

Surname	
Other Names	
Candidate's Signature	

## GCSE 9 - 1 Questions

### Sector Area and Segment Lengths

**Calculator Allowed**

#### INSTRUCTIONS TO CANDIDATES

Write your name in the space provided.

Write your answers in the spaces provided in this question paper.

Answer ALL questions.

Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.

You should have a ruler, compass and protractor where required.

**Total Marks :**

1)

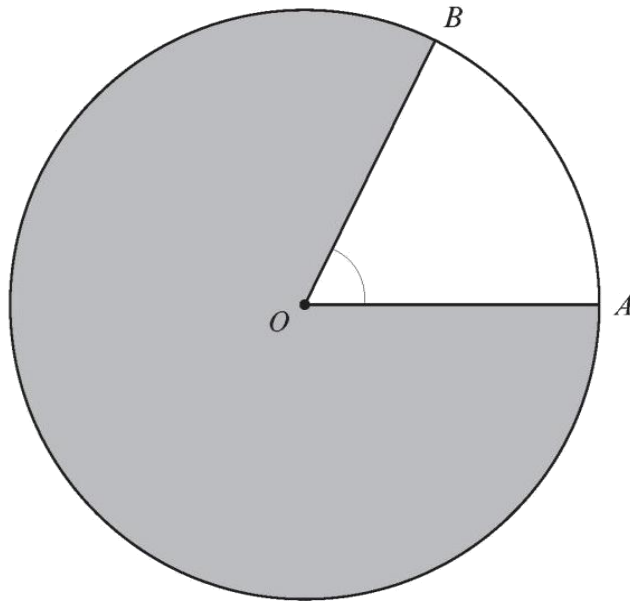


Diagram not drawn to scale

The points  $A$  and  $B$  lie on a circle with centre  $O$ .  
The radius of the circle is 15 cm and  $\widehat{AOB} = 80^\circ$ .

(a) Calculate the length of the minor arc  $AB$ .

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[2]

(b) Calculate the area of the shaded sector of the circle.

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[3]

2) A sector is removed from a circle of radius 12 cm, as shown below.

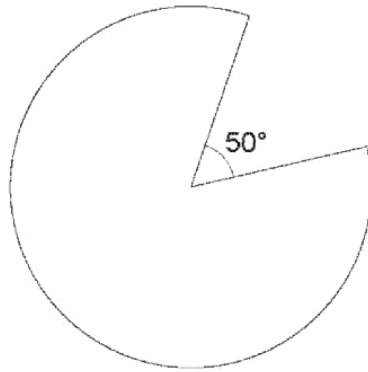


Diagram not drawn to scale

(a) Calculate the area of the remaining shape. [3]

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(b) What is the perimeter of the sector that has been removed? [4]

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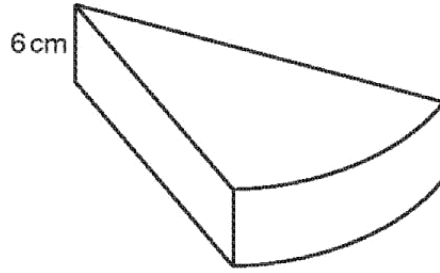
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3)



*Diagram not drawn to scale*

The shape above is  $\frac{1}{12}$  of a solid cylinder of radius 15 cm and height 6 cm.

Calculate the total surface area of this shape.

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- 4) (a) A circular flower bed in a town park has a radius of 8 metres.  
The perimeter of a major sector of this flower bed is marked out with a thin metal strip, as shown below.

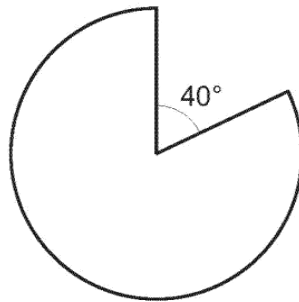


Diagram not drawn to scale

Calculate the total length of the thin metal strip. [3]

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- (b) A different circular flower bed has a radius of 12 metres.  
The park gardener wants to create a sector  $AOB$  of this circle that has a surface area of  $93\text{ m}^2$ .

