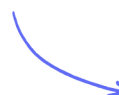


Circles, Arcs & Sectors

Properties of Circles / Area & Circumference of Circles / Arc Lengths & Sector Areas

Easy (9 questions)	/20
Medium (9 questions)	/30
Hard (10 questions)	/54
Total Marks	/104

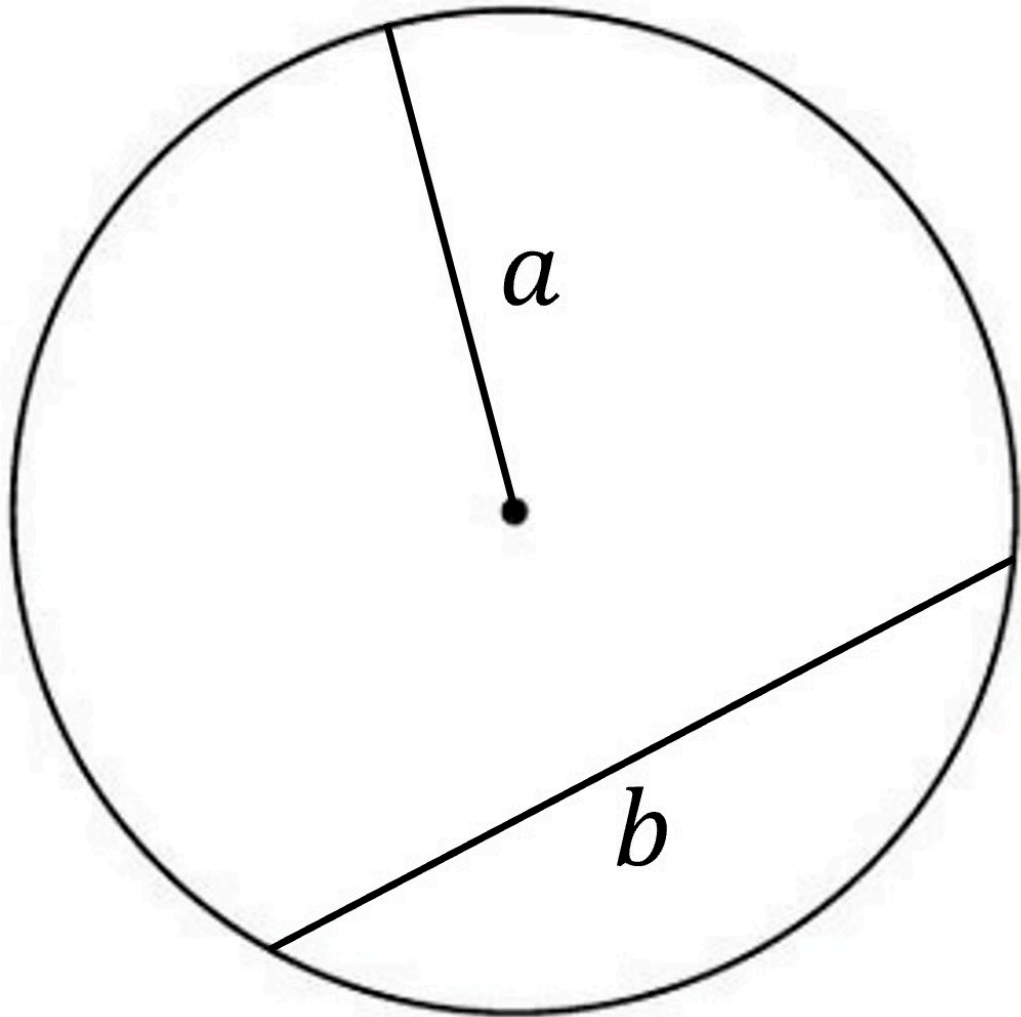
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Easy Questions

- 1 The diagram below shows two types of line associated with circles.

Write down the name of line a and the name of line b .



(2 marks)

- 2** A circle has a radius of 12 cm.

Find the exact value of the area of the circle.

Give your answer in terms of π .

..... cm²

(2 marks)

- 3** A circle has diameter 6 cm.

Calculate the area of the circle.

Give the units of your answer.

(3 marks)

- 4** Calculate the area of a circle with radius 12cm.

..... cm²

(2 marks)

- 5** Henry buys a circular mirror for the room.

The diameter of the mirror is 80 cm.

Calculate the circumference of the mirror.

..... cm

(2 marks)

6 Calculate the circumference of a circle with radius 4.5cm.

..... cm

(2 marks)

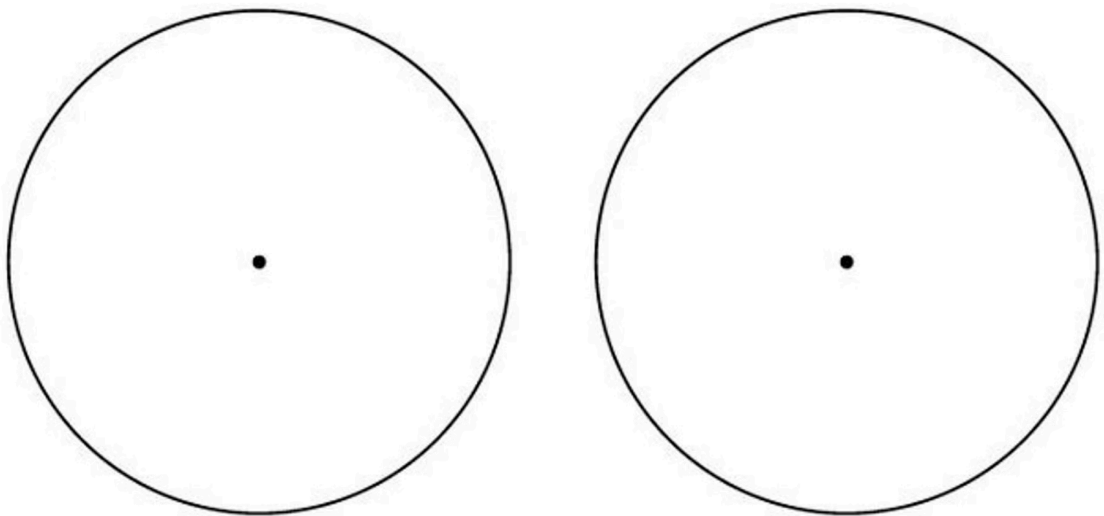
7 A circle has diameter 7 cm.

Show that the circumference of the circle is 21.99 cm, correct to 2 decimal places.

