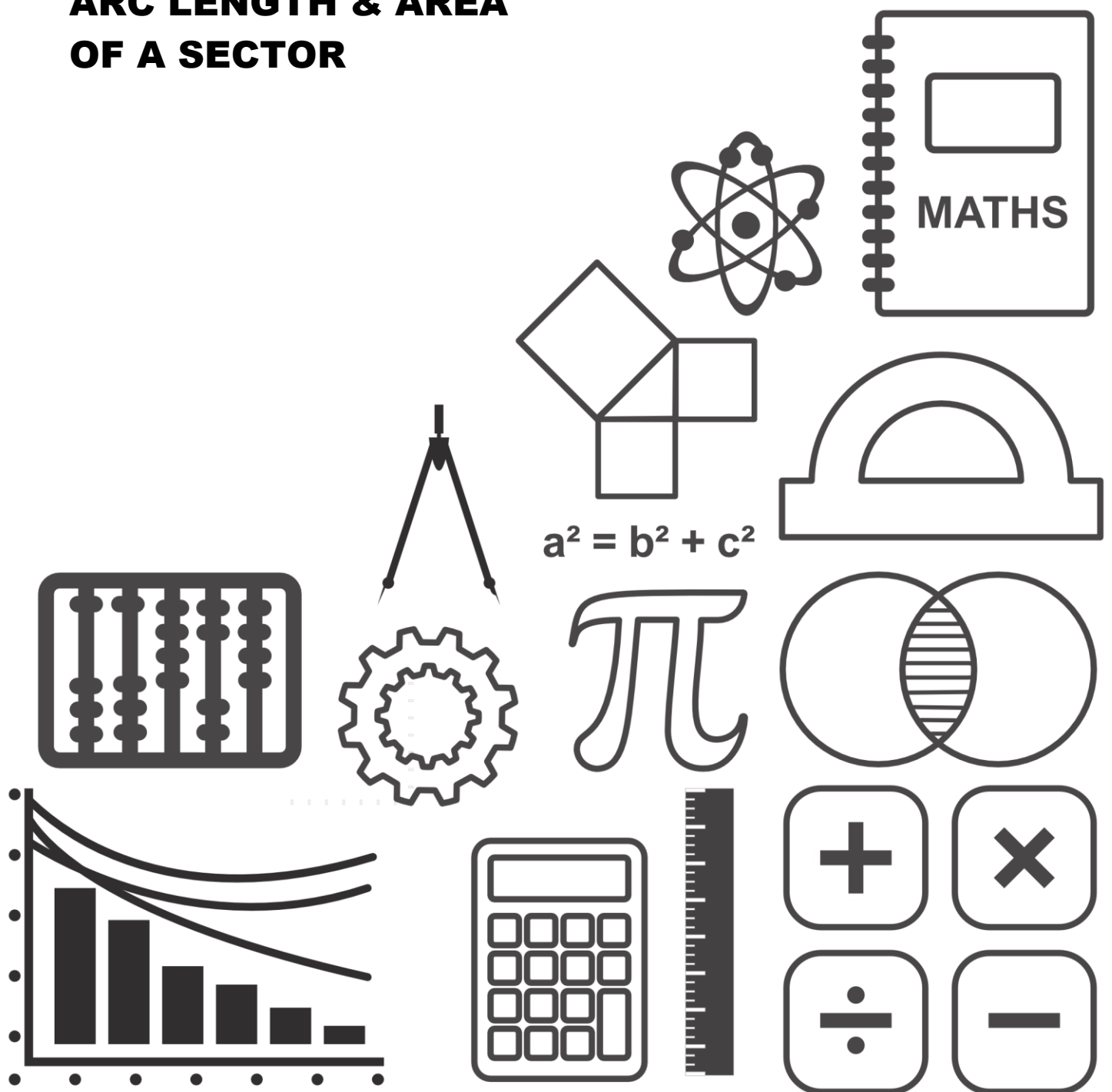


GCSE TOPIC BOOKLET ARC LENGTH & AREA OF A SECTOR



1.

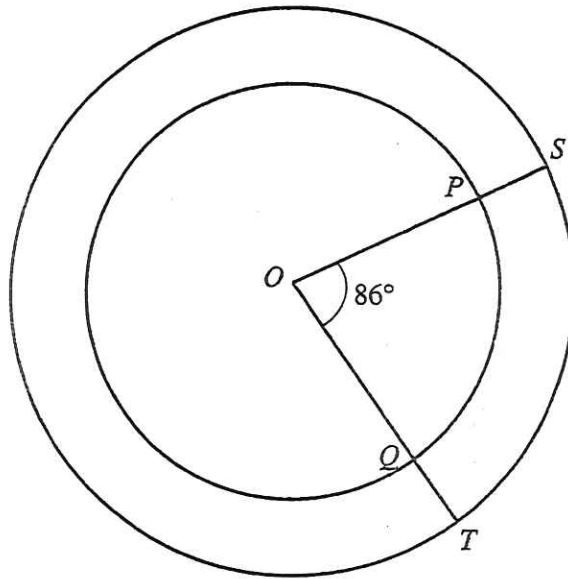


Diagram not drawn to scale.

