Arcs and Sectors: exam practice

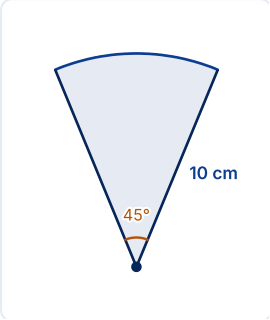
10 questions · 33 marks · worked solutions and markschemes

Name _____ Date _____ Score / 33

- Answer every question before you look at the solutions. They start after the last question, with the marks for each line: M for method, A for accuracy, R for reasoning.
- Online, with more practice: ibmathrevision.com/slai/arcs-and-sectors-exam-practice

1. **3 marks · Paper 1 style · calculator allowed**

A sector of a circle has a radius of 10 cm and a central angle of $45°$. Calculate the exact length of the arc.



Radius 10 cm, angle 45°

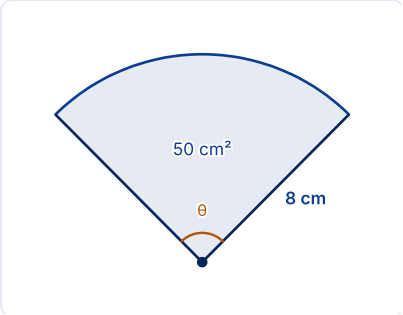
2. **3 marks · Paper 1 style · calculator allowed**

The minute hand of a clock is 10 cm long.

Find the distance the tip of the minute hand moves in 25 minutes. **[3]**

3. **2 marks · Paper 1 style · calculator allowed**

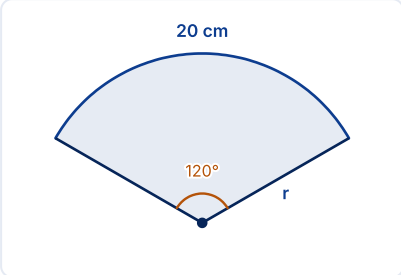
A sector of a circle of radius 8 cm has area $50\ \text{cm}^2$. Find the angle of the sector. **[2]**



Radius 8 cm, area 50 cm²

4. **2 marks · Paper 1 style · calculator allowed**

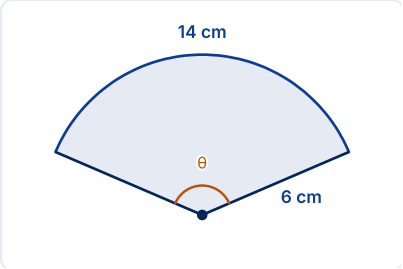
An arc of length 20 cm subtends an angle of $120°$ at the centre of a circle. Find the radius of the circle. **[2]**



Arc 20 cm, angle 120°

5. **3 marks · Paper 1 style · calculator allowed**

The length of an arc is 14 cm and the radius of the circle is 6 cm. Calculate the central angle of the sector, giving your answer in degrees correct to 1 decimal place.

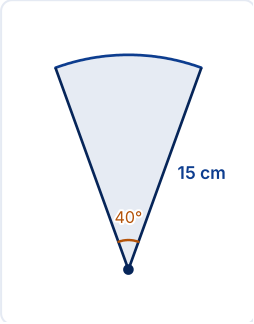


Radius 6 cm, arc 14 cm

6. **3 marks · Paper 1 style · calculator allowed**

A slice of pizza is a sector of a circle of radius 15 cm with angle $40°$.

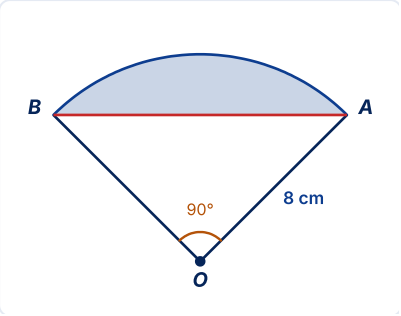
Find the perimeter of the slice. **[3]**



Radius 15 cm, angle 40°

7. **5 marks · Paper 2 style · calculator allowed**

A chord joins two points on the circumference of a circle with radius 8 cm. The chord subtends an angle of $90°$ at the centre of the circle. Calculate the exact area of the minor segment bounded by the chord and the arc.

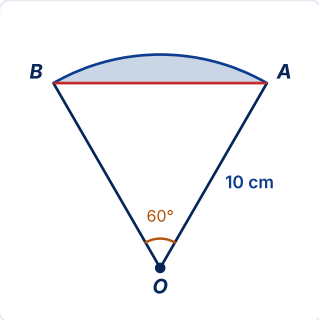


Chord AB, angle 90°

8. **4 marks · Paper 2 style · calculator allowed**

A chord cuts off a segment from a circle of radius 10 cm. The chord subtends an angle of $60°$ at the centre.

