

Edexcel GCSE

Mathematics (Linear) – 1MA0

AREA OF SECTOR AND LENGTH OF ARCS

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser.
Tracing paper may be used.

Items included with question papers

Nil

**Instructions**

Use black ink or ball-point pen.

Fill in the boxes at the top of this page with your name, centre number and candidate number.

Answer all questions.

Answer the questions in the spaces provided – there may be more space than you need.

Calculators may be used.

Information

The marks for each question are shown in brackets – use this as a guide as to how much time to spend on **each** question.

Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed – you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.

Advice

Read each question carefully before you start to answer it.

Keep an eye on the time.

Try to answer every question.

Check your answers if you have time at the end.

1.

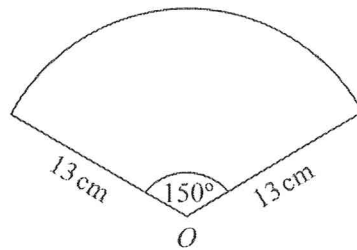


Diagram NOT accurately drawn

The diagram shows a sector of a circle, centre O .
The radius of the circle is 13 cm.
The angle of the sector is 150° .

Calculate the area of the sector.
Give your answer correct to 3 significant figures.

$$\frac{150}{360} \times \pi(13)^2 = 221.2204827$$

$$= 221 \text{ cm}^2 \text{ (3sf)}$$

..... 221 cm^2
(Total 2 marks)

2.

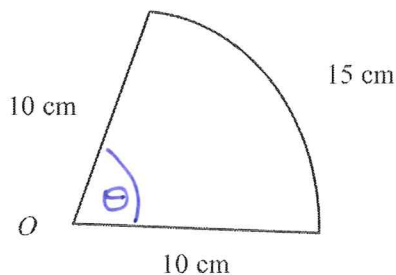


Diagram NOT accurately drawn

The diagram shows a sector of a circle, centre O , radius 10 cm.
The arc length of the sector is 15 cm.

Calculate the area of the sector.

$$\frac{\theta}{360} \times \pi(10)^2 = 15$$

$$\frac{\theta}{360} = \frac{15}{20\pi}$$

$$\theta = \frac{15}{20\pi} \times 360$$

$$\theta = 85.943669$$

$$\text{Area} = \frac{85.943669}{360} \times \pi(10)^2$$

$$= 75 \text{ cm}^2$$

..... 75 cm^2
(Total 4 marks)

3.

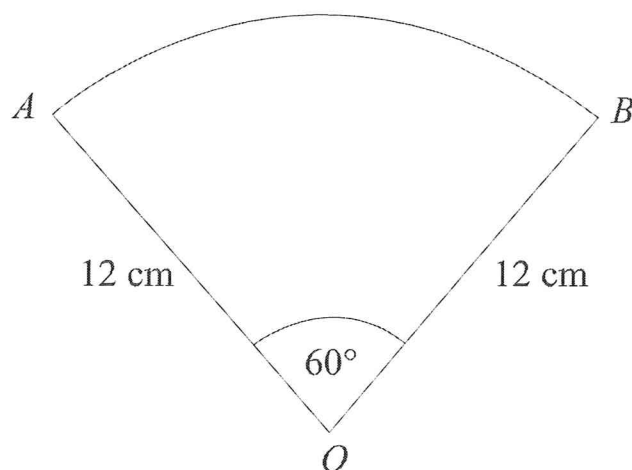


Diagram **NOT** accurately drawn

OAB is a sector of a circle, centre O .

Angle $AOB = 60^\circ$.

$OA = OB = 12$ cm.

Work out the length of the arc AB .

Give your answer in terms of π .

$$\begin{aligned} & \frac{60}{360} \times \pi (24) \\ &= \frac{1}{6} \times 24\pi \\ &= 4\pi \end{aligned}$$

4π cm
(Total 3 marks)

4.

