

Examination Practice Questions

You should have:

A ruler, protractor, compasses, a pen, pencil, eraser, calculator.
For some questions, you may need tracing paper.

Instructions

- Use **black** ink or ball-point pen.
- 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 the number of marks for each question as a guide as to how much time to spend on each question. As a rough guide, you can multiply the number of marks by 1.2 to see how many minutes you should spend on a question.
- Questions been carefully compiled from or modelled on a variety of past papers and will generally get more challenging as the document progresses. Some of the later questions will go beyond the core grade level for this topic.

Advice

- Read each question carefully before you start to answer it.
- Don't forget to have fun.
- Check your answers at the end.

Q1.

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The diagram shows a sector of a circle with radius 7 cm.

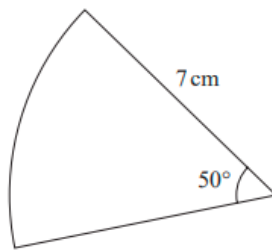


Diagram NOT
accurately drawn

Work out the length of the arc of the sector.
Give your answer correct to one decimal place.

$$\textcircled{m_1} \quad 2\pi(7) \times \frac{50}{360} = 6.1\text{cm} \quad \textcircled{A_1}$$

.....
(2 marks)

Q2.

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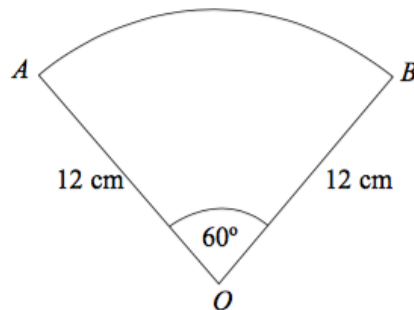


Diagram NOT
accurately drawn

OAB is a sector of a circle, centre O.
Angle AOB = 60° .
OA = OB = 12 cm.

Work out the length of the arc AB.
Give your answer in terms of π .

$$\textcircled{m_1} \quad \left[2\pi(12) \times \frac{60}{360} = 4\pi \right] \textcircled{A_1}$$

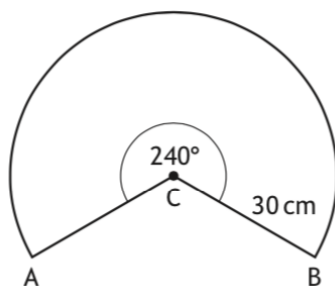
$$\left(24\pi \times \frac{1}{6} \right)$$

.....
(2 marks)

Q3.

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The diagram below shows a sector of a circle, centre C.



The radius of the circle is 30 centimetres.

Calculate the length of the major arc AB. Take $\pi = 3.14$.

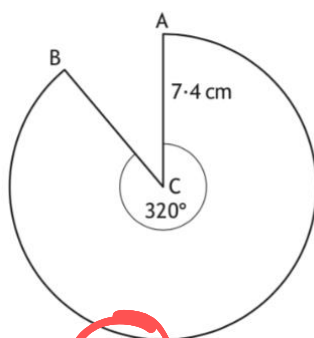
$$\left[2\pi(30) \times \frac{240}{360} \right] = \underline{125.6} \quad \text{A}_1$$

.....
(2 marks)

Q4.

AtoZrevision.com

The diagram below shows a sector of a circle, centre C.



The radius of the circle is 7.4 centimetres.

Calculate the length of the major arc AB.

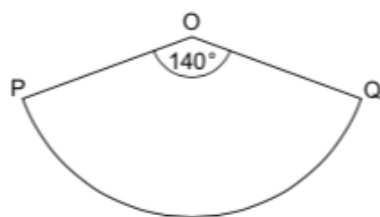
$$\left[2\pi(7.4) \times \frac{320}{360} \right] = \underline{\underline{41}} \quad \text{A}_1$$

.....
(3 marks)

Q5.

AtoZrevision.com

OPQ is a sector of a circle, centre O and radius 9 cm.



Not to scale

Find the perimeter of the sector.
Give your answer in terms of π .

$$2\pi(9) \times \frac{140}{360} = 7\pi + 18$$

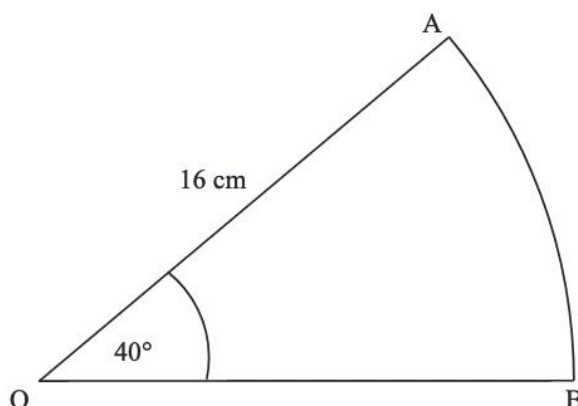
Handwritten solution for Q5. The formula for the arc length is written as $2\pi(9) \times \frac{140}{360}$, which is underlined in red and labeled M_1 . The result is $7\pi + 18$, which is also underlined in red and labeled A_1 . The final answer is circled in red and labeled A_1 .