(2 marks)

8 On the left circle below, draw a sector and shade it in. Label it "sector".

On the right circle below, draw a segment and shade it in. Label it "segment".



(2 marks)

9 Write down the mathematical terms associated with circles that can be described by the following definitions:

(i) A line passing through the centre of the circle, which intersects the circle in one place only.

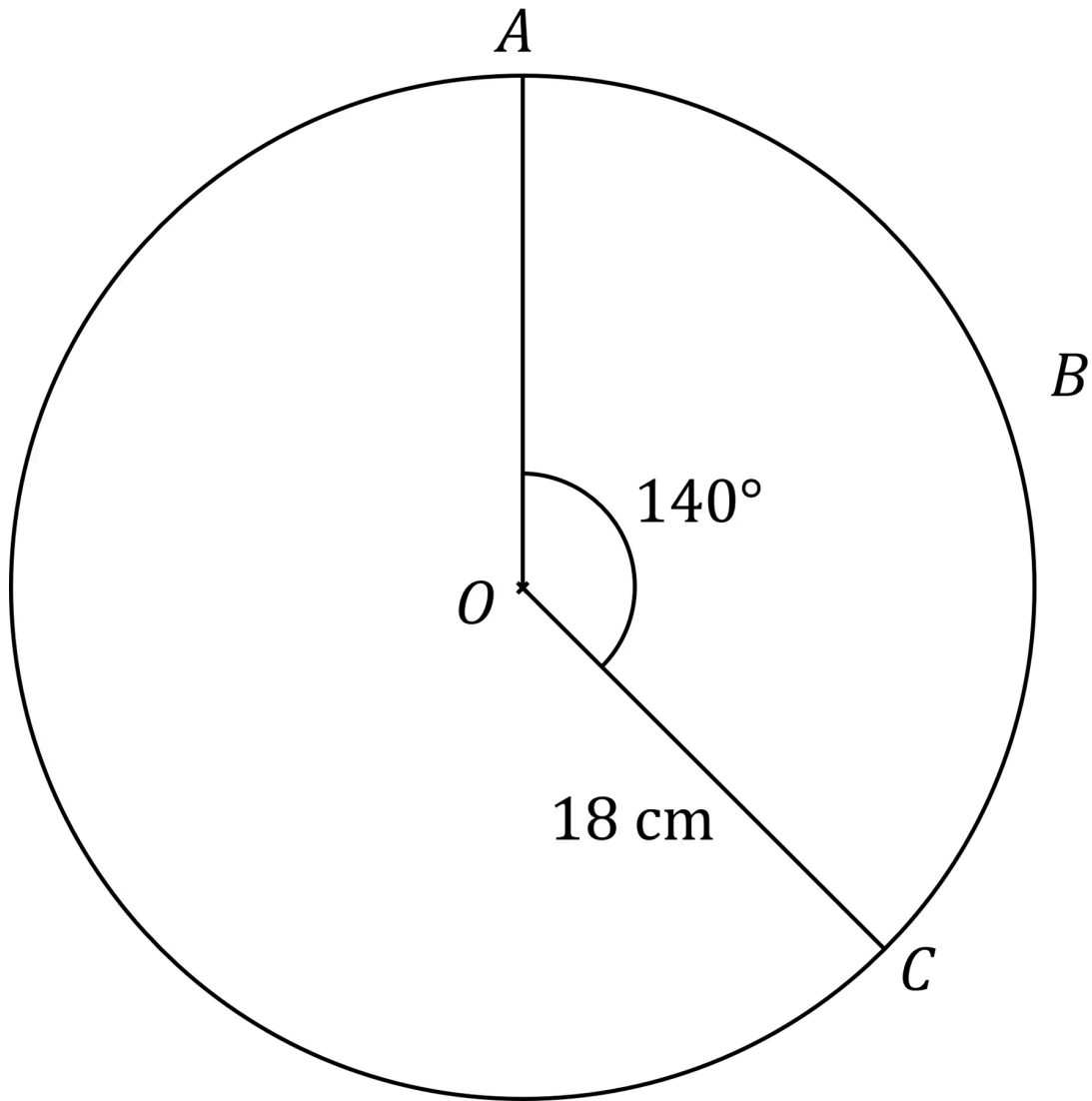
(ii) An area formed by two radii.

(iii) An area formed by a chord.

(3 marks)

Medium Questions

- 1 The diagram shows a sector $OABC$.



Find, giving your answers to 3 significant figures:

- (i) The area of the sector $OABC$.

[3]

- (ii) The length of the arc ABC .

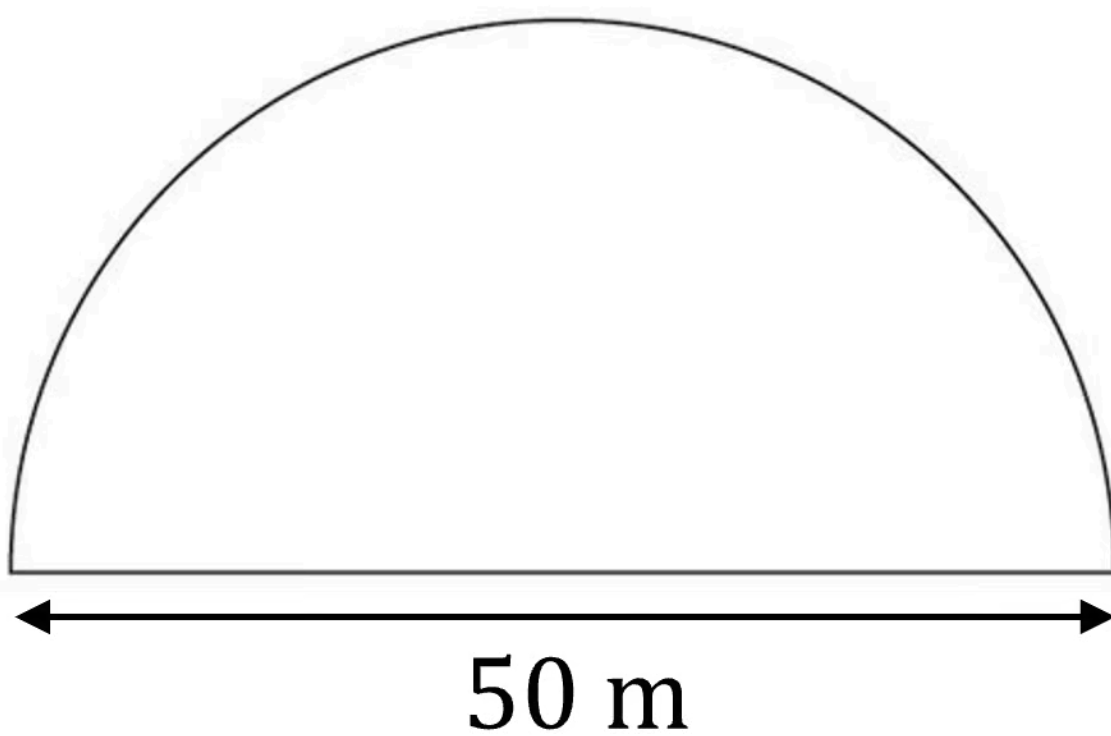
[3]

(6 marks)

2 The diagram below shows a semicircle with diameter 50 m.

Find the perimeter of the semicircle.

