Write your name, centre number and candidate number in the boxes below.

Surname	Other names

Centre number | | | | | |

Candidate number | | | | |

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Circular measure

Time allowed: 2 hours

Subject code **0606**

Additional Mathematics

Questions from Paper 1 and Paper 2

You must have: a ruler marked in centimetres and millimetres, a protractor, compasses, a pen, an HB pencil and an eraser.
Questions 2-6, 8-9 (Paper 1): no calculator.
Questions 1, 7, 10 (Paper 2): calculator allowed.

Total marks

/ 77

Instructions

- Answer every question in the space provided on this paper.
- Write in black or dark blue ink. Pencil may be used for diagrams and graphs.
- Fill in your name, centre number and candidate number above.
- Show your working: a correct method can earn marks even if the answer is wrong.
- Unless a question says otherwise, give answers that are not exact to 3 significant figures, and angles in degrees to 1 decimal place.

Information

- This paper has 10 questions worth 77 marks in total.
- The marks for each question or part are shown in brackets, for example [3].

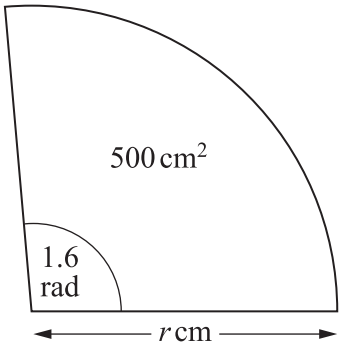
Advice

- Read every question through once before you write anything.
- Use the marks in brackets to judge how long to spend on each part.
- If you finish early, go back and check your working.

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Print at 100% (Actual size) so diagrams keep their real measurements.

1



The diagram shows a sector of a circle of radius r cm. The angle of the sector is 1.6 radians and the area of the sector is $500\,\text{cm}^2$.

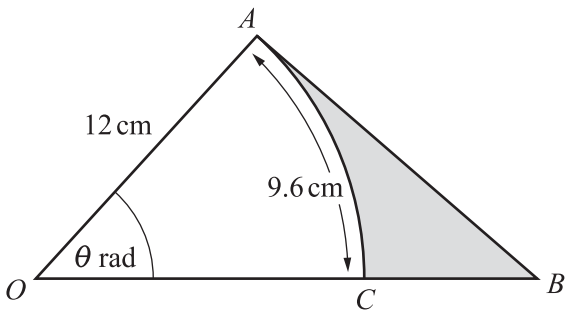
(i) Find the value of r. [2]

(ii) Hence find the perimeter of the sector. [2]

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2



The diagram shows the right-angled triangle OAB. The point C lies on the line OB. Angle $OAB = \frac{\pi}{2}$ radians and angle $AOB = \theta$ radians. AC is an arc of the circle, centre O, radius 12 cm and AC has length 9.6 cm.

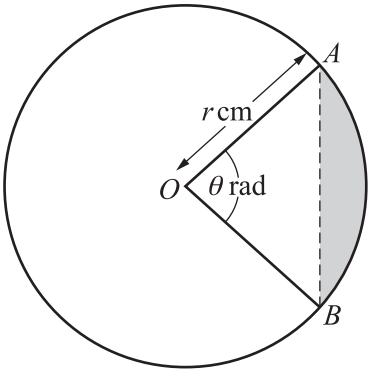
(i) Find the value of θ. [2]

(ii) Find the area of the shaded region. [4]

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3



The diagram shows a circle with centre O and radius r cm. The minor arc AB is such that angle AOB is θ radians. The area of the minor sector AOB is 48 cm^2.

(i) Show that $\theta = \frac{96}{r^2}$. [2]

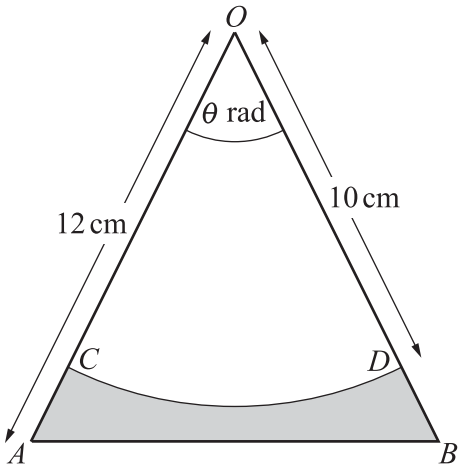
(ii) Given that the minor arc AB has length 12 cm, find the value of r and of θ. [3]

(iii) Using your values of r and θ, find the area of the shaded region. [2]

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4



The diagram shows an isosceles triangle OAB such that $OA = OB = 12\,\text{cm}$ and angle $AOB = \theta$ radians. Points C and D lie on OA and OB respectively such that CD is an arc of the circle, centre O, radius 10 cm. The area of the sector $OCD = 35\,\text{cm}^2$.

