

09	5c	<p>The diagram shows a circle with centre O and radius 2 centimetres. The points A and B lie on the circumference of the circle and $\angle AOB = \theta$.</p> <p>(i) There are two possible values of θ for which the area of $\triangle AOB$ is $\sqrt{3}$ square centimetres.</p> <p>One value is $\frac{\pi}{3}$. Find the other value.</p> <p>(ii) Suppose that $\theta = \frac{\pi}{3}$.</p> <p>(1) Find the area of the sector AOB.</p> <p>(2) Find the exact length of the perimeter of the minor segment bounded by the chord AB and the arc AB.</p>	<p>2</p> <p>1</p> <p>2</p>
		<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p>i. Area of $\triangle AOB = \frac{1}{2}ab \sin C$</p> $\sqrt{3} = \frac{1}{2} \times 2 \times 2 \times \sin \theta$ $\sqrt{3} = 2 \sin \theta$ $\sin \theta = \frac{\sqrt{3}}{2}$ $\theta = \frac{\pi}{3} \text{ or } \frac{2\pi}{3}$ <p>\therefore The other value is $\frac{2\pi}{3}$.</p> </div> <div style="width: 48%;"> <p>(2) To find length of chord AB, use cosine rule:</p> $x^2 = 2^2 + 2^2 - 2(2)(2) \cos \frac{\pi}{3}$ $= 4 + 4 - 4$ $= 4$ $x = 2$ <p>\therefore chord AB is 2 cm long</p> <p>To find length of arc AB, use</p> $l = r\theta$ $= 2 \times \frac{\pi}{3}$ $= \frac{2\pi}{3}$ <p>\therefore arc is $\frac{2\pi}{3}$ units</p> <p>\therefore Perimeter is $(2 + \frac{2\pi}{3})$ units.</p> </div> </div>	<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>State Mean:</p> <p>0.96/2</p> <p>0.69/1</p> <p>1.03/2</p> </div>
		<p>(ii) (1) Area = $\frac{1}{2}r^2 \theta$</p> $= \frac{1}{2} \times 2^2 \times \frac{\pi}{3}$ $= \frac{2\pi}{3}$ <p>\therefore area is $\frac{2\pi}{3}$ units²</p>	

* These solutions have been provided by [projectmaths](#) and are not supplied or endorsed by the Board of Studies

Board of Studies: Notes from the Marking Centre

- (i) A significant number of candidates did not read this part carefully enough and used the area of a sector formula to calculate the other value of θ . Candidates who presented a logical argument received full marks.
- (ii) Most candidates achieved the mark for this part by showing full working. A number of candidates used an incorrect formula.
- (iii) A significant number of candidates used the cosine rule to find AB but failed to take the square root at the end. Some candidates correctly calculated the arc length and AB but did not find the perimeter of the minor segment.

Source: http://www.boardofstudies.nsw.edu.au/hsc_exams/