Give your answer in an exact form.



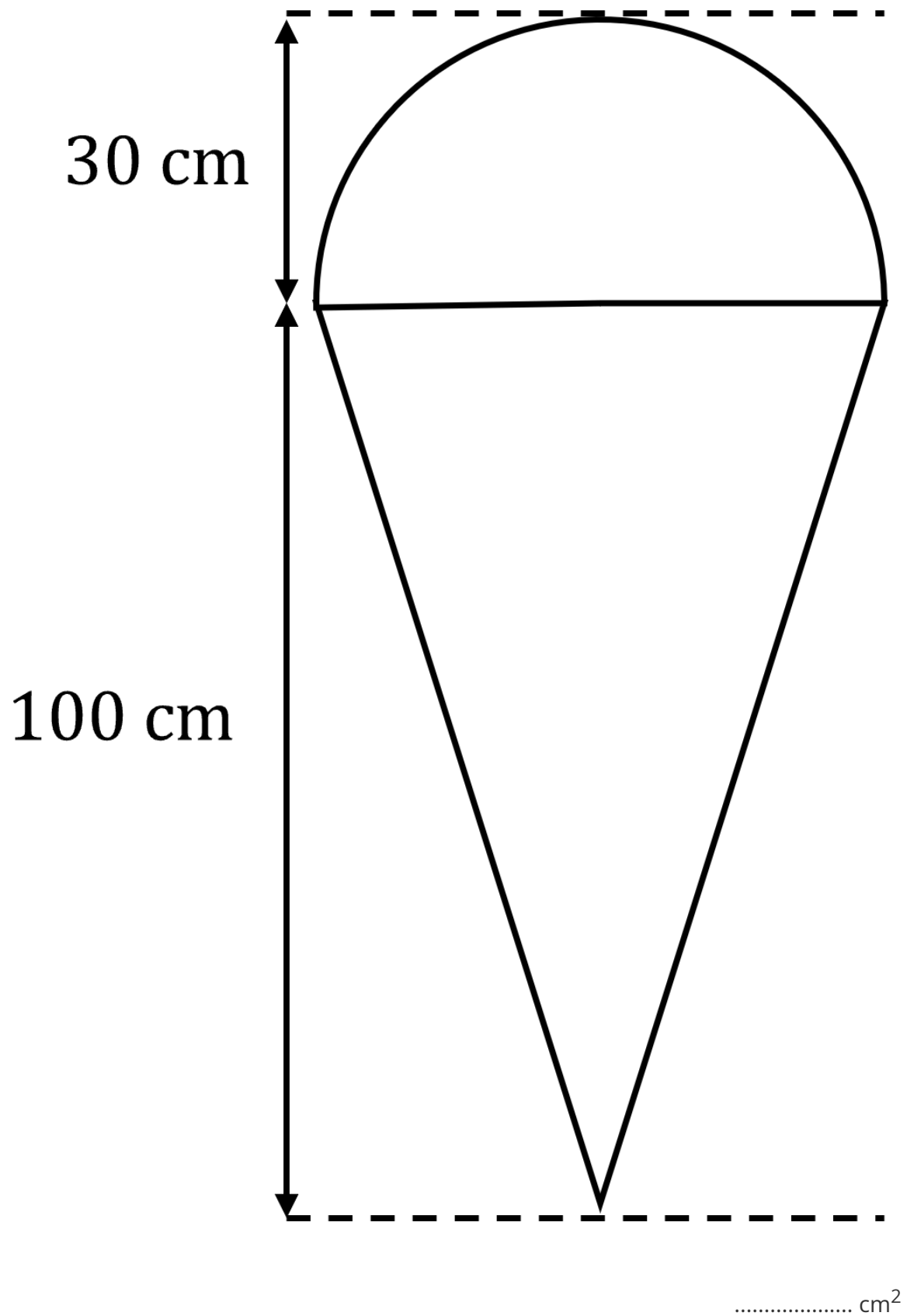
(2 marks)

3 A new sign for an ice cream shop has been designed.

It consists of a semicircle and an isosceles triangle.

The dimensions of the sign are shown in the diagram below.

Calculate the total area of the sign to 3 significant figures.



(5 marks)

- 4** A circle has a circumference of 56mm.

Work out the radius of this circle.

.....mm

(2 marks)

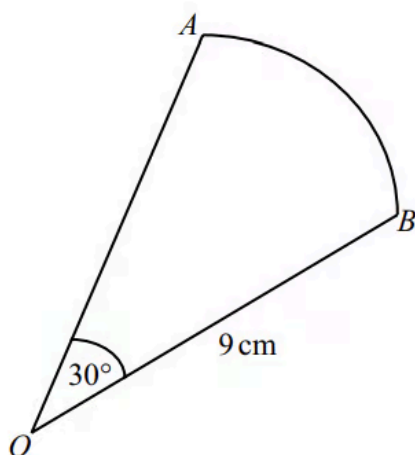
- 5** Rachel has a pond in her garden in the shape of a circle.
The circumference of the pond is 4.25m.

Calculate the diameter of the pond.
Give your answer in centimetres.

..... cm

(3 marks)

6

NOT TO
SCALE

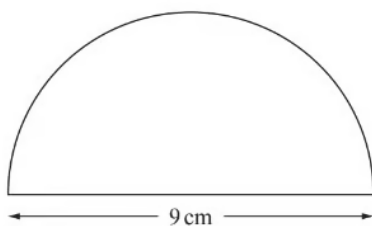
OAB is a sector of a circle with radius 9 cm and centre O .
The angle at O is 30° .

