

# Circular Measure

## Question Paper 5

<b>Level</b>	International A Level
<b>Subject</b>	Maths
<b>Exam Board</b>	CIE
<b>Topic</b>	Circular Measure
<b>Sub Topic</b>	
<b>Booklet</b>	Question Paper 5

**Time Allowed:** 63 minutes

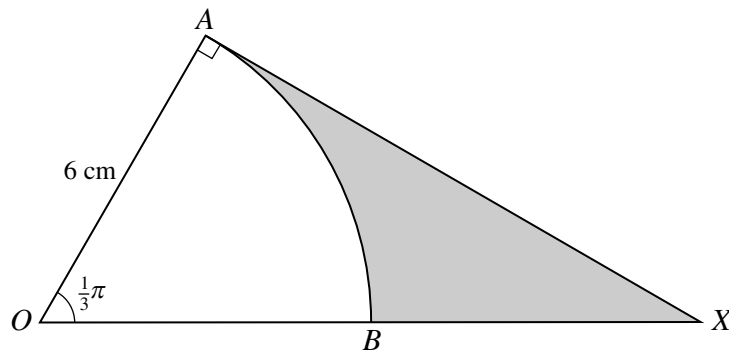
**Score:** /52

**Percentage:** /100

**Grade Boundaries:**

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

1



In the diagram,  $AB$  is an arc of a circle, centre  $O$  and radius 6 cm, and angle  $AOB = \frac{1}{3}\pi$  radians. The line  $AX$  is a tangent to the circle at  $A$ , and  $OBX$  is a straight line.

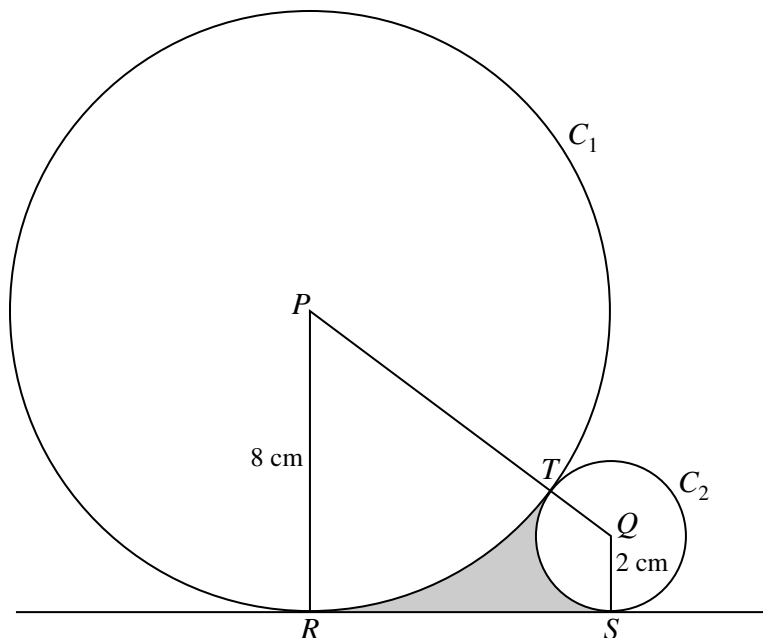
(i) Show that the exact length of  $AX$  is  $6\sqrt{3}$  cm. [1]

Find, in terms of  $\pi$  and  $\sqrt{3}$ ,

(ii) the area of the shaded region, [3]

(iii) the perimeter of the shaded region. [4]

2



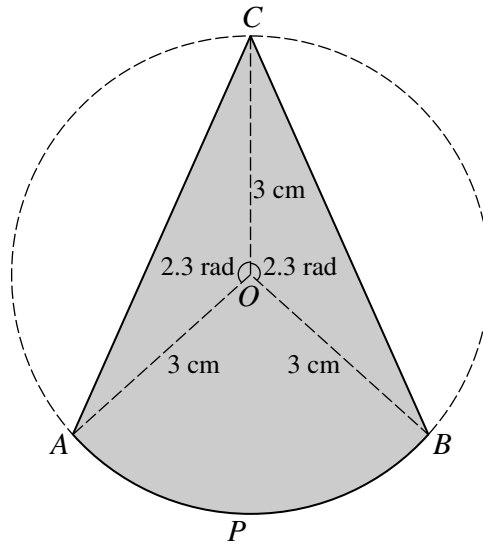
The diagram shows two circles,  $C_1$  and  $C_2$ , touching at the point  $T$ . Circle  $C_1$  has centre  $P$  and radius 8 cm; circle  $C_2$  has centre  $Q$  and radius 2 cm. Points  $R$  and  $S$  lie on  $C_1$  and  $C_2$  respectively, and  $RS$  is a tangent to both circles.

