

INTERNATIONAL BACCALAUREATE
Mathematics: applications and interpretation

MAI

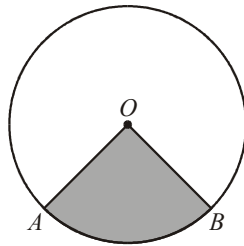
EXERCISES [MAI 3.5]
ARCS AND SECTORS

Compiled by Christos Nikolaidis

A. Paper 1 questions (SHORT)

1. [Maximum mark: 8]

O is the centre of the circle which has a radius of 10 cm. The size of $\text{A}\hat{\text{O}}\text{B}$ is 60° .



- (a) Find the **lengths** of the minor arc AB and of the major arc AB. [3]
- (b) Find the **areas** of the minor sector (shaded region) and of the major sector. [3]
- (c) Find the **perimeters** of the minor sector (shaded region) and of the major sector. [2]

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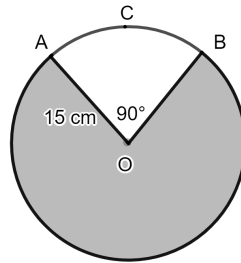
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2. [Maximum mark: 6]

The following diagram shows a circle of centre O, and radius 15 cm. The arc ACB subtends an angle of 90° at the centre O.



- (a) Find the length of the arc ACB; [2]
- (b) Find the area of the shaded region. [4]

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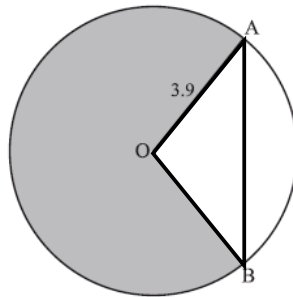
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3. [Maximum mark: 7]

The circle shown has centre O and radius 3.9 cm. The angle AOB is 100° .



- (a) Find the length AB. [3]
- (b) Find the area of the shaded region. [4]

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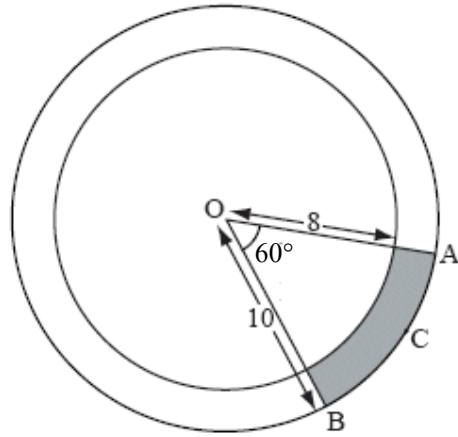
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4. [Maximum mark: 8]

The diagram shows two concentric circles with centre O.



The radius of the smaller circle is 8 cm, the radius of the larger circle is 10 cm.

Points A, B and C are on the circumference of the larger circle such that $\angle AOB$ is 60° .

- (a) Find the length of the arc ACB. [2]
- (b) Find the area of the shaded region. [3]
- (c) Find the perimeter of the shaded region. [3]

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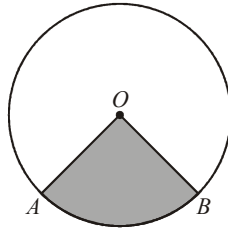
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5. [Maximum mark: 4]

O is the centre of the circle which has a radius of 5.4 cm.



The area of the shaded sector OAB is 21.6 cm^2 . Find the length of the minor arc AB .

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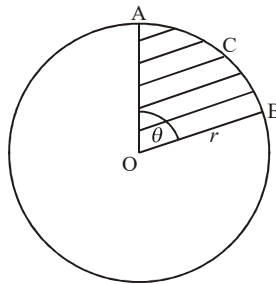
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6. [Maximum mark: 6]

The following diagram shows a circle of centre O, and radius r . The shaded sector $OACB$ has an area of 27 cm^2 . Angle $A\hat{O}B = \theta = 70^\circ$.



- (a) Find the radius. [4]
- (b) Calculate the length of the minor arc ACB . [2]

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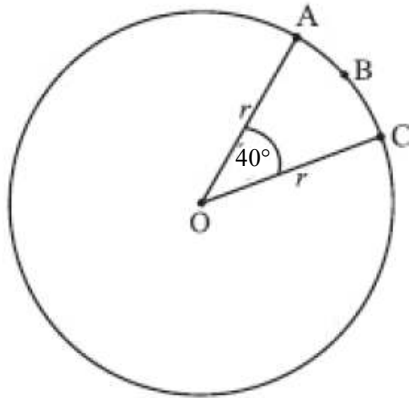
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7. [Maximum mark: 6]

The diagram below shows a circle centre O , with radius r .



The length of arc ABC is 3π cm and $\widehat{AOC} = 40^\circ$.