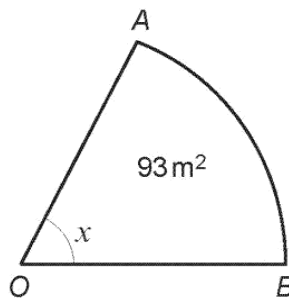


Diagram not drawn to scale

Calculate the size of angle  $x$ . [3]

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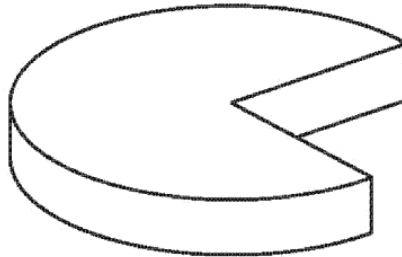
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- 5) A factory produces metal parts for an engine.  
One of the parts is a circular shape with a sector removed as shown below.



*Diagram not drawn to scale*

The angle subtended at the centre of the part is  $305^\circ$ .  
The radius of the circle is 6 cm.  
The thickness of the part is 2 cm.

- (a) Calculate the area of the top surface of the part. [2]

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- (b) The curved rim of the part is to be painted red.  
Calculate the area that will be painted red. [4]

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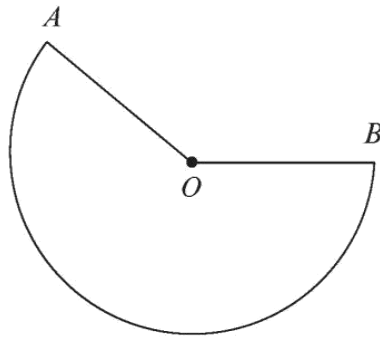
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- 6) A sector of a circular metal plate centre  $O$ , with radius 18 cm, is removed to leave the following shape.



*Diagram not drawn to scale*

The length of the arc  $AB$  of the shape is 66 cm.

- (a) Calculate the size of the reflex angle  $AOB$  correct to the nearest degree.

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[3]

- (b) What was the area of the piece of metal that was removed?

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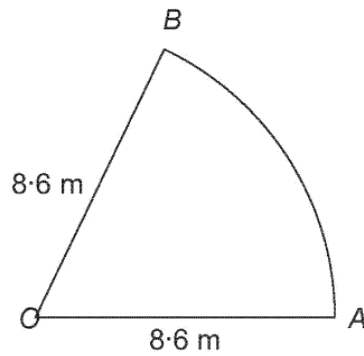
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- 7) A gardener is marking out the border of a flowerbed.  
The flowerbed is in the shape of a sector  $AOB$  of a circle centre  $O$  as shown below.

The complete border is 28 metres long.  
 $OA = OB = 8.6$  m.



*Diagram not drawn to scale*

- (a) Calculate the size of  $\widehat{AOB}$ . [4]

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- 8) Points  $E$  and  $F$  lie on a circle, centre  $O$ .  
The radius of the circle is 10 cm.  
The area of the shaded sector is  $65\text{ cm}^2$ .

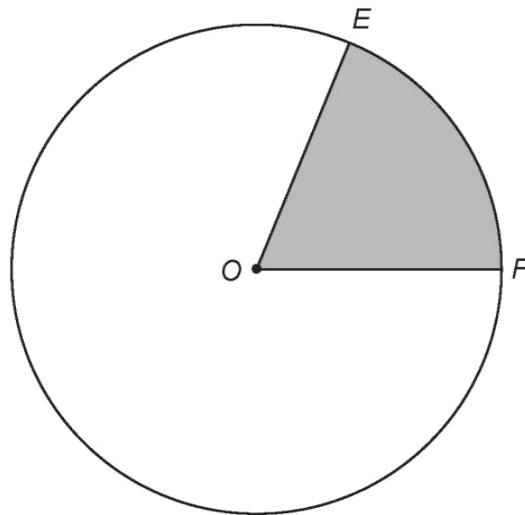


Diagram not drawn to scale

- (a) Calculate the size of  $\widehat{EOF}$ . [3]