The diagram shows two concentric circles with centre O .

OQ and OP are radii of the smaller circle.

OS and OT are radii of the larger circle.

The radius of the larger circle is 7.3 cm.

$\angle POQ = 86^\circ$.

(a) Calculate the area of sector SOT .

[2]

(b) The area of the sector POQ is 20.3 cm^2 . Calculate the radius of this sector POQ .

[3]

2.

- (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.

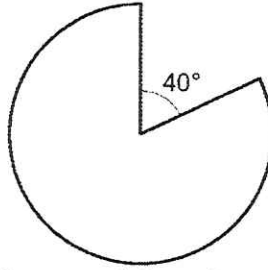


Diagram not drawn to scale

Calculate the total length of the thin metal strip.

[3]

- (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 m^2 .

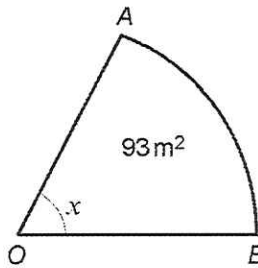


Diagram not drawn to scale

Calculate the size of angle x .

[3]

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

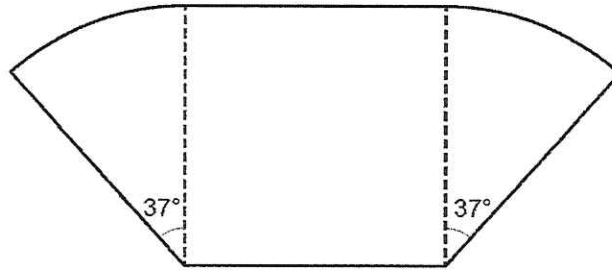


Diagram not drawn to scale

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]

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

4.

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

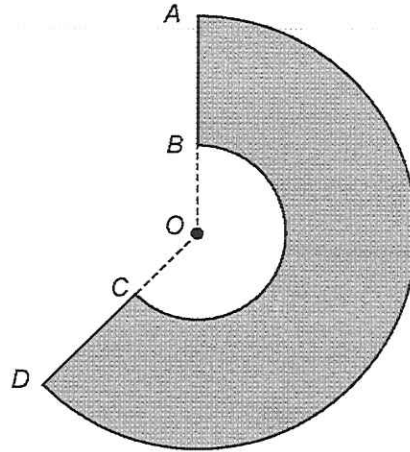


Diagram not drawn to scale

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 π , in its simplest form. [3]

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Length of anti-rust strip left over = cm

- (i) Calculate the cost of the paint to be used.
Give your answer in terms of π , in its simplest form.

(This area contains horizontal lines for writing.)

- (ii) Using $\pi = 3$, calculate how much it costs to paint the top surface of 20 engine parts. Give your answer in pounds. [1]

[illegible]

Paint cost is £

5.

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 cm^2 .

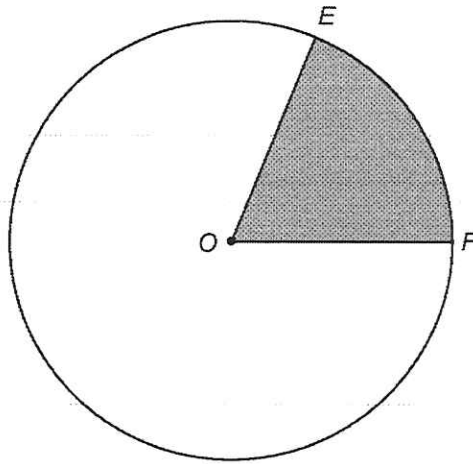


Diagram not drawn to scale

(a) Calculate the size of $\angle EOF$.

[3]

(b) Hence, calculate the length of the arc EF .

[2]

6.

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

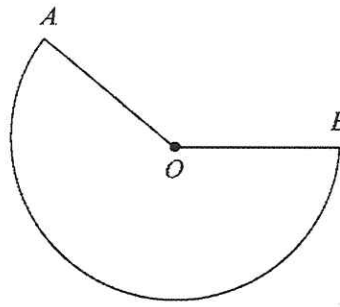


Diagram not drawn to scale

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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[2]

7.

The diagram shows a circular flower bed, which is split into two sectors, one for spring flowers and the other for roses.
The centre of the circle is O and the area of the minor sector is 31.3 m^2 .

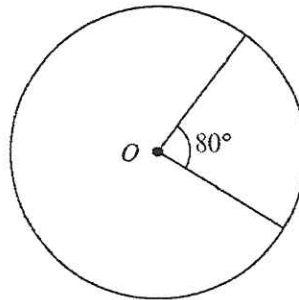


Diagram not drawn to scale

- (a) Calculate the radius of the flower bed.