(3 marks)

Q6.

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AOB is a sector of a circle, radius 16 cm.
Angle AOB = 40°



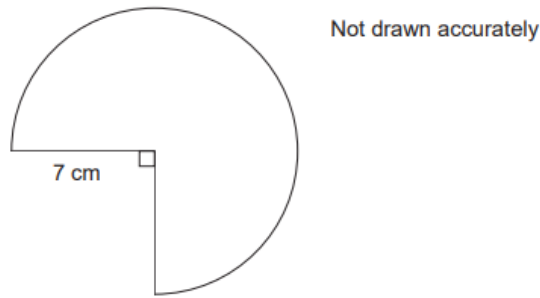
Work out the perimeter of the sector AOB.

$$2\pi(16) \times \frac{40}{360} + 16 + 16 = 43.2 \text{ cm}$$

Handwritten solution for Q6. The formula for the arc length is written as $2\pi(16) \times \frac{40}{360}$, which is underlined in red and labeled M_1 . The result is 43.2 cm , which is also underlined in red and labeled A_1 . The final answer is circled in red and labeled A_1 .

(3 marks)

The diagram shows a sector of a circle.
The radius is 7 cm.



Work out the perimeter of the shape.

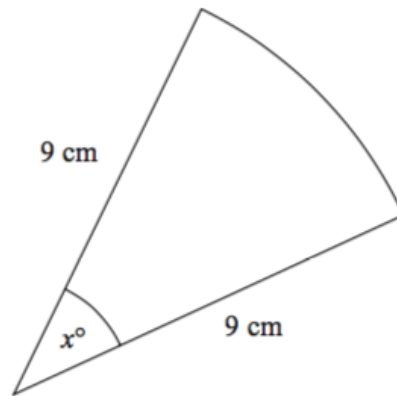
$$\text{m}_1 \left[2\pi(7) \times \frac{270}{360} = 10.5\pi \right]$$

$$\text{m}_1 \left[10.5\pi + 7 + 7 = \right]$$

$$\underline{\underline{10.5\pi + 14}} \quad \text{A}_1$$

.....
(3 marks)

The diagram shows a sector of a circle of radius 9 cm.



The sector has a perimeter of 25 cm.

Work out the value of x .

Give your answer correct to 1 decimal place.

$$2\pi(9) \times \frac{x}{360} + 18 = 25 \quad \text{P1}$$

$$18\pi + \frac{x}{360} = 7$$

$$x = (7 - 18\pi) \times 360$$

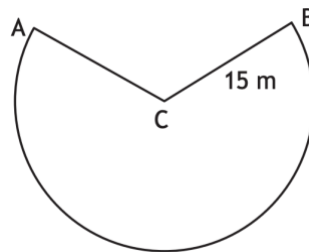
$$x = 44.5 \quad \text{A1}$$

P1
SOLVING

An attraction at a theme park has a carriage attached to an arm.



The arm swings from A to B along the arc of a circle, centre C, as shown in the diagram below.



The length of the arm, CB, is 15 metres.

The length of the major arc, AB, is 69.4 metres.

Calculate the size of the reflex angle ACB.

$$2\pi(15) \times \frac{x}{360} = 69.4 \quad \text{mi}$$

$$30\pi \times \frac{x}{360} = 69.4 \quad \text{mi}$$

$$\frac{69.4}{30\pi} \times 360 = 265.08^\circ$$

(3 marks)

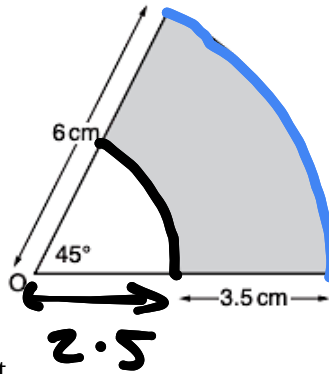
A1

HIGHER TIER QUESTIONS (GRADES 7-8)

Q10.

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The design below is made from two sectors of circles, centre O .