Calculate the area of this sector.
Give your answer in terms of π .

..... cm^2

(2 marks)

7

NOT TO
SCALE

The diagram shows a semicircle with diameter 9 cm.

Calculate the total perimeter of this semicircle.

..... cm

(3 marks)

8 There is a circular pool in the play area at a park. The pool has a diameter of 8m.

Calculate

i) the circumference of the pool,

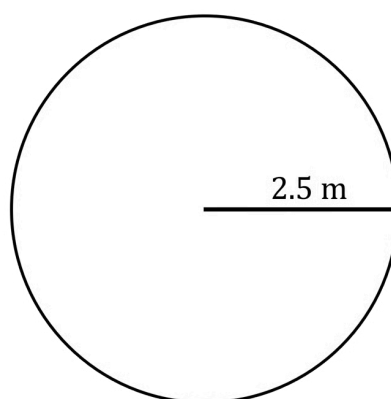
.....m [2]

ii) the area of the pool.

..... m² [2]

(4 marks)

9 A garden is in the shape of a circle with radius 2.5 metres.



Weeds have grown in 55% of the garden.

The rest of the garden is free of weeds.

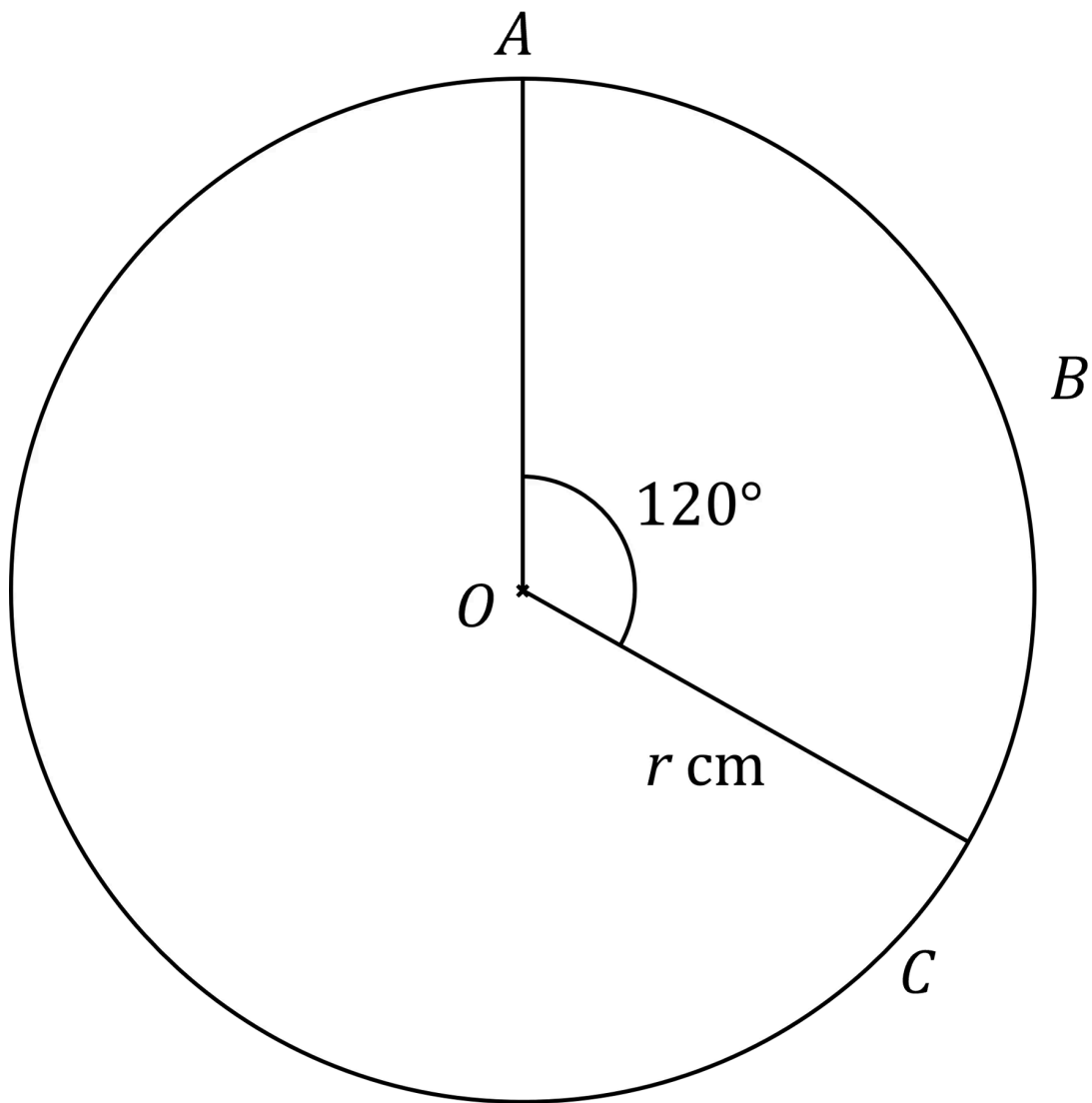
Work out the area of the garden that is free of weeds.

(3 marks)

Hard Questions

1 (a) The diagram below shows sector $OABC$.

