

# Circle Problems

## (Area, Circumference, Arcs)

### Question Paper 4

Level	IGCSE
Subject	Maths (0580)
Exam Board	Cambridge International Examinations (CIE)
Paper Type	Extended
Topic	Mensuration (Perimeters, Areas & Volumes)
Sub-Topic	Circle Problems (Area, Circumference, Arcs)
Booklet	Question Paper 4

**Time Allowed:** 56 minutes

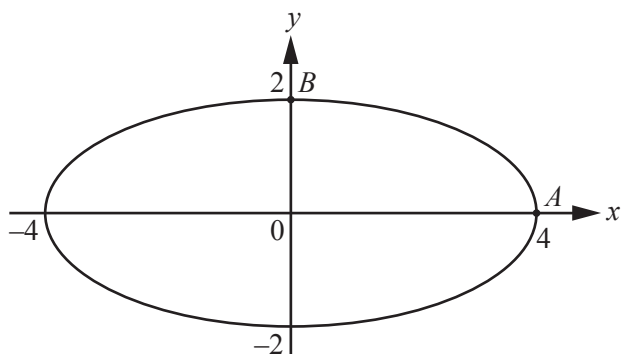
**Score:** /46

**Percentage:** /100

**Grade Boundaries:**

A*	A	B	C	D	E	U
>85%	75%	60%	45%	35%	25%	<25%

1



NOT TO  
SCALE

The diagram shows a curve with equation  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ .

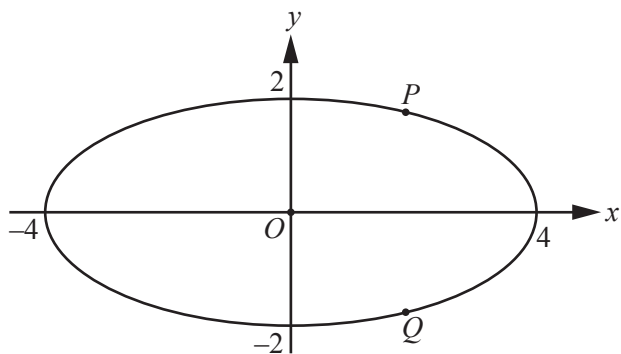
- (a)  $A$  is the point  $(4, 0)$  and  $B$  is the point  $(0, 2)$ .
  - (i) Find the equation of the straight line that passes through  $A$  and  $B$ .  
Give your answer in the form  $y = mx + c$ .

$y = \dots\dots\dots$  [3]

- (ii) Show that  $a^2 = 16$  and  $b^2 = 4$ .

[2]

(b)



NOT TO SCALE

$P(2, k)$  and  $Q(2, -k)$  are points on the curve  $\frac{x^2}{16} + \frac{y^2}{4} = 1$ .

(i) Find the value of  $k$ .

$k = \dots\dots\dots [3]$

(ii) Calculate angle  $POQ$ .

Angle  $POQ = \dots\dots\dots [3]$

(c) The area enclosed by a curve with equation  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  is  $\pi ab$ .

(i) Find the area enclosed by the curve  $\frac{x^2}{16} + \frac{y^2}{4} = 1$ .

Give your answer as a multiple of  $\pi$ .

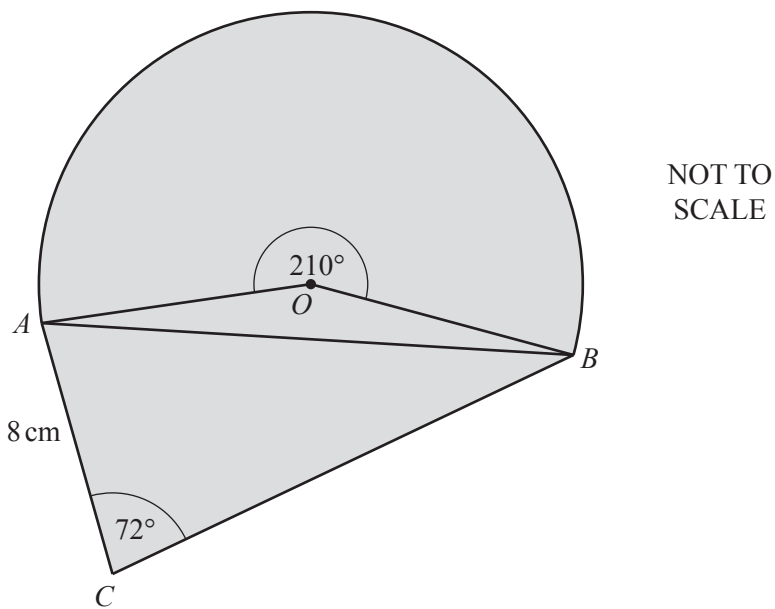
$\dots\dots\dots [1]$

(ii) A curve, mathematically similar to the one in the diagrams, intersects the  $x$ -axis at  $(12, 0)$  and  $(-12, 0)$ .

Work out the area enclosed by this curve, giving your answer as a multiple of  $\pi$ .

$\dots\dots\dots [2]$

2



The diagram shows a design for a logo made from a sector and two triangles. The sector, centre  $O$ , has radius 8 cm and sector angle  $210^\circ$ .  $AC = 8$  cm and angle  $ACB = 72^\circ$ .

(a) Show that angle  $OAB = 15^\circ$ .

[2]

(b) Calculate the length of the straight line  $AB$ .

$AB = \dots\dots\dots$  cm [4]

(c) Calculate angle  $ABC$ .

Angle  $ABC = \dots\dots\dots$  [3]

(d) Calculate the total area of the logo design.

