

Circular Measure

Question Paper 4

Level	International A Level
Subject	Maths
Exam Board	CIE
Topic	Circular Measure
Sub Topic	
Booklet	Question Paper 4

Time Allowed: **58 minutes**

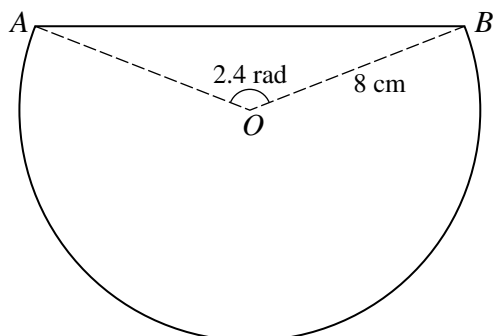
Score: **/48**

Percentage: **/100**

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

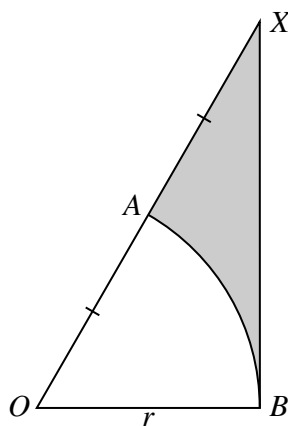
1



The diagram shows a metal plate made by removing a segment from a circle with centre O and radius 8 cm. The line AB is a chord of the circle and angle $AOB = 2.4$ radians. Find

- (i) the length of AB , [2]
- (ii) the perimeter of the plate, [3]
- (iii) the area of the plate. [3]

2



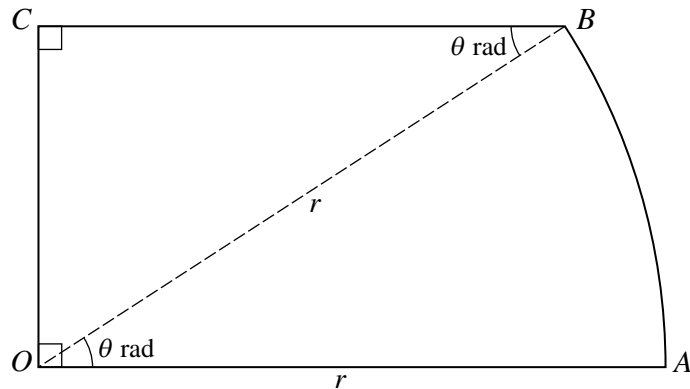
In the diagram, AB is an arc of a circle with centre O and radius r . The line XB is a tangent to the circle at B and A is the mid-point of OX .

- (i) Show that angle $AOB = \frac{1}{3}\pi$ radians. [2]

Express each of the following in terms of r , π and $\sqrt{3}$:

- (ii) the perimeter of the shaded region, [3]
- (iii) the area of the shaded region. [2]