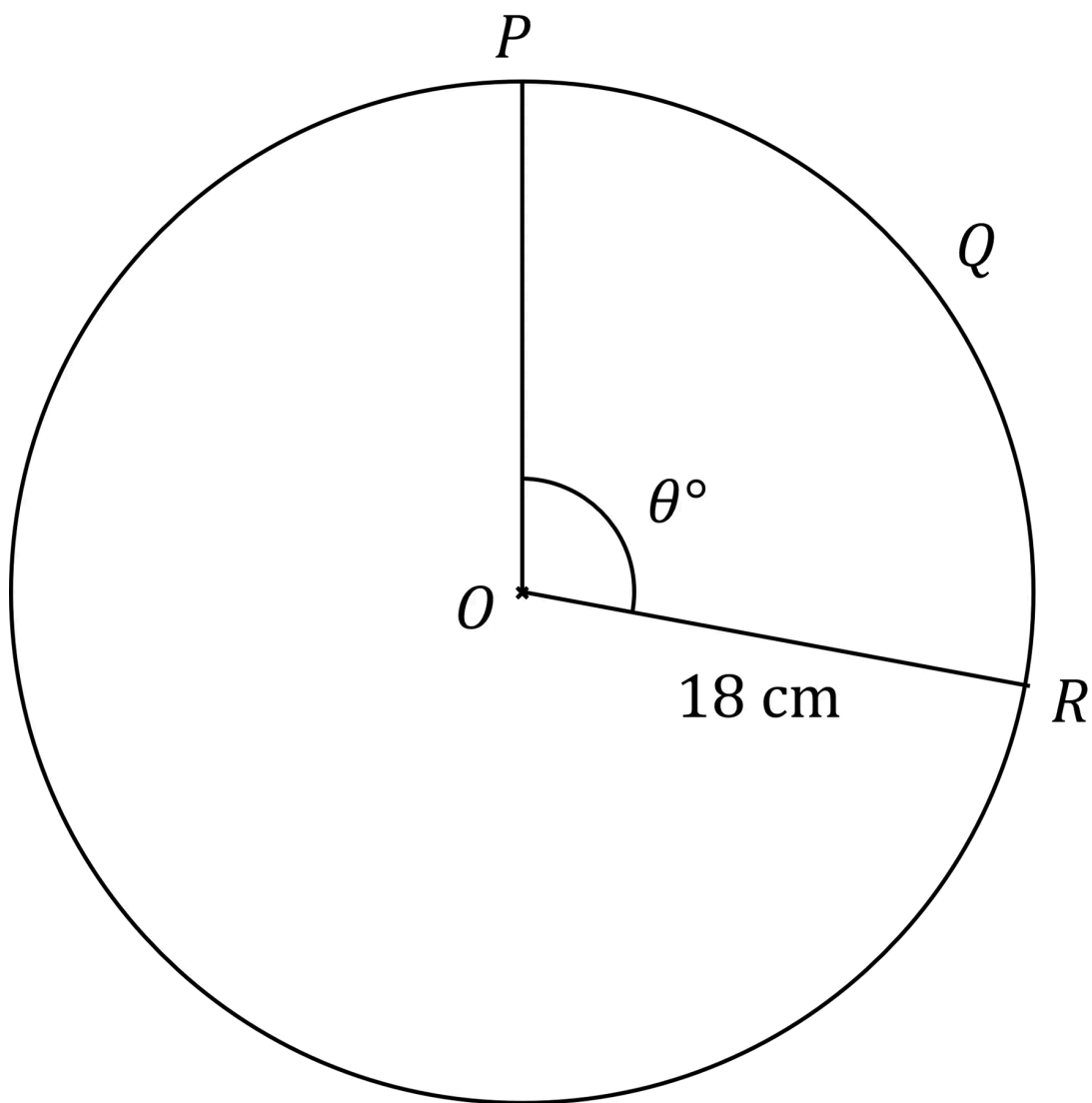
Given that the area of the sector $OABC$ is $48\pi \text{ cm}^2$, find the value of r .



(3 marks)

(b) The diagram below shows sector $OPQR$.

Given that the length of the arc PQR is 10π cm, find the value of θ .



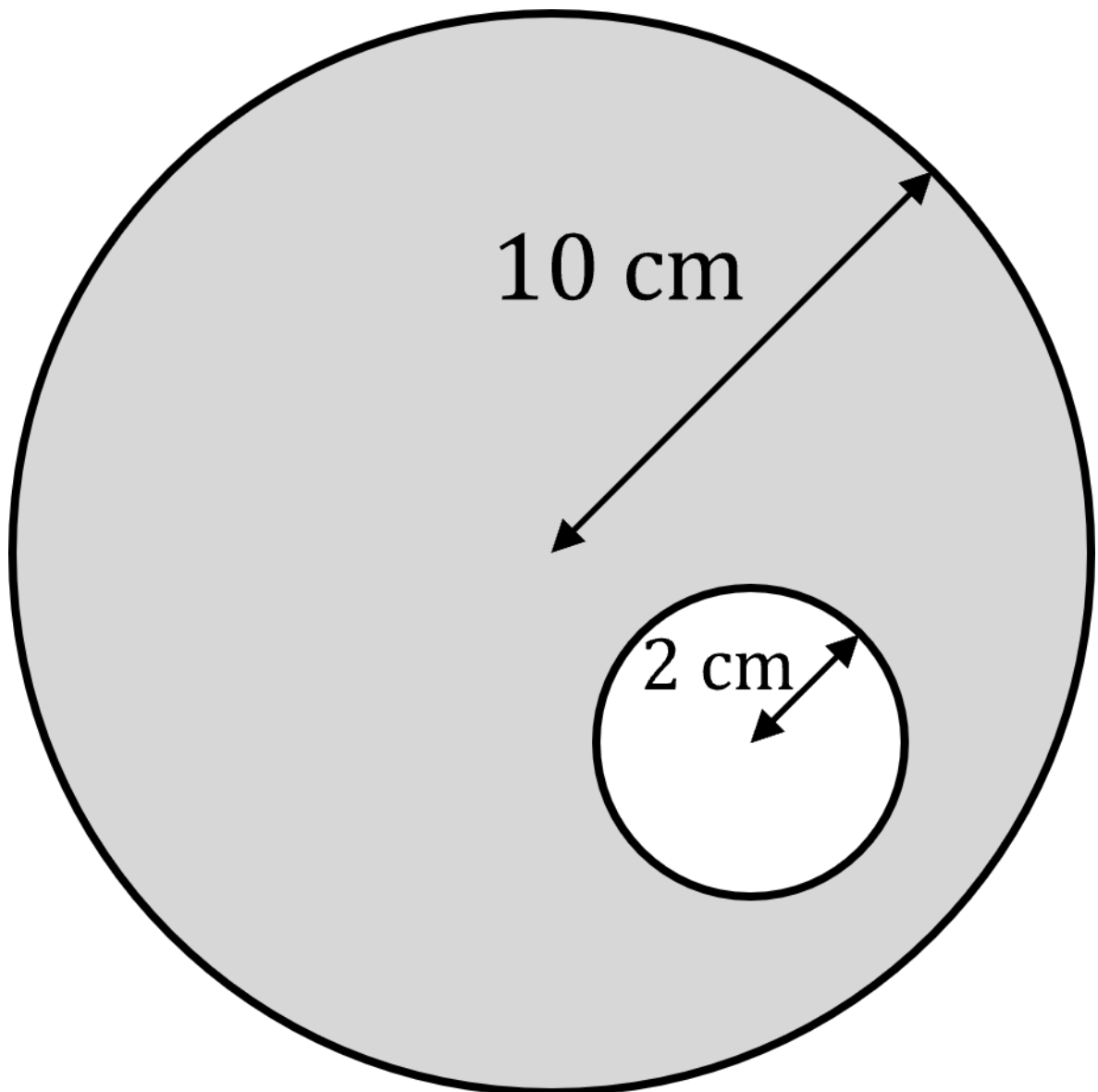
(3 marks)

2 The diagram below shows a circle with a circular hole.

The shape is made by starting with a circle of radius 10 cm , and then a smaller circle of radius 2 cm is removed.