Calculate the perimeter of the shaded part.
Give your answer correct to 3 significant figures.

m_1

$$\left[2\pi(6) \times \frac{45}{360} = \frac{3}{2}\pi \right]$$

m_1 $\left[2\pi(2.5) \times \frac{45}{360} = \frac{5}{8}\pi \right]$

$$\underbrace{\frac{3}{2}\pi + \frac{5}{8}\pi}_{m_1} + \underbrace{3.5 + 3.5}_{m_1} = \underline{13.7}_{A_1}$$

(5 marks)

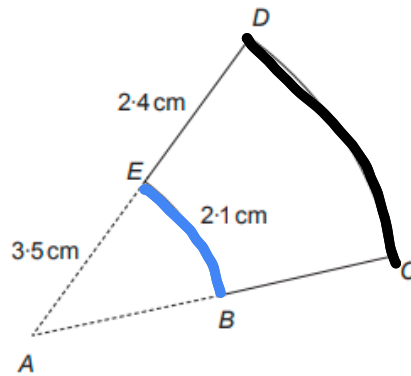


Diagram not drawn to scale

ADC is a sector of a circle, centre A .

AEB is a sector of another circle, also with centre A .

Calculate the perimeter of the shape $BCDE$.

M_1

$$\left[2\pi(3.5) \times \frac{x}{360} = 2.1 \right]$$

M_1

$$\left[\frac{2.1}{7\pi} = \frac{x}{360} \quad \therefore \frac{2.1}{7\pi} \times 360 = x \right]$$

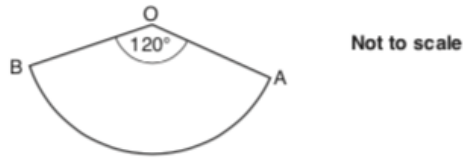
$$\left[x = 34.377 \right] \quad A_1$$

$$\left[2\pi(5.9) \times \frac{34.377}{360} = 3.54 \right] \quad A_1$$

$$\left[3.54 + 2.1 + \underbrace{2.4 + 2.4}_{M_1} = 10.4 \right] \quad A_1$$

(8 marks)

OAB is a sector of a circle, centre O.
Angle AOB = 120° .



The area of sector OAB is $3\pi \text{ cm}^2$.

Find, in terms of π , the length of the arc AB.

$$\pi r^2 \times \frac{120}{360} = 3\pi \quad \text{M}_1$$

$$\pi r^2 \times \frac{1}{3} = 3\pi$$

$$\frac{\pi r^2}{3} = 3\pi$$

$$\pi r^2 = 9\pi$$

$$r^2 = 9 \quad \text{M}_1$$

$$r = 3$$

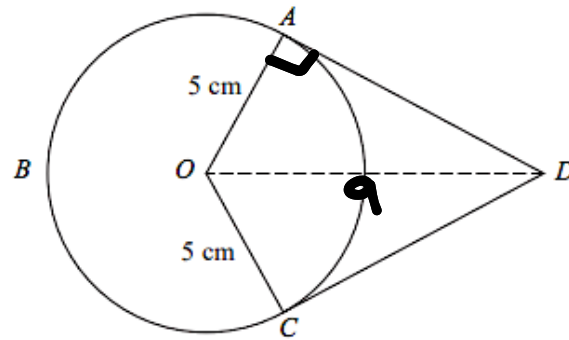
$$r \neq -3$$

(LENGTHS = +VE)

ARC AB:

$$[2\pi(3) \times \frac{1}{3} = \frac{6\pi}{3} = 2\pi \quad \text{M}_1 \quad \text{M}_2]$$

(4 marks)



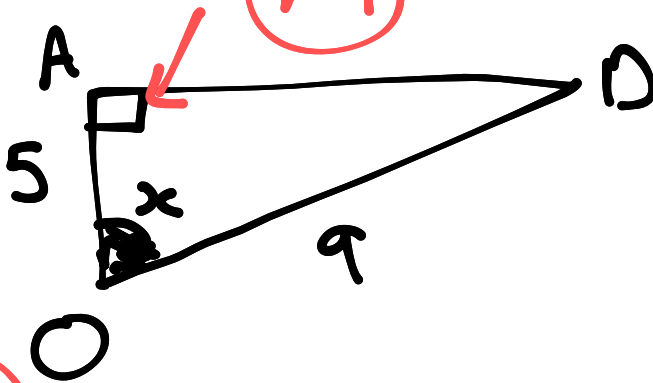
A, B and C are points on a circle of radius 5 cm, centre O.

DA and DC are tangents to the circle.

DO = 9 cm

Work out the length of arc ABC.

