

Perimeters, Area and Volumes

Difficulty: Hard

Question Paper 3

Level	IGCSE
Subject	Maths (0580/0980)
Exam Board	CIE
Topic	Perimeters, Area and Volumes
Paper	Paper 4
Difficulty	Hard
Booklet	Question Paper 3

Time allowed: 117 minutes

Score: /102

Percentage: /100

Grade Boundaries:

CIE IGCSE Maths (0580)

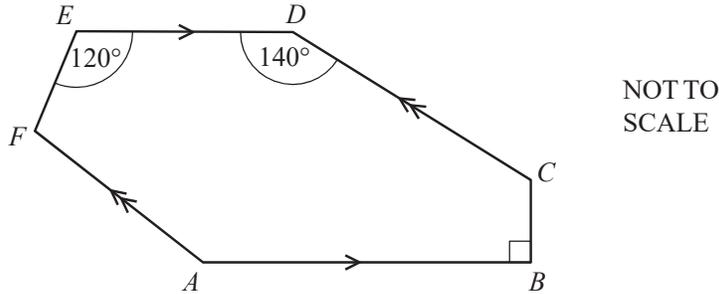
A*	A	B	C	D
>83%	67%	51%	41%	31%

CIE IGCSE Maths (0980)

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

Question 1

(a)

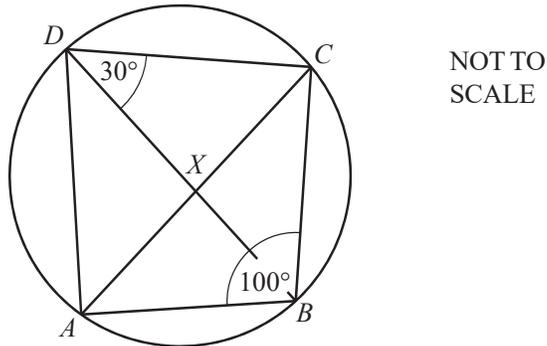


In the hexagon $ABCDEF$, AB is parallel to ED and AF is parallel to CD .
 Angle $ABC = 90^\circ$, angle $CDE = 140^\circ$ and angle $DEF = 120^\circ$.

Calculate angle EFA .

[4]

(b)



In the cyclic quadrilateral $ABCD$, angle $ABC = 100^\circ$ and angle $BDC = 30^\circ$.
 The diagonals intersect at X .

(i) Calculate angle ACB .

[2]

(ii) Angle $BXC = 89^\circ$.

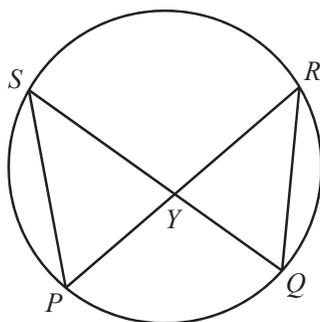
Calculate angle CAD .

[2]

(iii) Complete the statement.

[1]

(c)



NOT TO
SCALE

P , Q , R and S lie on a circle.

PR and QS intersect at Y .

$PS = 11$ cm, $QR = 10$ cm and the area of triangle $QRY = 23$ cm².

Calculate the area of triangle PYS .

[2]

(d) A regular polygon has n sides.

Each exterior angle is equal to $\frac{n}{10}$ degrees.

(i) Find the value of n .

[3]

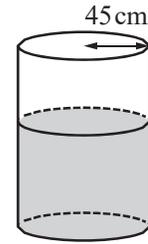
(ii) Find the size of an interior angle of this polygon.

[2]

Question 2

- (a) A cylindrical tank contains 180000 cm^3 of water.
The radius of the tank is 45 cm .

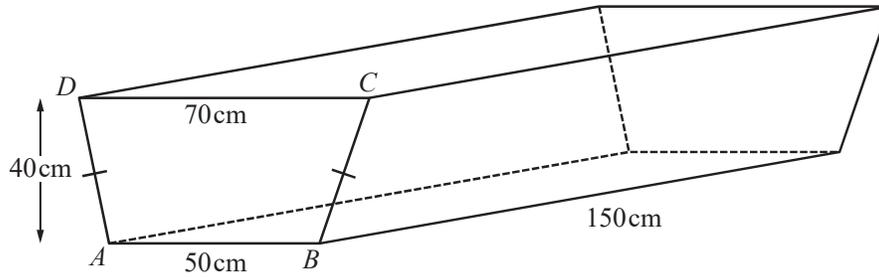
Calculate the height of water in the tank.