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[3]

- (b) Calculate the perimeter of the major sector of the flower bed.

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[3]

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.
 $OA = OB = 8.6\text{ m}$.

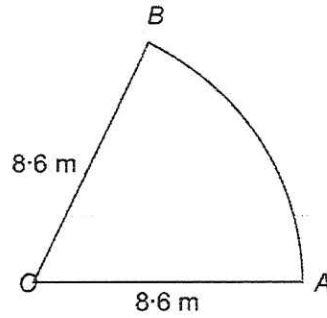


Diagram not drawn to scale

- (a) Calculate the size of $\hat{AOB}$.

[4]

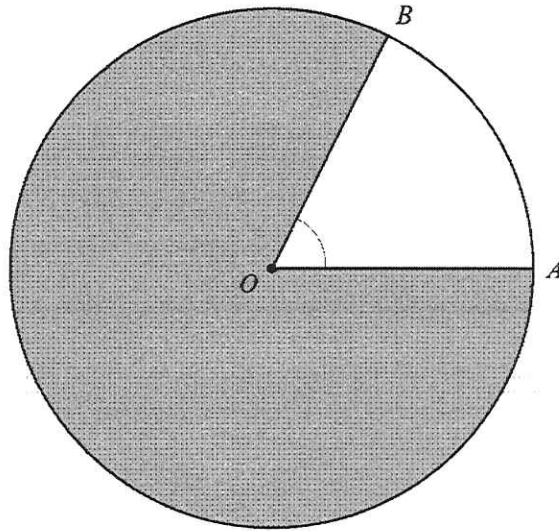


Diagram not drawn to scale

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 .

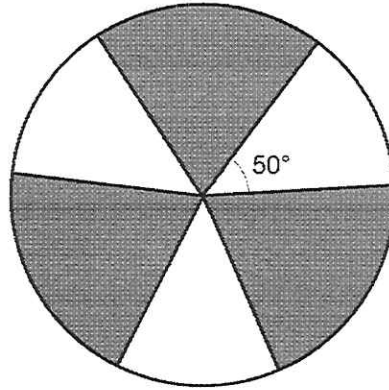
[2]

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

[3]

10.

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]

- (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]

The diagram shows two sectors of circles, BOC and AOD .
The circles have a common centre, O .
You are given that $\widehat{AOD} = 131^\circ$, $OB = OC = 8.4\text{cm}$ and $BA:AO$ is $1:2$.

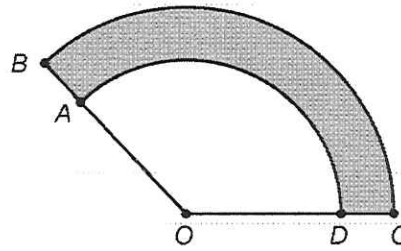


Diagram not drawn to scale

Calculate the perimeter of the shaded region $ABCD$.

[6]

[illegible]

Perimeter of $ABCD$ is cm

12.

The radius of the circle below is 3.6 cm.

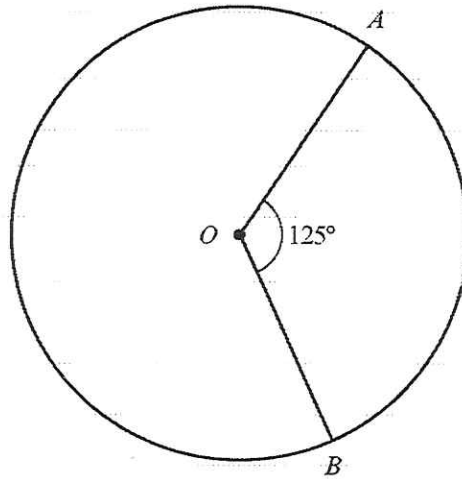


Diagram not drawn to scale

Calculate the length of the minor arc AB .

[2]

13.

A landing area, as shown below, is marked out for a throwing event in a sports field. AB is an arc of a circle centre O . The angle $\widehat{AOB} = 60^\circ$ and $OA = OB = 80\text{m}$.

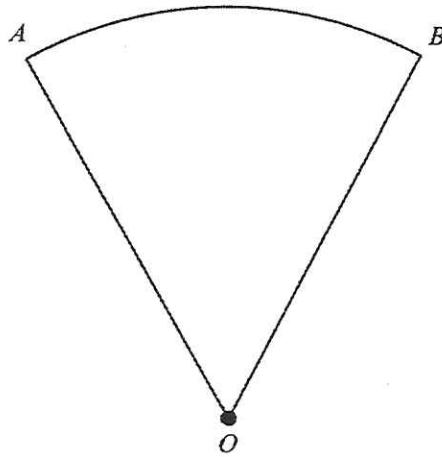


Diagram not drawn to scale

A rope is used to mark the boundary of the whole landing area.

(a) Calculate the area enclosed by the rope.

[2]

(b) What is the total length of the rope that is used to mark the landing area?

[4]