3

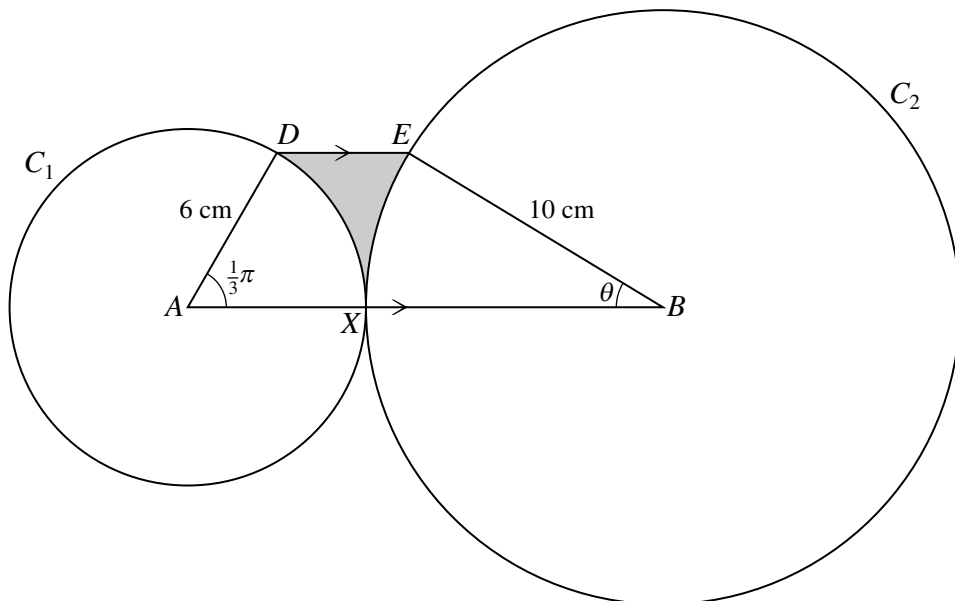


The diagram represents a metal plate $OABC$, consisting of a sector OAB of a circle with centre O and radius r , together with a triangle OCB which is right-angled at C . Angle $AOB = \theta$ radians and OC is perpendicular to OA .

(i) Find an expression in terms of r and θ for the perimeter of the plate. [3]

(ii) For the case where $r = 10$ and $\theta = \frac{1}{5}\pi$, find the area of the plate. [3]

4

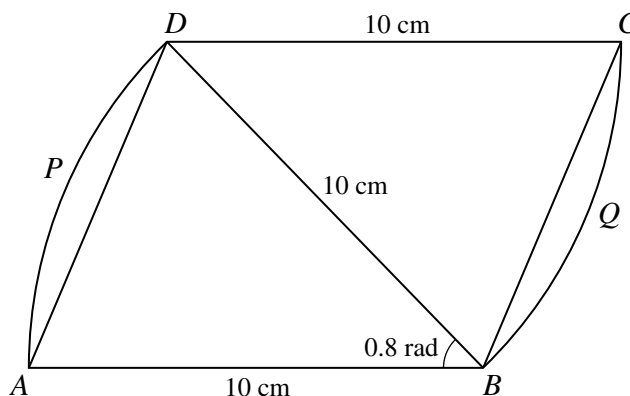


The diagram shows a circle C_1 touching a circle C_2 at a point X . Circle C_1 has centre A and radius 6 cm, and circle C_2 has centre B and radius 10 cm. Points D and E lie on C_1 and C_2 respectively and DE is parallel to AB . Angle $DAX = \frac{1}{3}\pi$ radians and angle $EBX = \theta$ radians.

(i) By considering the perpendicular distances of D and E from AB , show that the exact value of θ is $\sin^{-1}\left(\frac{3\sqrt{3}}{10}\right)$. [3]

(ii) Find the perimeter of the shaded region, correct to 4 significant figures. [5]

5

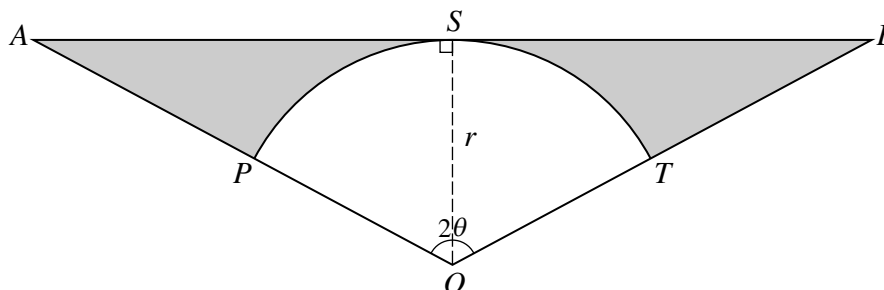


In the diagram, $ABCD$ is a parallelogram with $AB = BD = DC = 10$ cm and angle $ABD = 0.8$ radians. APD and BQC are arcs of circles with centres B and D respectively.

- (i) Find the area of the parallelogram $ABCD$. [2]
- (ii) Find the area of the complete figure $ABQCDP$. [2]
- (iii) Find the perimeter of the complete figure $ABQCDP$. [2]

6 The volume of a spherical balloon is increasing at a constant rate of 50 cm^3 per second. Find the rate of increase of the radius when the radius is 10 cm. [Volume of a sphere = $\frac{4}{3}\pi r^3$.] [4]

7



In the diagram, OAB is an isosceles triangle with $OA = OB$ and angle $AOB = 2\theta$ radians. Arc PST has centre O and radius r , and the line ASB is a tangent to the arc PST at S .

- (i) Find the total area of the shaded regions in terms of r and θ . [4]
- (ii) In the case where $\theta = \frac{1}{3}\pi$ and $r = 6$, find the total perimeter of the shaded regions, leaving your answer in terms of $\sqrt{3}$ and π . [5]