Find the area of the minor segment. **[4]**



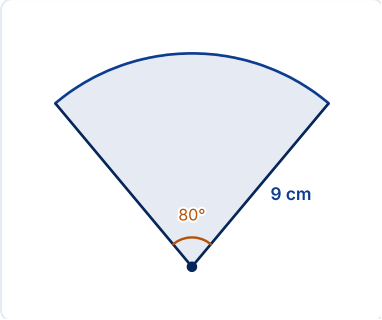
Minor segment: chord AB, angle 60°

9. **4 marks · Paper 1 style · calculator allowed**

A sector of a circle has radius 9 cm and angle $80°$.

(a) Find the length of the arc. **[2]**

(b) Find the area of the sector. **[2]**



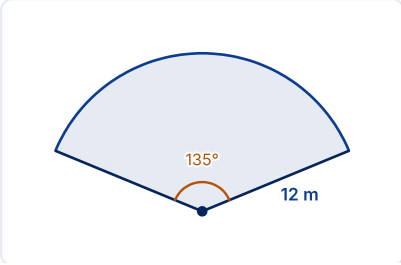
Radius 9 cm, angle 80°

10. **4 marks · Paper 2 style · calculator allowed**

A garden sprinkler waters a sector of radius 12 m and angle $135°$.

(a) Find the area watered. **[2]**

(b) Find the perimeter of the watered region. **[2]**



Radius 12 m, angle 135°

Answers and worked solutions

Question 1 — 3 marks

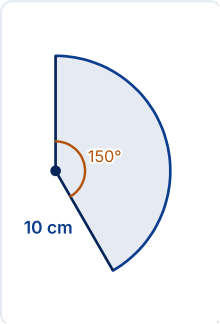
Answer: $5\pi/2$

Arc length formula:
$l = \frac{\theta}{360°} \times 2\pi r$
Substitute: $l = \frac{45}{360} \times 2\pi(10)$ **M1**
Simplify: $l = \frac{1}{8} \times 20\pi$ **A1**
$l = \frac{5\pi}{2}$ cm $(= 2.5\pi)$ **A1**

Question 2 — 3 marks

Answer: 26.2 cm

angle $\frac{25}{60} \times 360 = 150°$ **(A1)**
$\frac{150}{360} \times 2\pi \times 10$ **(M1)**
26.2 cm **A1**



25 minutes: $150°$ of $360°$

Question 3 — 2 marks

Answer: $89.5°$

$\frac{\theta}{360} \times \pi \times 64 = 50$ **(M1)**
$89.5°$ **A1**

Question 4 — 2 marks

Answer: 9.55 cm

$\frac{120}{360} \times 2\pi r = 20$ **(M1)**
$r = 9.55$ cm **A1**

Question 5 — 3 marks

Answer: $133.7°$

Arc length equation:
$14 = \frac{\theta}{360} \times 2\pi(6)$ **M1**
Rearrange: $\theta = \frac{14 \times 360}{12\pi} = \frac{420}{\pi}$ **A1**
$\theta = 133.690... \approx 133.7°$ **A1**

Question 6 — 3 marks

Answer: 40.5 cm

arc
$\frac{40}{360} \times 2\pi \times 15 = 10.47...$ **(M1)(A1)**
40.5 cm **A1**

Question 7 — 5 marks

Answer: $16\pi - 32$

Segment area = sector area − triangle area **M1**
Sector area:
$\frac{90}{360} \times \pi(8)^2 = \frac{1}{4} \times 64\pi = 16\pi$ **A1**
Triangle area: $\frac{1}{2}(8)(8)\sin 90°$ **M1**
$= 32$ **A1**
Segment area $= 16\pi - 32$ cm^2 $(\approx 18.3$ cm$^2)$ **A1**

Question 8 — 4 marks

Answer: 9.06 cm^2

sector $\frac{60}{360}\pi(10)^2 = 52.36...$ **(A1)**
triangle
$\frac{1}{2}(10)(10)\sin 60° = 43.30...$ **(M1)(A1)**
9.06 cm^2 **A1**

Question 9 — 4 marks

Answer: (a) 12.6 cm; (b) 56.5 cm^2

(a)
$\frac{80}{360} \times 2\pi \times 9$ **(M1)**
12.6 cm **A1**

(b)
$\frac{80}{360} \times \pi \times 9^2$ **(M1)**
56.5 cm^2 **A1**

Question 10 — 4 marks

Answer: (a) 170 m^2; (b) $52.3\,m$

(a)
$\frac{135}{360} \times \pi \times 144$ **(M1)**
170 m^2 **A1**

(b)
$24 + \frac{135}{360} \times 2\pi \times 12$ **(M1)**
$52.3\,m$ **A1**

Every solution is also on ibmathrevision.com/slai/arcs-and-sectors-exam-practice
Our own original questions, written and checked by IB Math Revision. IB Math Revision is independent and is not affiliated with, endorsed by or connected to the International Baccalaureate Organization. This work/product/service has been developed independently from and is not endorsed by the International Baccalaureate Organization. International Baccalaureate, Baccalauréat International, Bachillerato Internacional and IB are registered trademarks owned by the International Baccalaureate Organization.