Find the shaded area of the shape.

Write your answer to 3 significant figures.

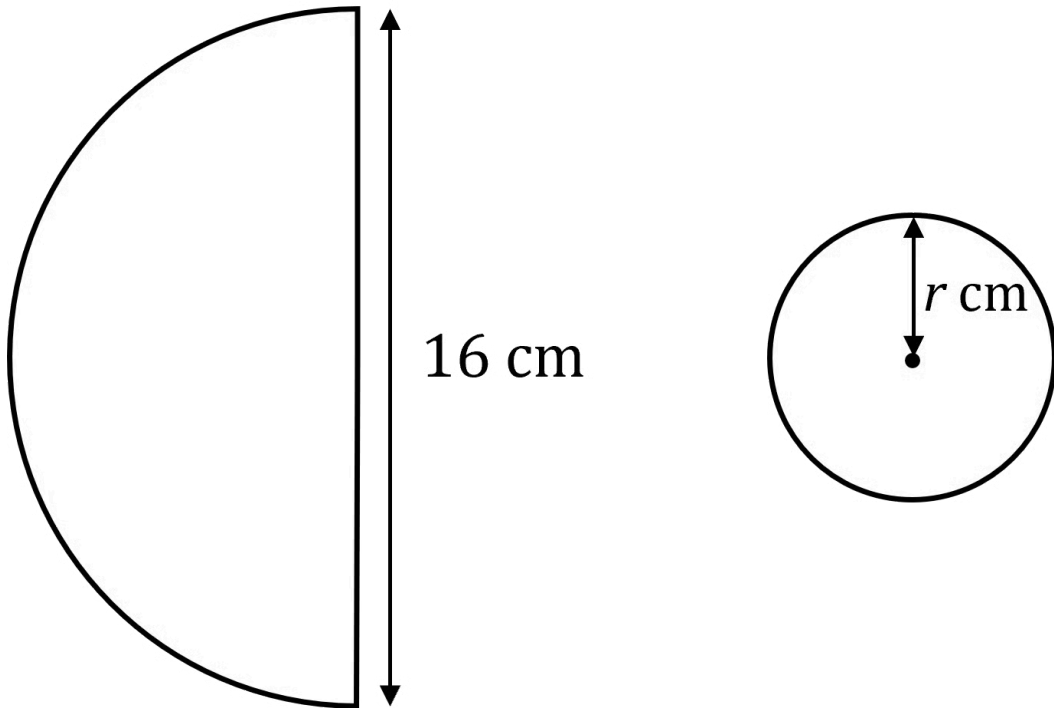


(4 marks)

3 The diagram below shows a semicircle and a circle.

The diameter of the semicircle is 16 cm.

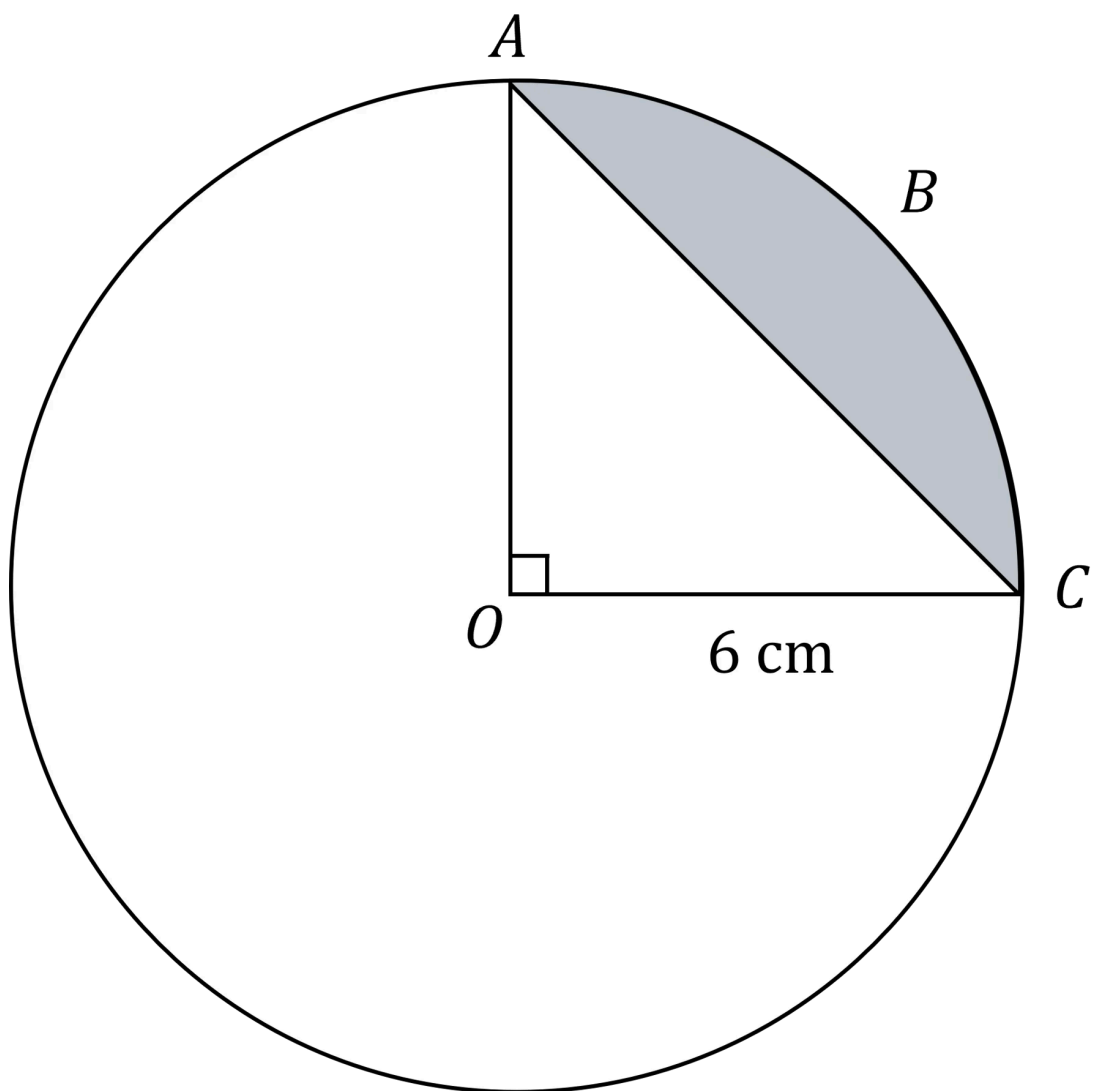
The radius of the circle is r cm.



