cone.



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The capacity of each glass is  $95 \text{ cm}^3$ .

- (i) Calculate the radius,  $r$ , and show that it rounds to 3.3 cm, correct to 1 decimal place.

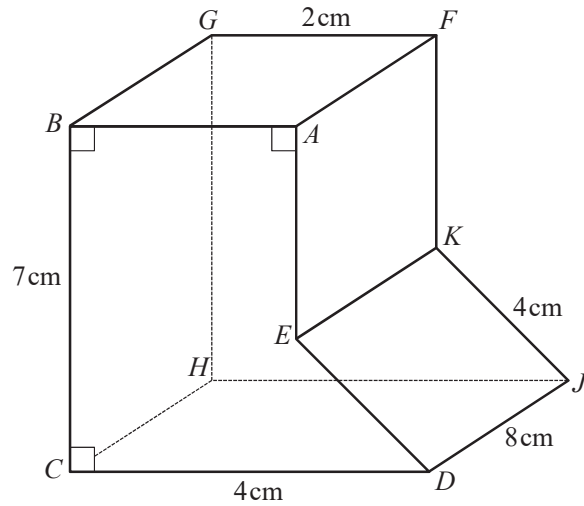
[The volume,  $V$ , of a cone with radius  $r$  and height  $h$  is  $V = \frac{1}{3}\pi r^2 h$ .] [3]

- (ii) Calculate the curved surface area of the cone.

[The curved surface area,  $A$ , of a cone with radius  $r$  and slant height  $l$  is  $A = \pi r l$ .] [4]

## Question 2

- (a) The diagram shows a solid metal prism with cross section  $ABCDE$ .



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- (i) Calculate the area of the cross section  $ABCDE$ .

[6]

- (ii) The prism is of length 8 cm.

Calculate the volume of the prism.

[1]

- (b) A cylinder of length 13 cm has volume  $280 \text{ cm}^3$ .

- (i) Calculate the radius of the cylinder.

[3]

- (ii) The cylinder is placed in a box that is a cube of side 14 cm.

Calculate the percentage of the volume of the box that is occupied by the cylinder.

[3]

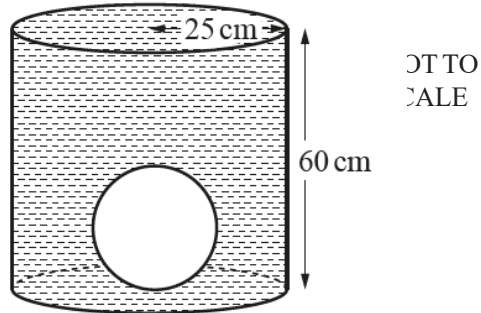
### Question 3

- (a) Calculate the volume of a metal sphere of radius 15 cm and show that it rounds to  $14\,140\text{ cm}^3$ , correct to 4 significant figures.

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

[2]

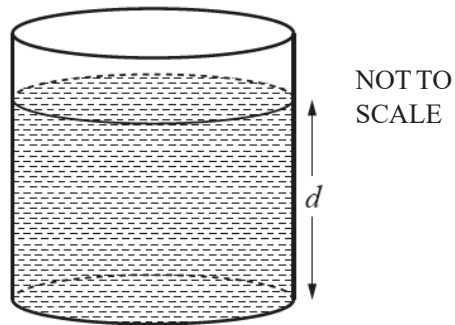
- (b) (i) The sphere is placed inside an empty cylindrical tank of radius 25 cm and height 60 cm. The tank is filled with water.



Calculate the volume of water required to fill the tank.

[3]

- (ii) The sphere is removed from the tank.



Calculate the depth,  $d$ , of water in the tank.

[2]

(c) The sphere is melted down and the metal is made into a solid cone of height 54 cm.

(i) Calculate the radius of the cone.

