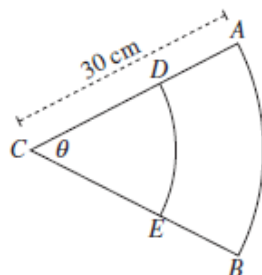


13	13 c	<p>The region <math>ABC</math> is a sector of a circle with radius 30 cm, centred at <math>C</math>. The angle of the sector is <math>\theta</math>. The arc <math>DE</math> lies on a circle also centred at <math>C</math>, as shown in the diagram.</p> <p>The arc <math>DE</math> divides the sector <math>ABC</math> into two regions of equal area.</p> <p>Find the exact length of the interval <math>CD</math>.</p>		2
$\begin{aligned}\text{Area of sector } ACB &= \frac{1}{2}r^2\theta \\ &= \frac{1}{2} \times 30^2 \times \theta \\ &= 450\theta \\ \text{Area of sector } DCE &= \frac{1}{2} \times 450\theta \\ &= 225\theta\end{aligned}$		$\begin{aligned}\therefore \frac{1}{2} \times r^2 \times \theta &= 225\theta \\ \therefore r^2 &= 450 \\ r &= \sqrt{450} \\ &= 15\sqrt{2} \\ \therefore \text{length of } CD &\text{ is } 15\sqrt{2} \text{ cm}\end{aligned}$	State Mean: 1.08/2	

\* 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

Candidates who began by finding the area of sector  $ABC$  ( $A = 450\theta$ ) were able to access one mark. Generally, those who equated the areas solved the equation to get the correct answer in the exact form  $(CD = 15\sqrt{2})$ .

Common problems were:

- not knowing how to use the fact that the area of the small sector was half the area of the large sector to find the radius of the small sector
- misquoting the area formula
- using incorrect formulae (eg of a segment).

Source: [http://www.boardofstudies.nsw.edu.au/hsc\\_exams/](http://www.boardofstudies.nsw.edu.au/hsc_exams/)