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[2]

- (b)



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The diagram shows an empty tank in the shape of a horizontal prism of length 150 cm .
The cross section of the prism is an isosceles trapezium $ABCD$.
 $AB = 50 \text{ cm}$, $CD = 70 \text{ cm}$ and the vertical height of the trapezium is 40 cm .

- (i) Calculate the volume of the tank. [3]
- (ii) Write your answer to **part (b)(i)** in litres. [1]

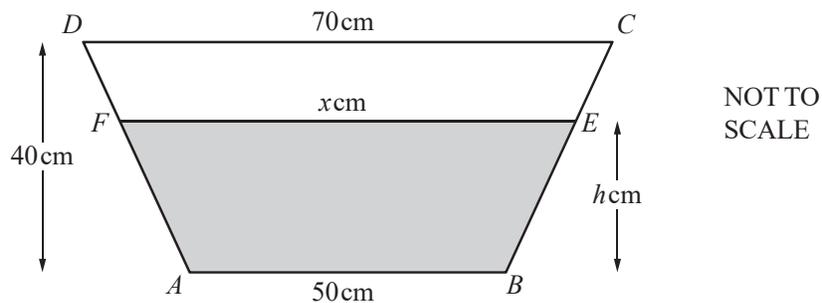
- (c) The $180\,000 \text{ cm}^3$ of water flows from the tank in **part (a)** into the tank in **part (b)** at a rate of $15 \text{ cm}^3/\text{s}$.

Calculate the time this takes.

Give your answer in hours and minutes.

[3]

(d)



The $180\,000\text{ cm}^3$ of water reaches the level EF as shown above.
 $EF = x\text{ cm}$ and the height of the water is $h\text{ cm}$.

(i) Using the properties of similar triangles, show that $h = 2(x - 50)$. [2]

(ii) Using $h = 2(x - 50)$, show that the shaded area, in cm^2 , is $x^2 - 2500$.

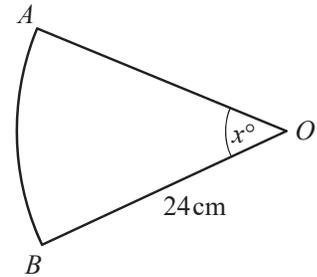
Answer(d)(ii) [1]

(iii) Find the value of x . [2]

(iv) Find the value of h . [1]

Question 3

- (a) The diagram shows a sector of a circle with centre O and radius 24 cm.



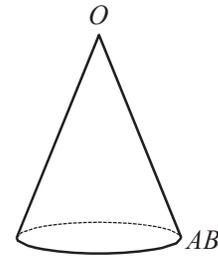
NOT TO SCALE

- (i) The total perimeter of the sector is 68 cm.

Calculate the value of x .

[3]

- (ii) The points A and B of the sector are joined together to make a hollow cone.
The arc AB becomes the circumference of the base of the cone.



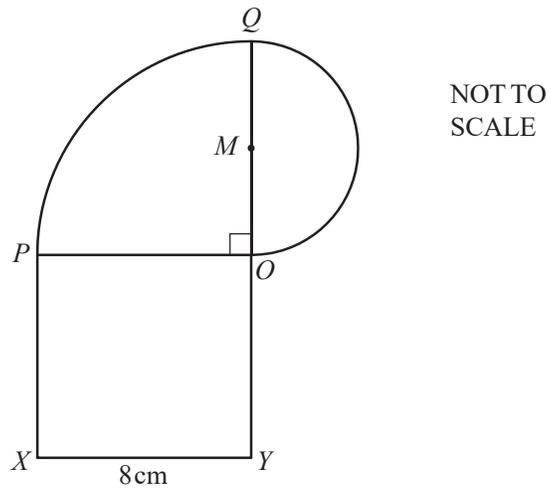
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Calculate the volume of the cone.

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

[6]

(b)



The diagram shows a shape made from a square, a quarter circle and a semi-circle.

$OPXY$ is a square of side 8 cm.

OPQ is a quarter circle, centre O .

The line OMQ is the diameter of the semi-circle.

Calculate the area of the shape.

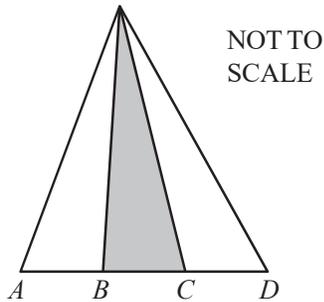
[5]

Question 4

The total area of each of the following shapes is X .
The area of the shaded part of each shape is kX .