Given that the area of the semicircle is 8 times larger than the area of the circle, find the value of r .

(4 marks)

- 4 The diagram shows a sector $OABC$ of a circle, centre O and radius 6 cm.



OAC is a right-angled triangle.

Work out the area of the shaded segment ABC .

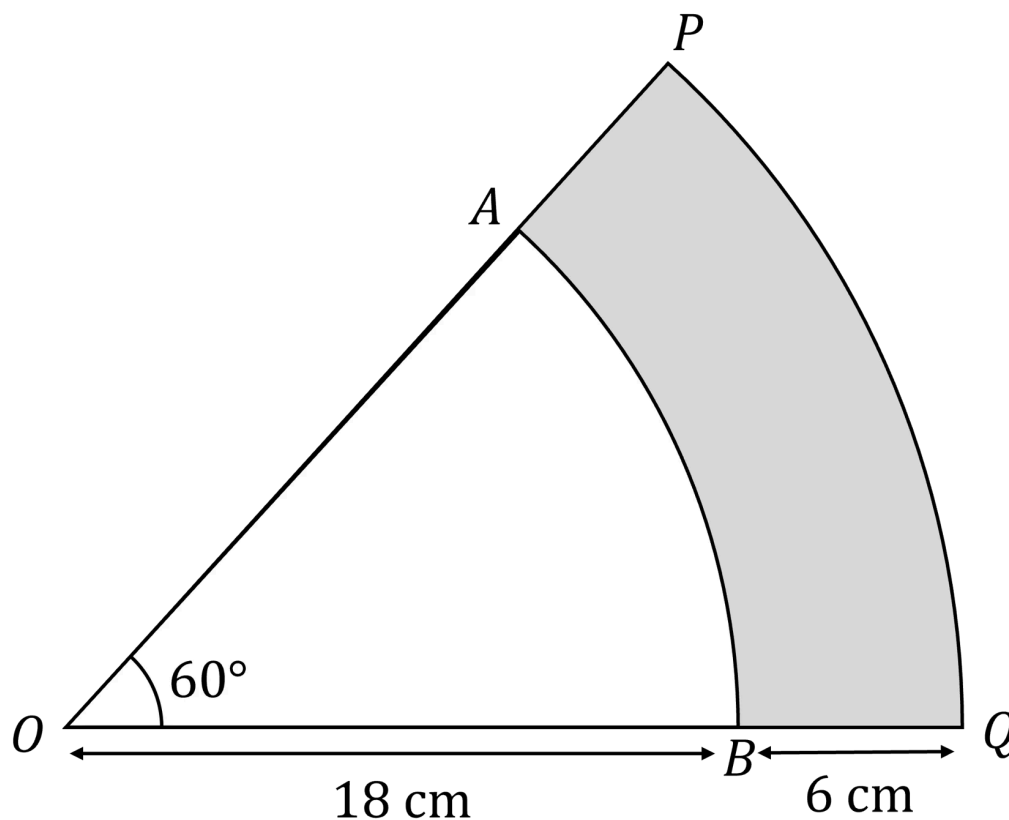
Give your answer to 3 significant figures.

..... cm^2

(4 marks)

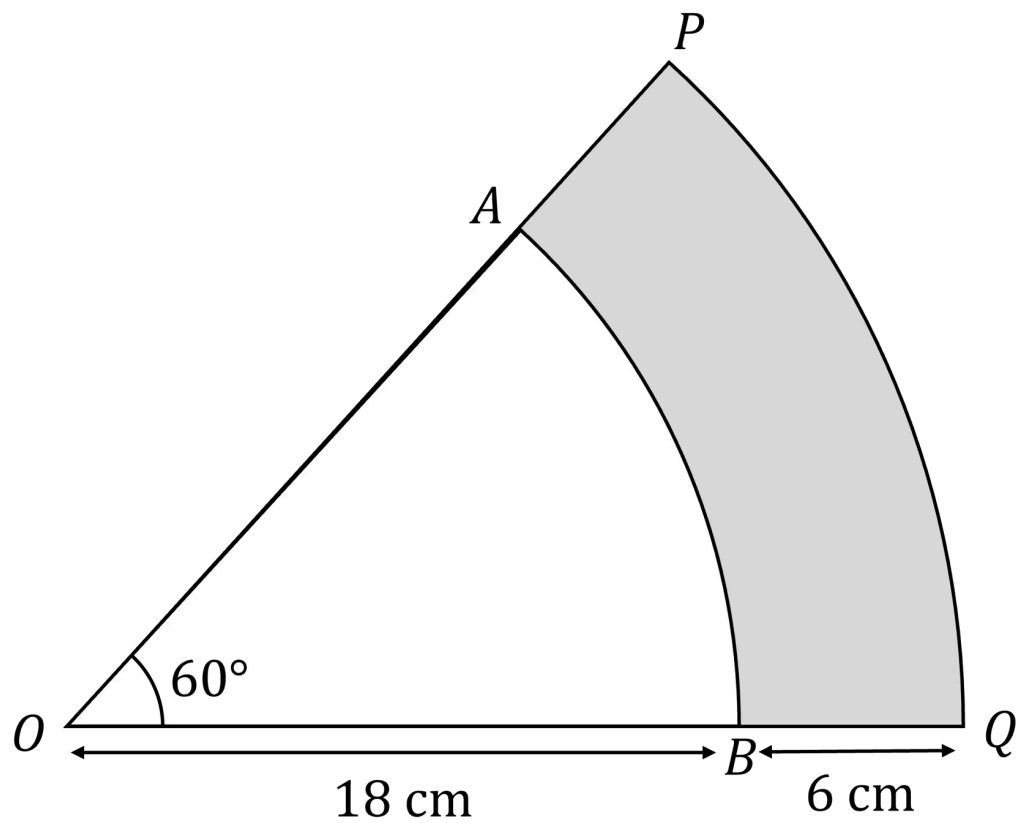
- 5 (a) The shaded shape below, $APQB$, is formed by taking a large sector, OPQ , and removing a smaller sector, OAB .