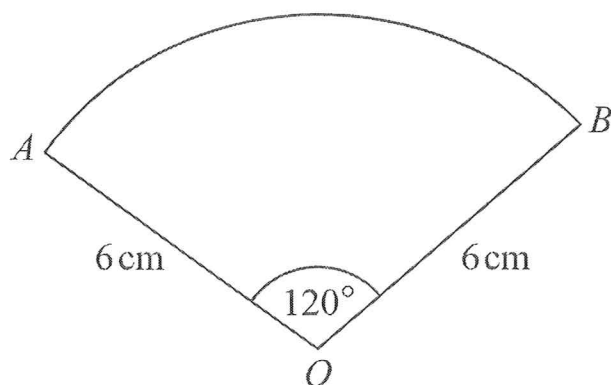


Diagram NOT accurately drawn

The diagram shows a sector of a circle, centre O .

The radius of the circle is 6 cm.

Angle $AOB = 120^\circ$.

Work out the **perimeter** of the sector.

Give your answer in terms of π in its simplest form.

Arc Length

$$\frac{120}{360} \times \pi(12)$$

$$= \frac{1}{3} \times 12\pi$$

$$= 4\pi$$

$$\text{Perimeter} = 4\pi + 6 + 6$$

$$= 4\pi + 12$$

$$\underline{4\pi + 12} \text{ cm}$$

(Total 3 marks)

5.

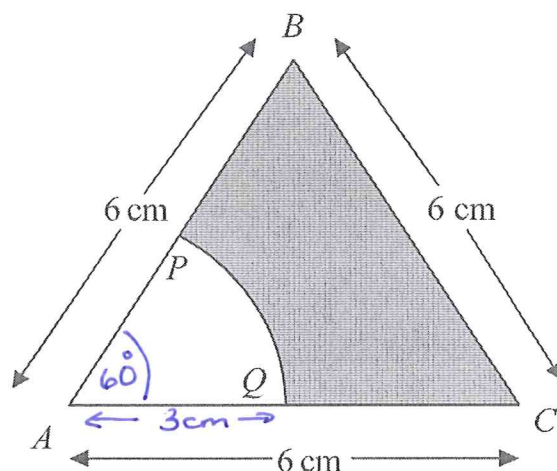


Diagram NOT accurately drawn

The diagram shows an equilateral triangle ABC with sides of length 6 cm.

P is the midpoint of AB .

Q is the midpoint of AC .

APQ is a sector of a circle, centre A .

Calculate the area of the shaded region.

Give your answer correct to 3 significant figures.

Area triangle using $\frac{1}{2}ab\sin C$

$$\begin{aligned}\text{Area } \Delta &= \frac{1}{2} \times 6 \times 6 \times \sin 60 \\ &= 9\sqrt{3}\end{aligned}$$

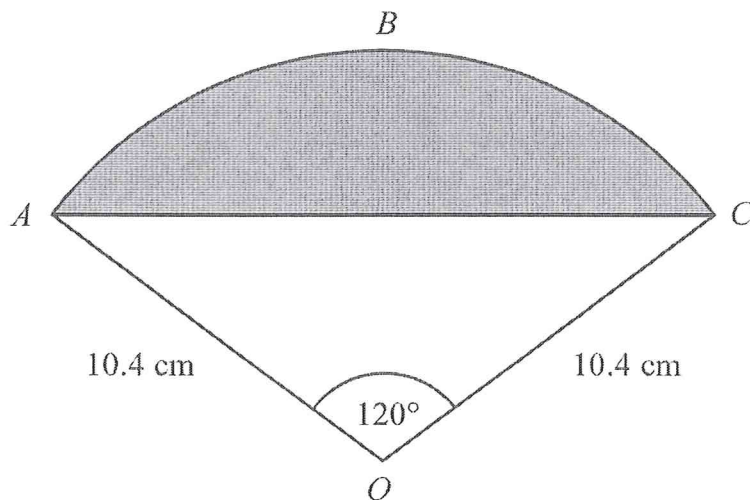
$$\begin{aligned}\text{Area of Sector} &= \frac{60}{360} \times \pi (3)^2 \\ &= \frac{3}{2}\pi\end{aligned}$$

$$\text{Shaded Area} = 9\sqrt{3} - \frac{3}{2}\pi = 10.876068 = 10.9 \text{ (3sf)}$$

..... 10.9 cm^2
(Total 4 marks)

6.

Diagram NOT accurately drawn



The diagram shows a sector $OABC$ of a circle with centre O .

$OA = OC = 10.4$ cm.

Angle $AOC = 120^\circ$.