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

[3]

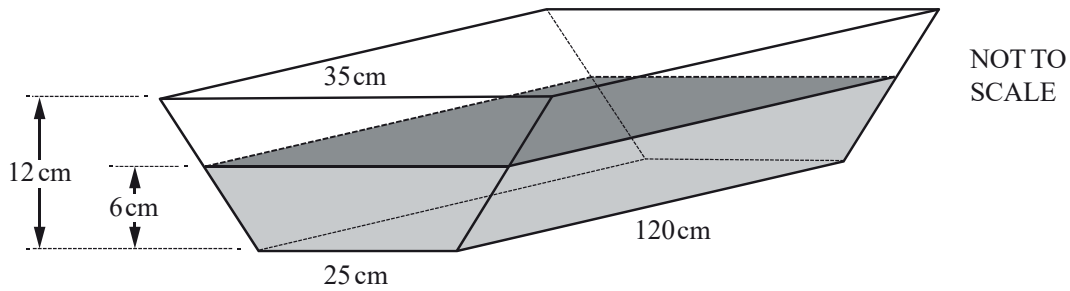
(ii) Calculate the **total** surface area of the cone.

[The curved surface area,  $A$ , of a cone with radius  $r$  and slant height  $l$  is  $A = \pi r l$ .]

[4]

## Question 4

The diagram shows a horizontal water trough in the shape of a prism.



The cross section of this prism is a trapezium.

The trapezium has parallel sides of lengths 35 cm and 25 cm and a perpendicular height of 12 cm.

The length of the prism is 120 cm.

(a) Calculate the volume of the trough.

[3]

(b) The trough contains water to a depth of 6 cm.

(i) Show that the volume of water is  $19\,800\text{ cm}^3$ .

*Answer (b)(i)*

[2]

(ii) Calculate the percentage of the trough that contains water.

[1]

(c) The water is drained from the trough at a rate of 12 litres per hour.

Calculate the time it takes to empty the trough.  
Give your answer in hours and minutes.

[4]

(d) The water from the trough just fills a cylinder of radius  $r$  cm and height  $3r$  cm.

Calculate the value of  $r$ .

[3]

(e) The cylinder has a mass of 1.2 kg.  
1 cm<sup>3</sup> of water has a mass of 1 g.

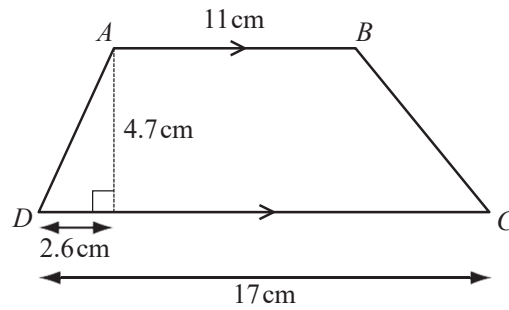
Calculate the total mass of the cylinder and the water.  
Give your answer in kilograms.

[2]



## Question 5

(a)  $ABCD$  is a trapezium.



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(i) Calculate the length of  $AD$ . [2]

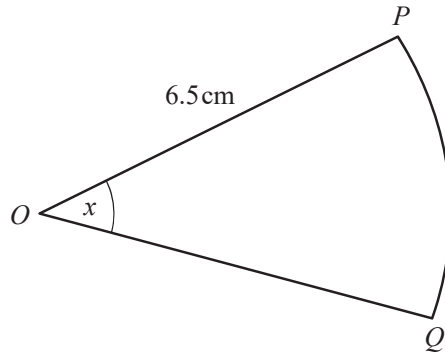
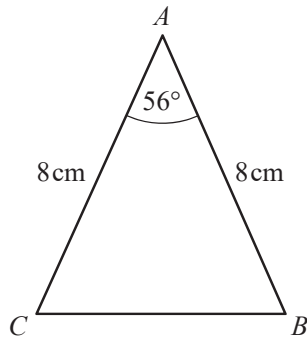
(ii) Calculate the size of angle  $BCD$ . [3]

(iii) Calculate the area of the trapezium  $ABCD$ . [2]

(b) A **similar** trapezium has perpendicular height 9.4 cm.

Calculate the area of this trapezium. [3]

## Question 6



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The diagram shows a triangle and a sector of a circle.  
In triangle  $ABC$ ,  $AB = AC = 8\text{ cm}$  and angle  $BAC = 56^\circ$ .  
Sector  $OPQ$  has centre  $O$ , sector angle  $x$  and radius  $6.5\text{ cm}$ .

