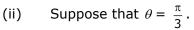
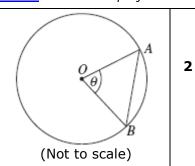
O9 5c The diagram shows a circle with centre O and radius 2 centimetres. The points A and B lie on the circumference of the circle and $\angle AOB = \theta$.

- (i) There are two possible values of θ for which the area of \triangle AOB is $\sqrt{3}$ square centimetres.
 - One value is $\frac{\pi}{3}$. Find the other value.



- (1) Find the area of the sector AOB.
- (2) Find the exact length of the perimeter of the minor segment bounded by the chord AB and the arc AB.



1

1.03/2

i. Area of $\triangle AOB = \frac{1}{2}ab \sin C$ $\sqrt{3} = \frac{1}{2} \times 2 \times 2 \times \sin \theta$ $\sqrt{3} = 2 \sin \theta$ $\sin \theta = \frac{\sqrt{3}}{2}$ $\theta = \frac{\pi}{3} \text{ or } \frac{2\pi}{3}$

 \therefore The other value is $\frac{2\pi}{3}$.

(ii) Area = $\frac{1}{2}r^2 \theta$ = $\frac{1}{2} \times 2^2 \times \frac{\pi}{3}$ = $\frac{2\pi}{3}$ \therefore area is $\frac{2\pi}{3}$ units² (2) To find length of chord AB, use cosine rule:

use cosine rule:

$$x^2 = 2^2 + 2^2 - 2(2)(2) \cos \frac{\pi}{3}$$

 $= 4 + 4 - 4$
 $= 4$
 $x = 2$
 \therefore chord AB is 2 cm long

State Mean:
0.96/2
0.69/1

To find length of arc AB, use $I = r\theta$ = $2 \times \frac{\pi}{2}$

$$= 2 \times \frac{\pi}{3}$$
$$= \frac{2\pi}{3}$$

- \therefore arc is $\frac{2\pi}{3}$ units
- \therefore Perimeter is $(2 + \frac{2\pi}{3})$ units.

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.
- 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/

^{*} These solutions have been provided by projectmaths and are not supplied or endorsed by the Board of Studies