Give your answer correct to 3 significant figures.



$$\cos x = \frac{5}{9}$$

$$\cos^{-1}\left(\frac{5}{9}\right) = 56.25$$

$$\angle AOC = 56.25 \times 2 = 112.5$$

$$360 - 112.5 = 247.5$$

$$\text{Arc ABC} =$$

$$2\pi(5) \times \frac{247.5}{360}$$

$$= 21.59$$

$$= \underline{\underline{21.6}} \quad (\text{5 marks})$$

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

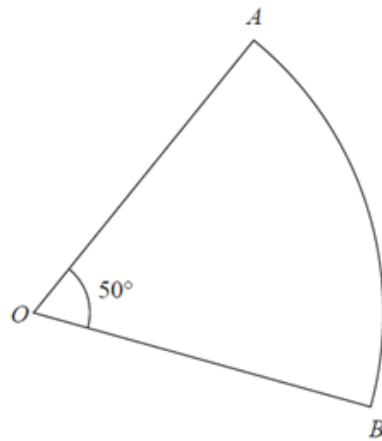


Diagram NOT
accurately drawn

Angle $AOB = 50^\circ$

Sector OAB has area $20\pi \text{ cm}^2$

Calculate the perimeter of sector OAB .

Give your answer correct to 3 significant figures.

$$\cancel{\pi} r^2 \times \frac{50}{360} = 20\cancel{\pi} \quad \text{M1}$$

$$r^2 = \frac{20\pi}{\left(\frac{50}{360}\right)} = 144$$

$$r = 12 \quad \text{A1}$$

$$2\pi(12) \times \frac{50}{360} = 10.47 \quad \text{M1}$$

$$10.47 + 12 + 12 \quad \text{M1}$$

$$= 34.5 \quad \text{A1}$$

3 sf.

(5 marks)

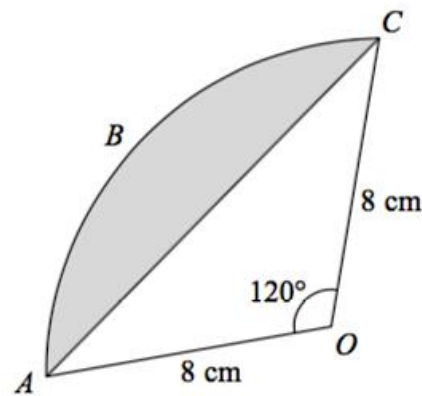


Diagram NOT
accurately drawn

ABC is an arc of a circle with centre O and radius 8 cm.

AC is a chord of the circle.

Angle $AOC = 120^\circ$

Calculate the perimeter of the shaded segment.

Give your answer correct to 3 significant figures.

$$AC = \sqrt{8^2 + 8^2 - 2 \times 8 \times 8 \times \cos 120} \\ = \sqrt{192} \quad \text{m}_1 \quad \text{A}_1$$

$$\text{Arc } ABC = 2 \times \pi \times 8 \times \frac{120}{360} = \frac{16\pi}{3} \quad \text{m}_1$$

$$\frac{16\pi}{3} + \sqrt{192} = 30.6 \quad \text{3 s.f.} \quad \text{A}_1 \quad \text{m}_2$$

The diagram shows a shaded shape $ABCD$ made from a semicircle ABC and a right-angled triangle ACD .

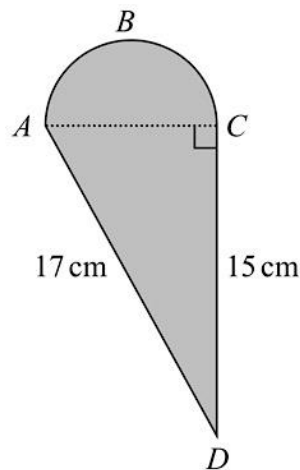


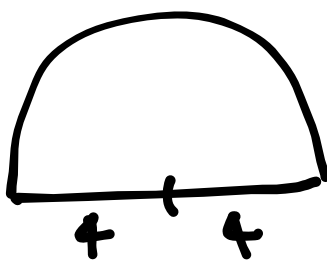
Diagram NOT
accurately drawn

AC is the diameter of the semicircle ABC .

Work out the perimeter of the shaded shape.
Give your answer correct to 3 significant figures.

$$AC = \sqrt{17^2 - 15^2} \quad] \quad m_1$$

$$= \sqrt{64} = 8 \quad A_1$$



$$\frac{2\pi(4)}{2} = 4\pi \quad] \quad m_1$$

$$[\quad 17 + 15 + 4\pi = 44.6 \quad A_1$$

3 s.f.

m_1