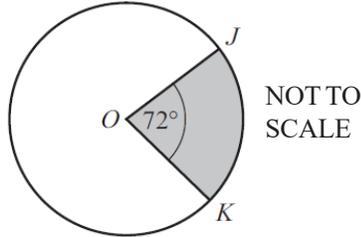
For each shape, find the value of k and write your answer below each diagram.

[10]



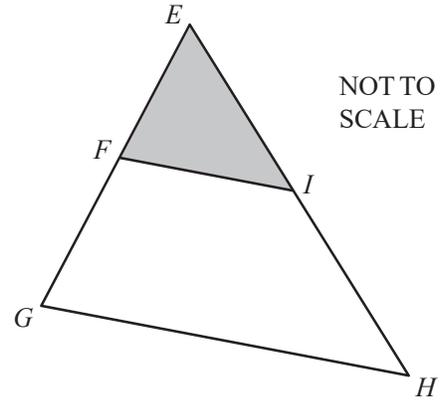
$AB = BC = CD$

$k = \dots\dots\dots$



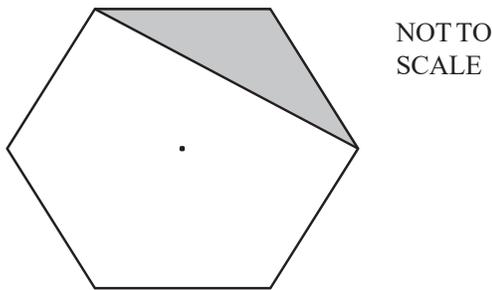
Angle $JOK = 72^\circ$

$k = \dots\dots\dots$



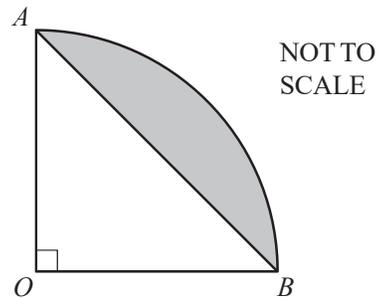
$EF = FG$ and $EI = IH$

$k = \dots\dots\dots$



The shape is a regular hexagon.

$k = \dots\dots\dots$

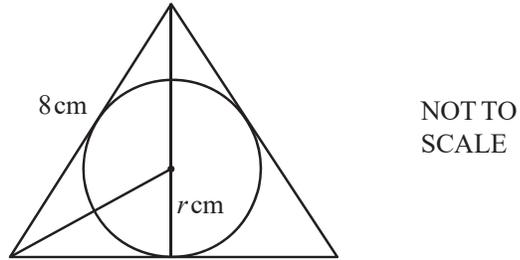


The diagram shows a sector of a circle centre O .
Angle $AOB = 90^\circ$

$k = \dots\dots\dots$

Question 5

(a)



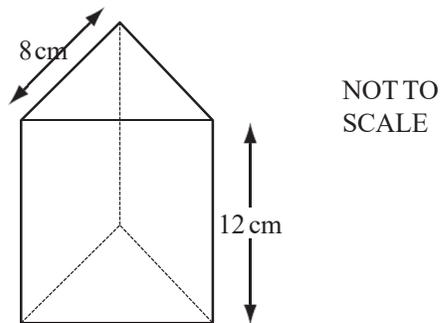
The three sides of an equilateral triangle are tangents to a circle of radius r cm. The sides of the triangle are 8 cm long.

Calculate the value of r .

Show that it rounds to 2.3, correct to 1 decimal place.

[3]

(b)



The diagram shows a box in the shape of a triangular prism of height 12 cm. The cross section is an equilateral triangle of side 8 cm.

Calculate the volume of the box.

[4]

(c) The box contains biscuits.

Each biscuit is a cylinder of radius 2.3 centimetres and height 4 millimetres.

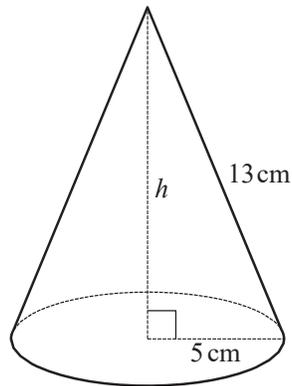
Calculate

(i) the largest number of biscuits that can be placed in the box, [3]

(ii) the volume of one biscuit in cubic centimetres, [2]

(iii) the percentage of the volume of the box **not** filled with biscuits. [3]

Question 6



NOT TO
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(a) The diagram shows a cone of radius 5 cm and slant height 13 cm .

(i) Calculate the curved surface area of the cone.

