

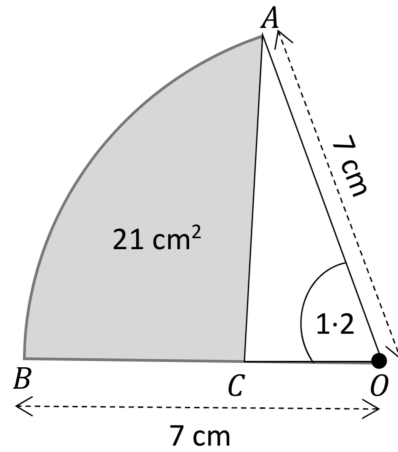
Question 4**(25 marks)**

(a) Find the two values of θ for which $\tan \frac{\theta}{2} = -\frac{1}{\sqrt{3}}$, where $0 \leq \theta \leq 4\pi$.

(b) The diagram shows OAB , a sector of a circle of radius 7 cm with centre O .
In the sector, $|\angle BOA| = 1.2$ radians.
The area of the shaded region is 21 cm^2 .

Find $|BC|$.

Give your answer correct to 1 decimal place.



Q4	Model Solution – 25 Marks	Marking Notes
(a)	<p>Reference angle: $\frac{\pi}{6}$</p> <p>2nd Quadrant: $\pi - \frac{\pi}{6} = \frac{5\pi}{6}$</p> $\frac{\theta}{2} = \frac{5\pi}{6} + 2n\pi$ $\theta = \frac{5\pi}{3} + 4n\pi$ <p>$n = 0 \Rightarrow \theta = \frac{5\pi}{3} = 300^\circ$</p> <p>4th Quadrant: $2\pi - \frac{\pi}{6} = \frac{11\pi}{6}$</p> $\frac{\theta}{2} = \frac{11\pi}{6} + 2n\pi$ $\theta = \frac{11\pi}{3} + 4n\pi$ <p>$n = 0 \Rightarrow \theta = \frac{11\pi}{3} = 660^\circ$</p>	<p>Scale 15D (0, 4, 7, 11, 15)</p> <p><i>Low Partial Credit:</i> 30° or -30° Mention of 2nd or 4th quadrants</p> <p><i>Mid Partial Credit</i> 150° or 330° or equivalent</p> <p><i>High Partial Credit:</i> 150° and 330° or equivalent</p>
(b)	<p>Area of ΔCOA = Area of Sector – 21</p> $= \frac{1}{2}r^2\theta - 21 = 8.4$ <p>Area of ΔCOA: $\frac{1}{2} CO 7 \sin 1.2 = 8.4$</p> $ CO = \frac{8.4}{3.5 \sin 1.2} = 2.57$ $ BC = 7 - 2.6 = 4.4 \text{ cm}$	<p>Scale 10D (0, 3, 5, 8, 10)</p> <p><i>Low Partial Credit:</i> Area of ΔCOA Area of Sector COA</p> <p><i>Mid Partial Credit:</i> Area of ΔCOA = Area of Sector – 21</p> <p><i>High Partial Credit:</i> $\frac{1}{2} CO 7 \sin 1.2 = 8.4$</p> <p><i>Full credit (-1)</i> Distance CO found and stops</p>