(i) Show that  $RS = 8$  cm. [2]

(ii) Find angle  $RPQ$  in radians correct to 4 significant figures. [2]

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

3

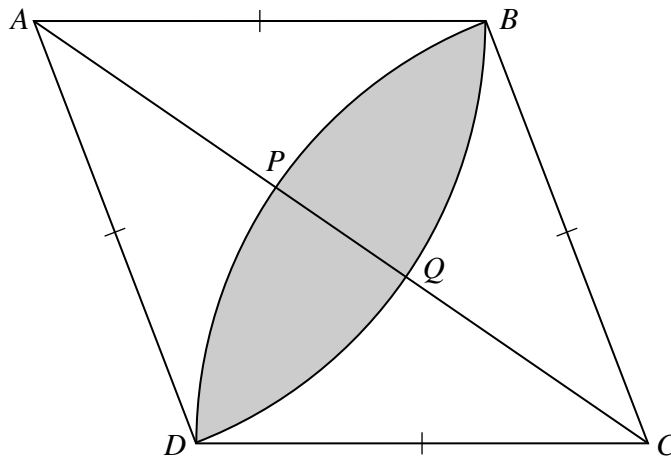


The diagram shows points  $A, C, B, P$  on the circumference of a circle with centre  $O$  and radius 3 cm. Angle  $AOC = \text{angle } BOC = 2.3$  radians.

(i) Find angle  $AOB$  in radians, correct to 4 significant figures. [1]

(ii) Find the area of the shaded region  $ACBP$ , correct to 3 significant figures. [4]

4

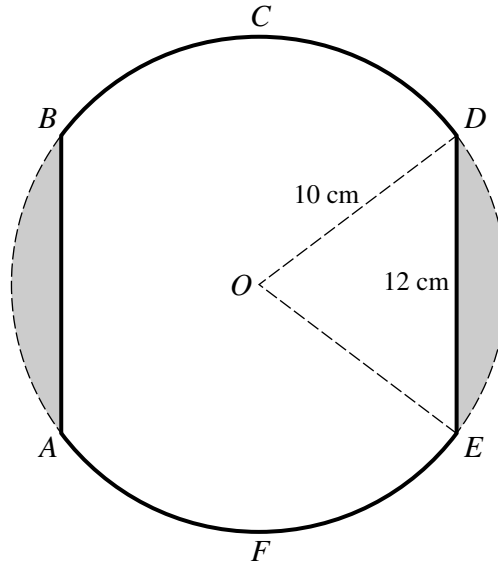


The diagram shows a rhombus  $ABCD$ . Points  $P$  and  $Q$  lie on the diagonal  $AC$  such that  $BPD$  is an arc of a circle with centre  $C$  and  $BQD$  is an arc of a circle with centre  $A$ . Each side of the rhombus has length 5 cm and angle  $BAD = 1.2$  radians.

(i) Find the area of the shaded region  $BPDQ$ . [4]

(ii) Find the length of  $PQ$ . [4]

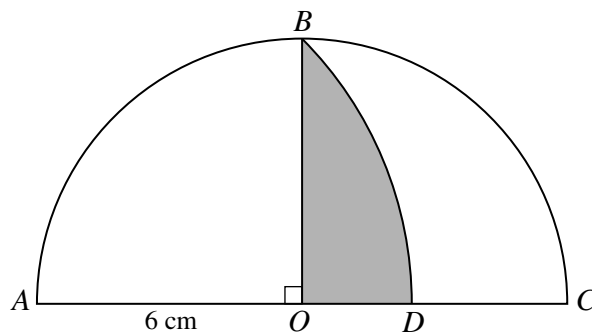
5



The diagram shows a metal plate  $ABCDEF$  which has been made by removing the two shaded regions from a circle of radius 10 cm and centre  $O$ . The parallel edges  $AB$  and  $ED$  are both of length 12 cm.

- (i) Show that angle  $DOE$  is 1.287 radians, correct to 4 significant figures. [2]
- (ii) Find the perimeter of the metal plate. [3]
- (iii) Find the area of the metal plate. [3]

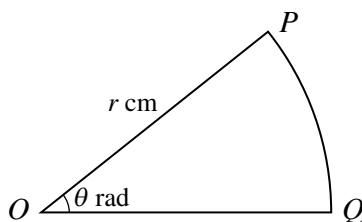
6



The diagram shows a semicircle  $ABC$  with centre  $O$  and radius 6 cm. The point  $B$  is such that angle  $BOA$  is  $90^\circ$  and  $BD$  is an arc of a circle with centre  $A$ . Find

- (i) the length of the arc  $BD$ , [4]
- (ii) the area of the shaded region. [3]

7



A piece of wire of length 50 cm is bent to form the perimeter of a sector  $POQ$  of a circle. The radius of the circle is  $r$  cm and the angle  $POQ$  is  $\theta$  radians (see diagram).

- (i) Express  $\theta$  in terms of  $r$  and show that the area,  $A$  cm<sup>2</sup>, of the sector is given by

$$A = 25r - r^2. \quad [4]$$

- (ii) Given that  $r$  can vary, find the stationary value of  $A$  and determine its nature. [4]