(a) Show that $\theta = 0.7$. [1]

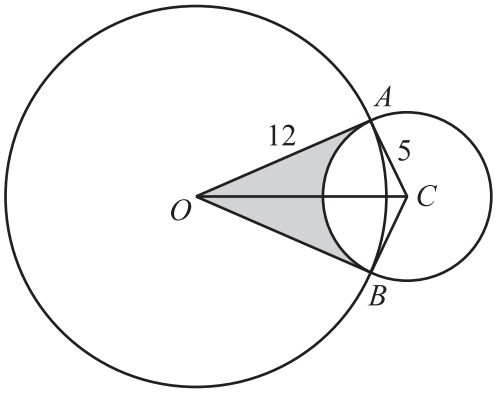
(b) Find the perimeter of the shaded region. [4]

(c) Find the area of the shaded region. [3]

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5 In this question, all lengths are in centimetres and all angles are in radians.



The diagram shows a circle with centre O and radius 12, and a circle with centre C and radius 5. The circles intersect at the points A and B, such that OA and OB are tangents to the circle with centre C.

(a) Show that the obtuse angle ACB is 2.35 radians, correct to 2 decimal places. [2]

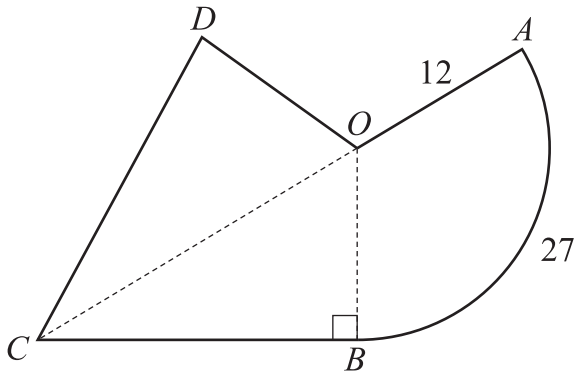
(b) Find the perimeter of the shaded region. [2]

(c) Find the area of the shaded region. [3]

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6 In this question all lengths are in centimetres and all angles are in radians.



The diagram shows a badge which consists of a minor sector, OAB, of the circle with centre O and radius 12, and a kite $OBCD$, where $OB = OD$ and $CD = CB$. The arc AB has length 27. The line OB is perpendicular to the line CB, and COA is a straight line.

(a) Find the perimeter of the badge. [4]

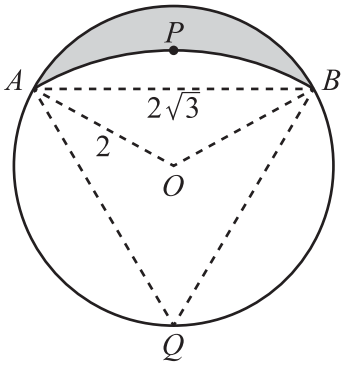
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(b) Find the area of the badge. [3]

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7 In this question the units are metres.



The diagram shows a circle, centre O and radius 2.
The chord AB has length $2\sqrt{3}$.
The point Q lies on the circle such that $AQ = BQ$.
The arc APB is part of a circle, centre Q.