- (a) Calculate the length of the arc ABC of the sector.
Give your answer correct to 3 significant figures.

$$\begin{aligned} & \frac{120}{360} \times \pi (20.8) \\ & = 21.781709 \\ & = 21.8 \text{ (3 sf)} \end{aligned} \quad \begin{array}{l} 21.8 \\ \text{.....cm} \end{array}$$

(3)

- (b) Calculate the area of the shaded segment ABC .
Give your answer correct to 3 significant figures.

$$\begin{array}{ll} \text{Sector Area} & \text{Area Triangle } (\frac{1}{2}ab \sin c) \\ \frac{120}{360} \times \pi (10.4)^2 & = \frac{1}{2} \times 10.4 \times 10.4 \sin 120 \\ = 113.2648871 \text{ cm}^2 & = 46.83465384 \text{ cm}^2 \\ & \text{.....} \boxed{66.4} \text{.....cm}^2 \end{array}$$

(4)

$$\text{Shaded Area} = \text{Sector} - \text{Triangle}$$

(Total 7 marks)

$$\begin{aligned} & = 66.43023326 \text{ cm}^2 \\ & = 66.4 \text{ (3 sf)} \end{aligned}$$

7. The diagram shows a sector of a circle with centre O .
The radius of the circle is 8 cm.

PRS is an arc of the circle.

PS is a chord of the circle.

Angle $POS = 40^\circ$

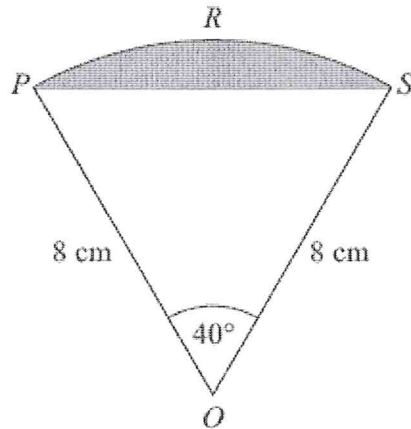


Diagram NOT
accurately drawn

Calculate the area of the shaded segment.
Give your answer correct to 3 significant figures.

Sector

$$\frac{40}{360} \times \pi (8)^2$$

Triangle

$$\frac{1}{2} (8)(8) \sin 40$$

$$= 22.34021443 \text{ cm}^2 \quad = 20.56920351 \text{ cm}^2$$

$$\text{Shaded Area} = \text{Sector} - \text{Triangle}$$

$$= 1.7710109 \text{ cm}^2$$

$$= 1.77 \text{ (3sf)}$$

$$\dots\dots\dots 1.77 \text{ cm}^2$$

(Total 5 marks)

8.

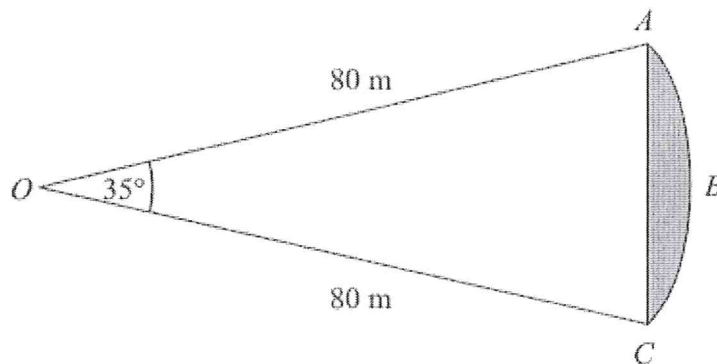


Diagram NOT
accurately drawn

ABC is an arc of a circle centre O with radius 80 m.
 AC is a chord of the circle.
 Angle $AOC = 35^\circ$.

Calculate the area of the shaded region.
 Give your answer correct to 3 significant figures.

Sector

$$\frac{35}{360} \times \pi (80)^2$$

$$= 1954.768762 \text{ m}^2$$

Triangle

$$\frac{1}{2} (80)(80) \sin 35$$

$$= 1835.444596 \text{ m}^2$$

$$\begin{aligned} \text{Shaded Area} &= \text{Sector} - \text{Triangle} \\ &= 119.3241657 \text{ m}^2 \\ &= 119 \text{ (3 sf)} \end{aligned}$$

$$\dots\dots\dots 119 \dots\dots\dots \text{m}^2$$

(Total 5 marks)