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- (b) Hence, calculate the length of the arc  $EF$ . [2]

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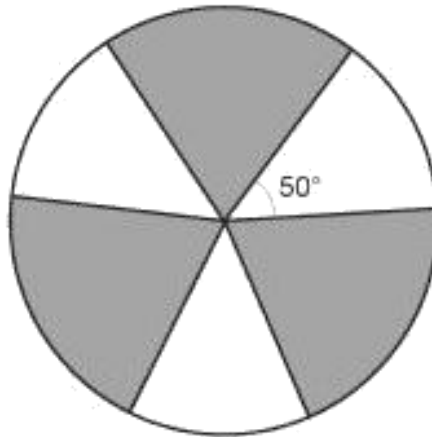
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9) A circular logo, with radius 8 cm, is shown below.



All three white sectors are equal in size and shape.  
All three shaded sectors are equal in size and shape.

(a) Calculate the total area of the shaded sectors. [4]

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(b) The whole perimeter of all the shaded sectors is to be drawn in red.  
Calculate the total length of all these red boundary lines. [4]

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10) The shaded part of the diagram below shows the top surface of an engine part.

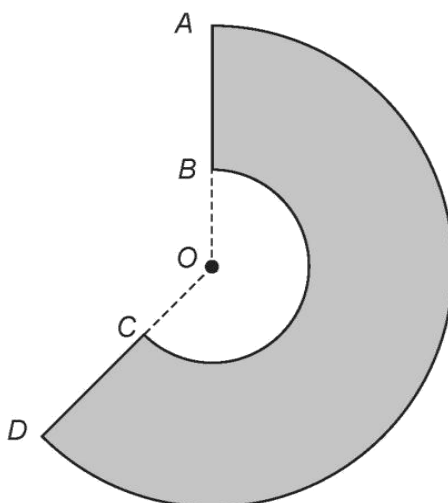


Diagram not drawn to scale

The measurements taken by a motor engineer are:

- reflex angle  $\widehat{BOC} = 240^\circ$ ,
- $AO = OD = 6\text{ cm}$ ,
- $BO = OC = 3\text{ cm}$ .

(a) The length of the major arc  $AD$  is to be sealed by attaching a flexible anti-rust strip. Each flexible anti-rust strip is of length 35 cm. What length of the anti-rust strip will be left over after sealing the length of the major arc  $AD$ ? Give your answer in terms of  $\pi$ , in its simplest form. [3]

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Length of anti-rust strip left over = ..... cm

- 11) The diagram shows two concentric circles with centre  $O$ .  
 $OP = 10\text{cm}$  and  $OR = 6\text{cm}$ .  
The area of the shaded section is  $48.03\text{cm}^2$ .

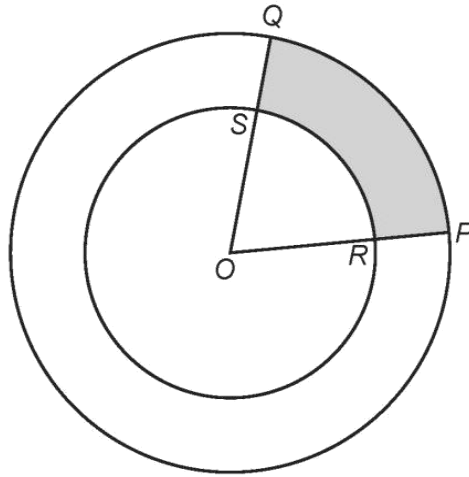


Diagram not drawn to scale

- (a) Calculate the size of  $\widehat{POQ}$ .