$\dots\dots\dots\text{cm}^2$  [6]

(e) The logo design is an enlargement with scale factor 4 of the actual logo.

Calculate the area of the actual logo.

$\dots\dots\dots\text{cm}^2$  [2]

3 A circle has a radius of 8.5 cm correct to the nearest 0.1 cm.

The lower bound for the area of the circle is  $p\pi \text{ cm}^2$ .

The upper bound for the area of the circle is  $q\pi \text{ cm}^2$ .

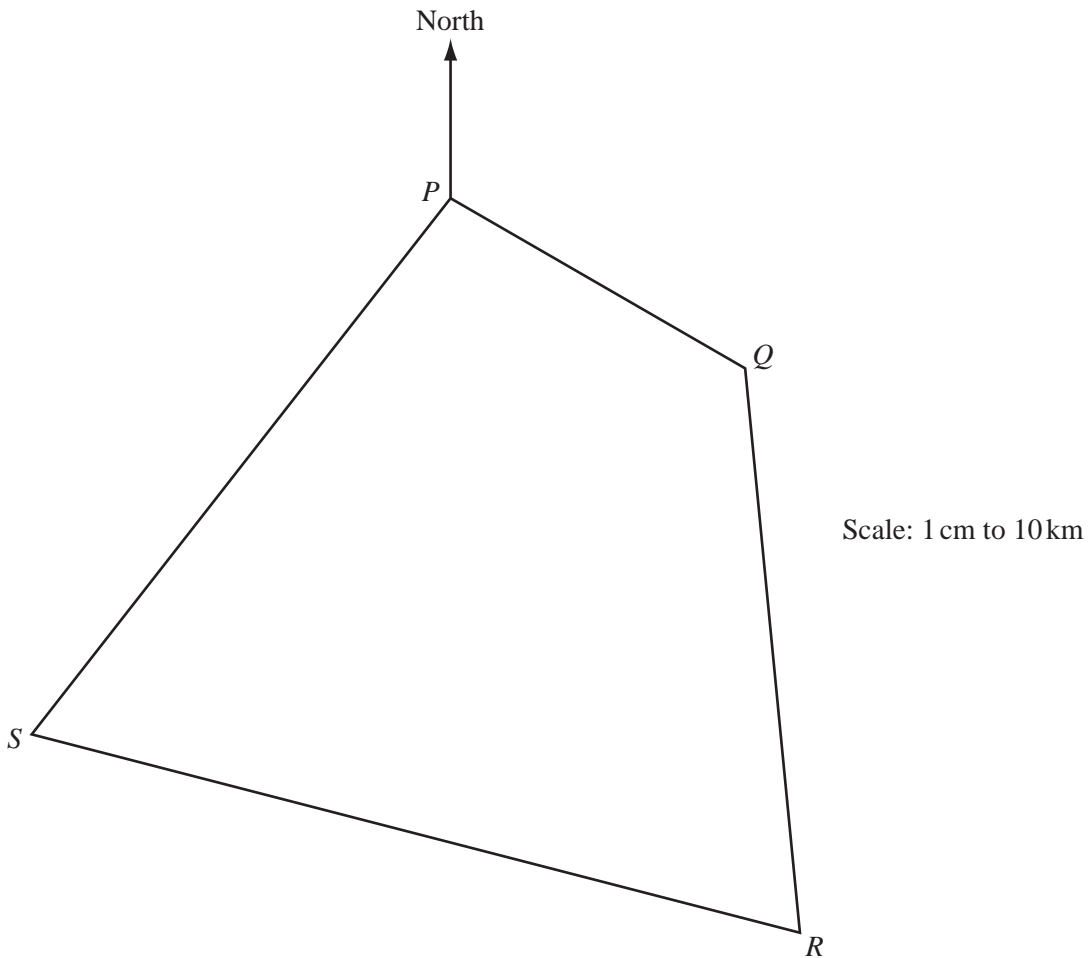
Find the value of  $p$  and the value of  $q$ .

Answer  $p = \dots\dots\dots$

$q = \dots\dots\dots$  [3]

- 4 (a) In this question show all your construction arcs and use only a ruler and compasses to draw the boundaries of your region.

This scale drawing shows the positions of four towns,  $P$ ,  $Q$ ,  $R$  and  $S$ , on a map where 1 cm represents 10 km.



A nature reserve lies in the quadrilateral  $PQRS$ .  
The boundaries of the nature reserve are:

- equidistant from  $Q$  and from  $R$
- equidistant from  $PS$  and from  $PQ$
- 60 km from  $R$
- along  $QR$ .

- (i) Shade the region which represents the nature reserve. [7]
- (ii) Measure the bearing of  $S$  from  $P$ .

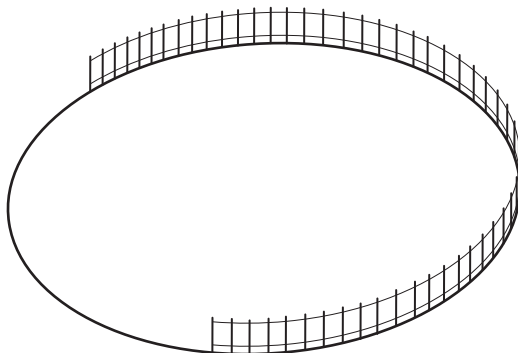
Answer(a)(ii) ..... [1]

(b) A circular lake in the nature reserve has a radius of 45 m.

(i) Calculate the area of the lake.

Answer(b)(i) ..... m<sup>2</sup> [2]

(ii)



NOT TO SCALE

A fence is placed along part of the circumference of the lake.  
This arc subtends an angle of 210° at the centre of the circle.

Calculate the length of the fence.

Answer(b)(ii) ..... m [2]