Find the shaded area, stating your answer in terms of π .



(4 marks)

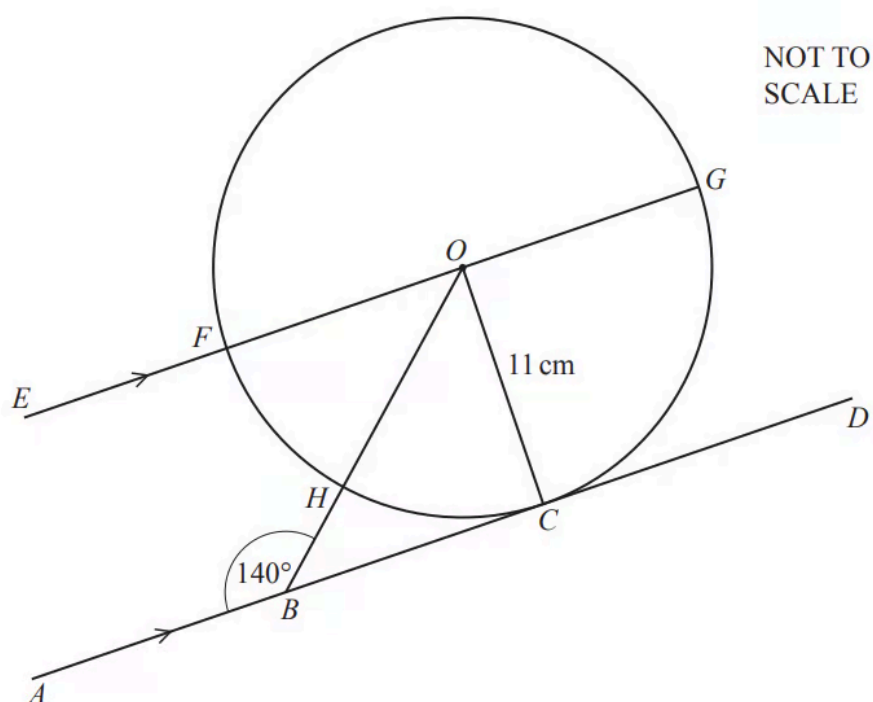
(b) For the same shape described in part (a)



Find the perimeter of the shape $APQB$, stating your answer in terms of π .

(5 marks)

6 (a)



The diagram shows a circle, centre O , radius 11 cm. C , F , G and H are points on the circumference of the circle.

The line AD touches the circle at C and is parallel to the line EG . B is a point on AD and angle $ABO = 140^\circ$.

Write down the mathematical name of the straight line AD .

(1 mark)

(b) i) Find, in terms of π , the circumference of the circle.

[2]

ii) Work out angle FOH .

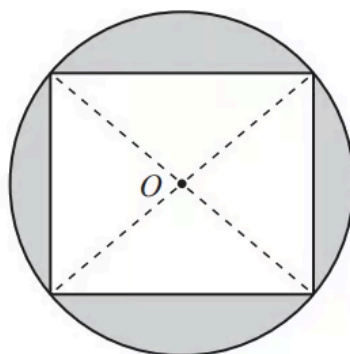
Angle $FOH = \dots\dots\dots$ [2]

iii) Calculate the length of the minor arc FH .

$\dots\dots\dots$ cm [2]

(6 marks)

7



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The diagram shows a square with vertices on the circumference of a circle, centre O .
The radius of the circle is 6 cm.

Work out the shaded area.

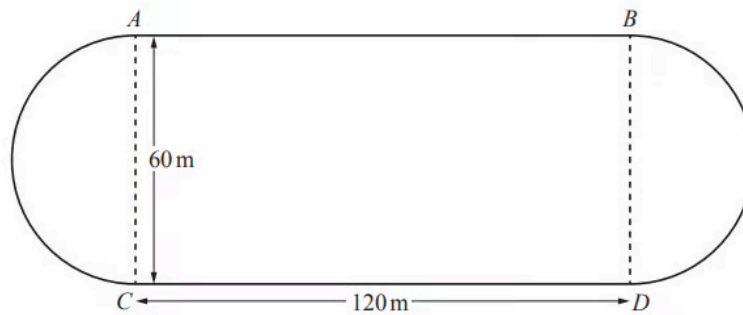
..... cm²

(5 marks)

- 8 The diagram shows a rectangle and two semicircles with diameters AC and BD .
This diagram is a scale drawing of a running track.

$$AC = BD = 60\text{m}$$

$$AB = CD = 120\text{m}$$



i) Complete the statement.

1 centimetre represents metres [2]

ii) Work out the total length of the running track in metres.

..... m [3]

iii) Shreva walks at 1.4m/s.

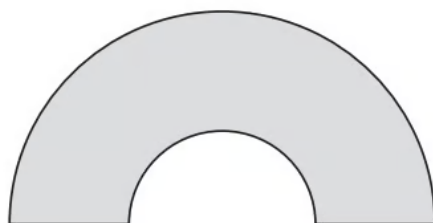
Work out how long it will take her to walk once around the track.

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

..... minutes seconds [3]

(8 marks)

9



NOT TO
SCALE

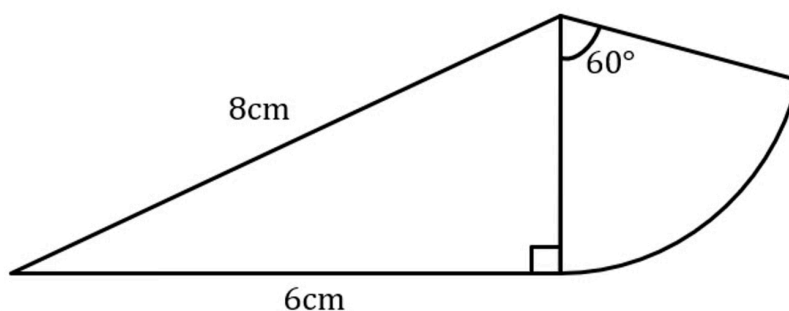
This shape is drawn using two semicircles that have the same centre.
The large semicircle has radius 7 cm.
The small semicircle has radius 3 cm.

Calculate the area of the shape.

..... cm²

(3 marks)

10 The diagram shows a right angled triangle and a sector of a circle with angle 60 degrees.



Not drawn to scale

Calculate the area of the sector.

(4 marks)