[The curved surface area, A , of a cone with radius r and slant height l is $A = \pi rl$.] [2]

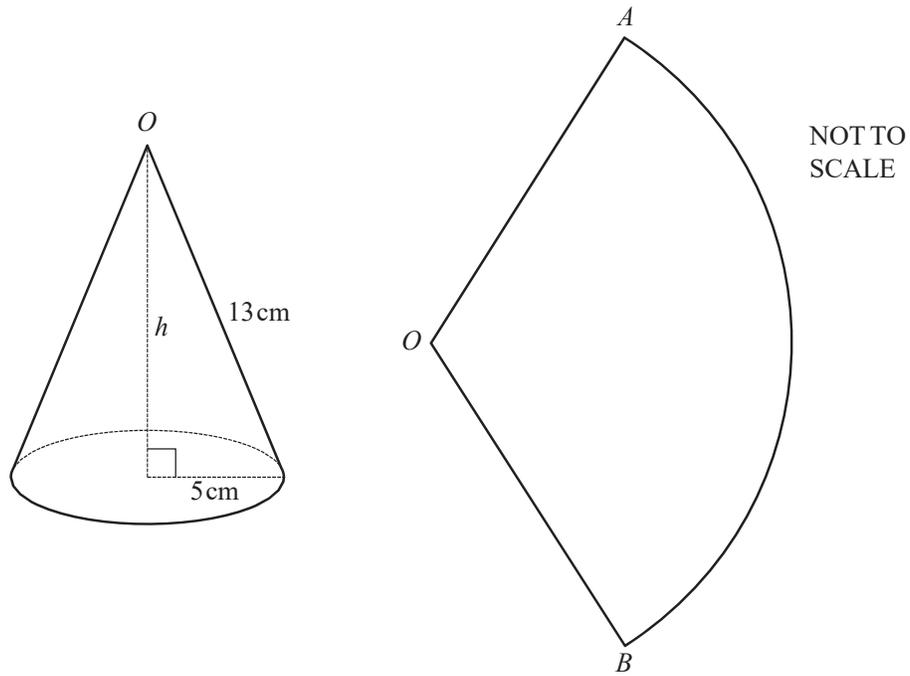
(ii) Calculate the perpendicular height, h , of the cone. [3]

(iii) Calculate the volume of the cone.

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

(iv) Write your answer to **part (a)(iii)** in cubic metres.
Give your answer in standard form. [2]

(b)

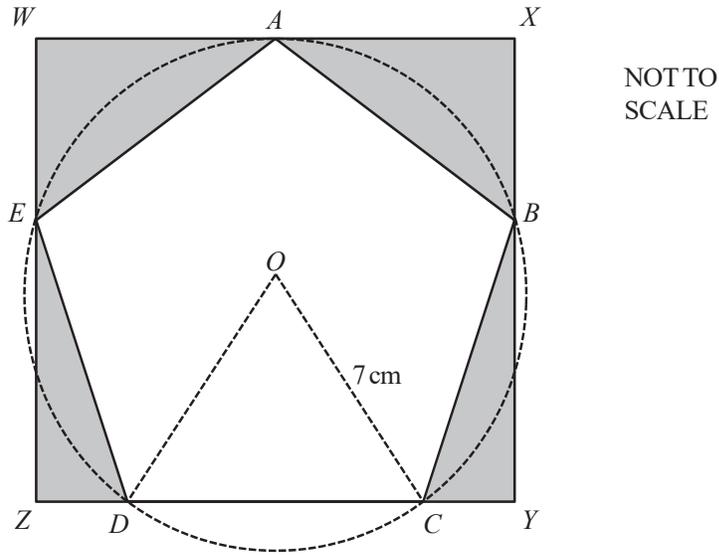


The cone is now cut along a slant height and it opens out to make the sector AOB of a circle.

Calculate angle AOB .

[4]

Question 7



The vertices A , B , C , D and E of a regular pentagon lie on the circumference of a circle, centre O , radius 7 cm.
They also lie on the sides of a rectangle $WXYZ$.

(a) Show that

(i) angle $DOC = 72^\circ$, [1]

(ii) angle $DCB = 108^\circ$, [2]

(iii) angle $CBY = 18^\circ$. [1]

(b) Show that the length CD of one side of the pentagon is 8.23 cm correct to three significant figures. [3]

(c) Calculate

(i) the area of the triangle DOC , [2]

(ii) the area of the pentagon $ABCDE$, [1]

(iii) the area of the sector ODC , [2]

(iv) the length XY . [2]

(d) Calculate the ratio
area of the pentagon $ABCDE$: area of the rectangle $WXYZ$.

Give your answer in the form $1 : n$. [5]