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- (b) Using your answer to part (a), calculate the length of the perimeter of the shaded section, PQSR. [4]

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- 12) A company logo is made up of three parts: a square and two identical sectors attached to two of its sides, as shown below.

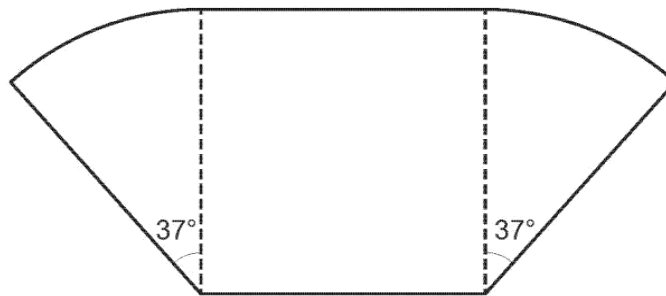


Diagram not drawn to scale

The logo displayed outside the company's head office has a central square with a side length of 7 metres.

- (a) Calculate the total area of this logo. [3]

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- (b) Calculate the total length of the perimeter of this logo. [3]

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- 13) Thelma is selling three plots of land in an auction. She needs to advertise the perimeters of each of the plots of land. The sketch below shows the measurements that Thelma has taken. She has added her notes about the shape of some of the plots.

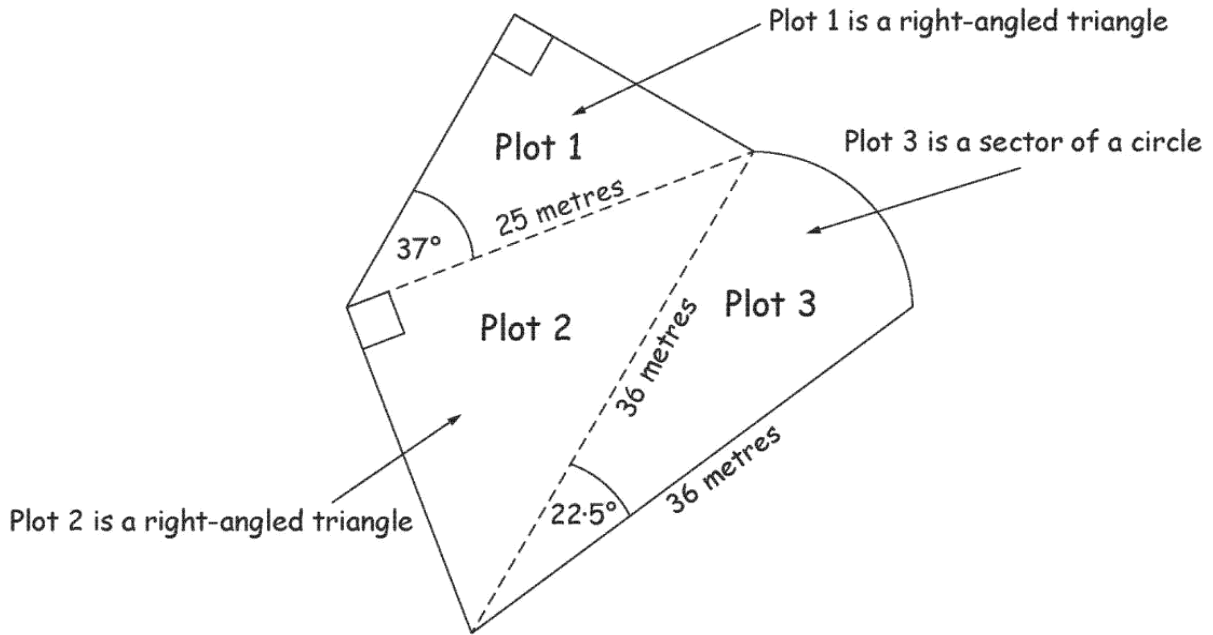


Diagram not drawn to scale

Calculate the perimeter of each of the plots of land.  
Give your final answers correct to the nearest metre.  
You must show all your working.

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