- (a) Find the value of r . [2]
- (b) Find the perimeter of sector $OABC$. [2]
- (c) Find the area of sector $OABC$. [2]

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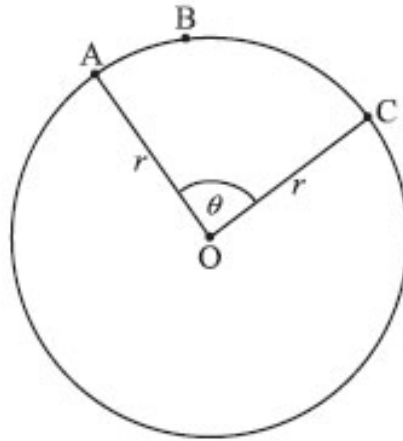
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8. [Maximum mark: 6]

The following diagram shows a circle with radius r and centre O . The points A , B and C are on the circle and $\hat{AOC} = \theta$.



The area of the sector OAB is 180 cm^2 , the length of the arc AB is 24 cm .

- (a) Find the value of r and of θ .
- (b) Find the perimeter of the sector $OABC$.

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9. [Maximum mark: 10]

The diagram below shows a sector AOB of a circle of radius 15 cm and centre O. The angle θ at the centre of the circle is 120° .

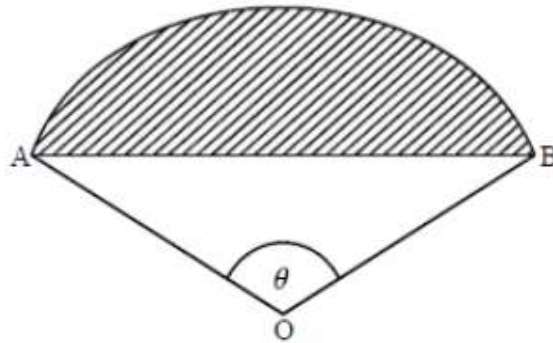


Diagram not to scale

- (a) Calculate the area of the sector AOB. [2]
- (b) Calculate the area of the triangle AOB. [2]
- (c) Calculate the area of the shaded region. [1]
- (d) Calculate the perimeter of the shaded region. [5]

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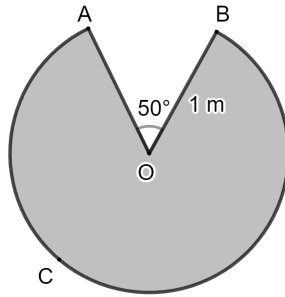
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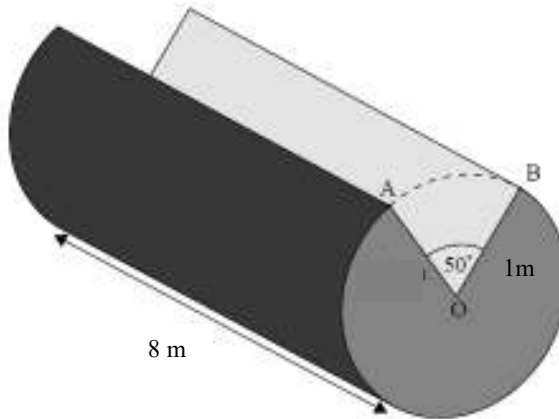
15. [Maximum mark: 14]

The following diagram shows a sector OACB of centre O, and radius 1 m. \hat{AOB} is 50° .



- (a) Find the length of the major arc ACB. [3]
- (b) Find the area of the shaded region. [3]

The following diagram shows a solid made from a cylinder from which a wedge was removed. The length of the cylinder is 8 m and the cross-section of the solid is as in the diagram above.



- (c) Find the volume of the solid. [2]
- (d) Find the total surface area of the solid. [6]

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16. [Maximum mark: 13]

The following diagram shows a circle with centre O and radius 4 cm.

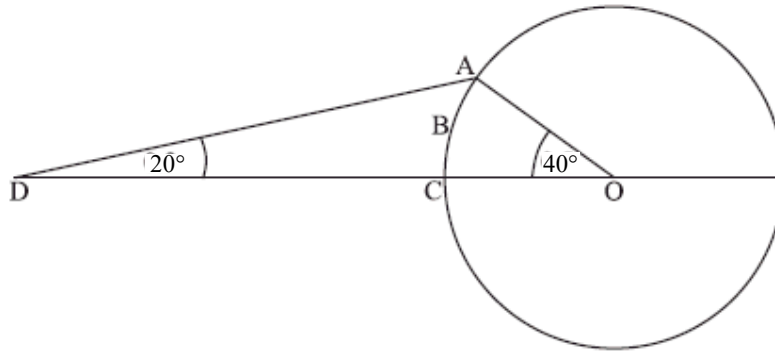


diagram not to scale

The points A, B and C lie on the circle. The point D is outside the circle, on (OC).

Angle ADC = 20° and angle AOC = 40° .

- (a) Find AD. [3]
- (b) Find OD. [4]
- (c) Find the area of sector OABC. [2]
- (d) Find the area of region ABCD. [4]

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