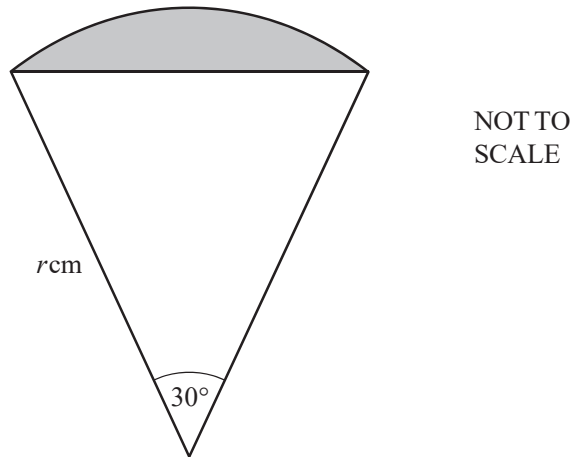
(a) Show that the area of triangle  $ABC$  is  $26.5\text{ cm}^2$  correct to 1 decimal place. [2]

(b) The area of sector  $OPQ$  is equal to the area of triangle  $ABC$ .

(i) Calculate the sector angle  $x$ . [3]

(ii) Calculate the perimeter of the sector  $OPQ$ . [3]

(c) The diagram shows a sector of a circle, radius  $r$  cm.



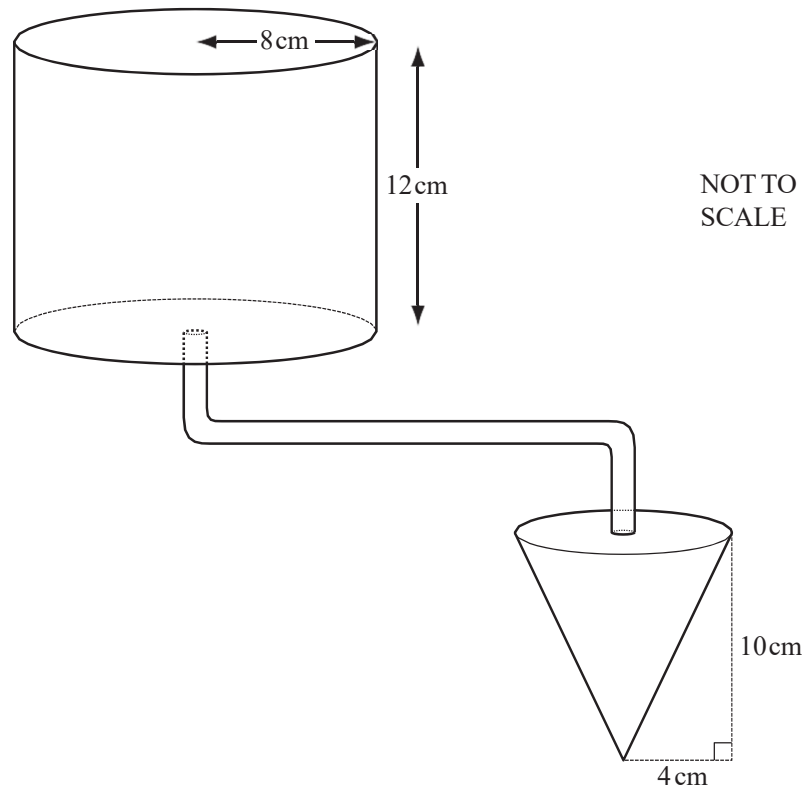
(i) Show that the area of the shaded segment is  $\frac{1}{4} r^2 (\frac{1}{3} \pi - 1)$  cm<sup>2</sup>. [4]

(ii) The area of the segment is 5 cm<sup>2</sup>.

Find the value of  $r$ .

[3]

## Question 7



The diagram shows a cylinder with radius 8 cm and height 12 cm which is full of water. A pipe connects the cylinder to a cone. The cone has radius 4 cm and height 10 cm.

(a) (i) Calculate the volume of water in the cylinder.

Show that it rounds to  $2410 \text{ cm}^3$  correct to 3 significant figures.

[2]

(ii) Change  $2410 \text{ cm}^3$  into litres.

[1]

(b) Water flows from the cylinder along the pipe into the cone at a rate of  $2 \text{ cm}^3$  per second.

Calculate the time taken to fill the empty cone.

Give your answer in minutes and seconds correct to the nearest second.

[The volume,  $V$ , of a cone with radius  $r$  and height  $h$  is  $V = \frac{1}{3}\pi r^2 h$ .] [4]

(c) Find the number of empty cones which can be filled completely from the full cylinder. [3]