05	4a	A pendulum is 90 cm long and swings through an angle of 0.6 radians. The extreme positions of the pendulum are indicated by the points *A* and *B* in the diagram. (i) Find the length of the arc *AB*. (ii) Find the straight-line distance between the extreme positions of the pendulum. (iii) Find the area of the sector swept out by the pendulum.	1 2 2

i.   Using $l = r\theta$, using $r = 90$ and $\theta = 0.6$

$l = 90 \times 0.6$

   $= 54$

∴ The length is 54 cm

(ii)   Using cosine rule, (with in θ radians):

$AB^2 = 90^2 + 90^2 - 2 \times 90 \times 90 \times \cos 0.6$

$= 2829.563038 \ldots$

$AB = 53.1936372 \ldots$

$= 53.19$ (2 dec pl)

Distance is 53.19 cm

iii. Area of sector $A = \frac{1}{2}r^2\theta$

$= \frac{1}{2} \times 90^2 \times 0.6$

$= 2430$

∴ area is 2430 cm^2

* 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

This part was generally done well. Many candidates realised that all the subparts of (a) could be done without converting 0.6 radians to degrees.

(i)   Successful candidates used the formula $l = r\theta$ or found a proportion of the circumference. Common errors included using 0.6π or 108° or 34° as θ.

(ii)   This part was not done well and often it was omitted. In successful responses, candidates either used the cosine rule, the sine rule or right-angled triangle trigonometry, and then used the appropriate calculator mode. Common errors in the use of the cosine rule included using incorrect signs and neglecting to take the square root. Candidates who used the sine rule often made errors in calculating the base angles.

(iii) This part was generally done well, although many candidates found the area of the minor segment instead of the sector. Quite a number successfully found the correct proportion of the circle area. Candidates are reminded that the correct substitution into the appropriate formula should be shown.

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