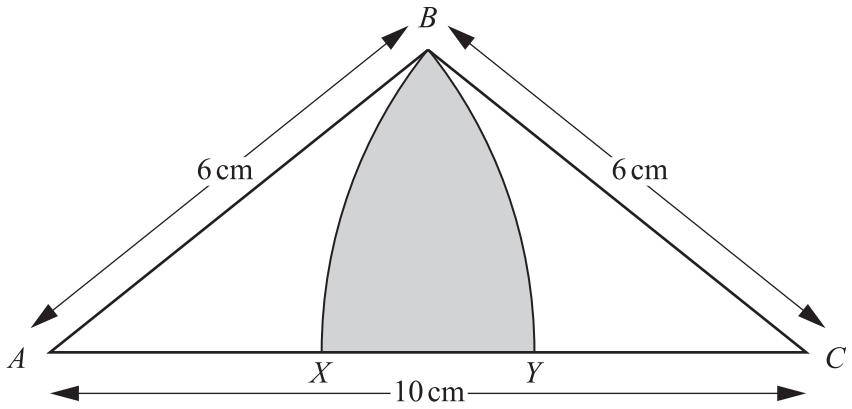
(a) Find the exact value of angle AQB in radians. [2]

(b) Hence find the area of the shaded region. Give your answer in terms of π. [6]

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8



The diagram shows an isosceles triangle ABC such that $AC = 10$ cm and $AB = BC = 6$ cm. BX is an arc of a circle, centre C, and BY is an arc of a circle, centre A.

(i) Show that angle $ABC = 1.970$ radians, correct to 3 decimal places. [2]

(ii) Find the perimeter of the shaded region. [4]

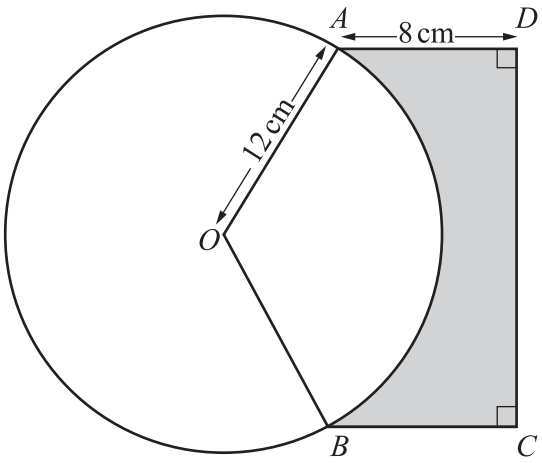
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(iii) Find the area of the shaded region. [3]

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9



The diagram shows a circle, centre O, radius 12 cm. The points A and B lie on the circumference of the circle and form a rectangle with the points C and D. The length of AD is 8 cm and the area of the minor sector AOB is 150 cm^2.

(i) Show that angle AOB is 2.08 radians, correct to 2 decimal places. [2]

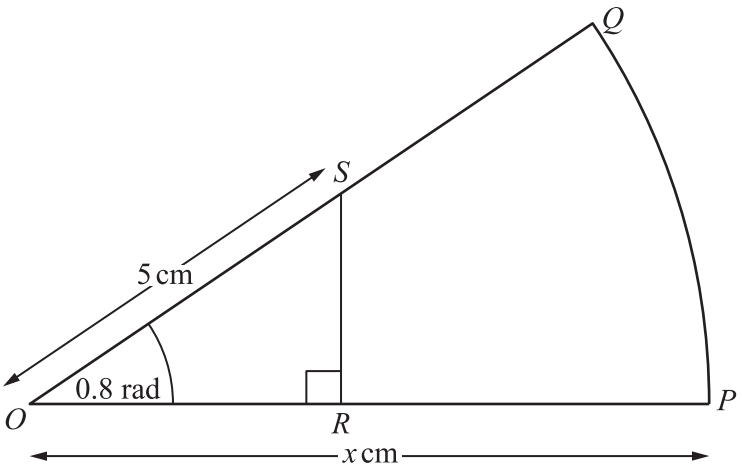
(ii) Find the area of the shaded region $ADCB$. [6]

(iii) Find the perimeter of the shaded region $ADCB$. [3]

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10



The diagram shows a sector OPQ of a circle with centre O and radius x cm. Angle POQ is 0.8 radians. The point S lies on OQ such that $OS = 5$ cm. The point R lies on OP such that angle ORS is a right angle. Given that the area of triangle ORS is one-fifth of the area of sector OPQ, find

(i) the area of sector OPQ in terms of x and hence show that the value of x is 8.837 correct to 4 significant figures, [5]

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(ii) the perimeter of $PQSR$, [3]

(iii) the area of $PQSR$. [2]

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