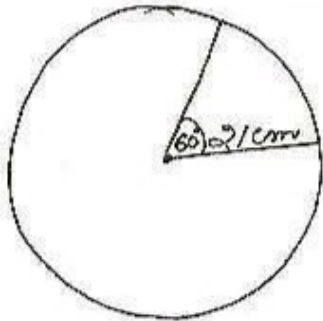


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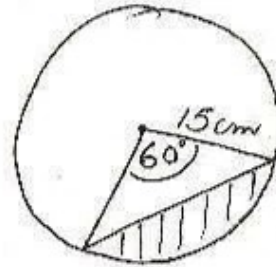


$$\begin{aligned} \text{(i) length of arc} &= \frac{2\pi r \theta}{360} \\ &= 2 \times \frac{22}{7} \times 21 \times \frac{60}{360} \\ &= 22 \text{ cm} \end{aligned}$$

$$\begin{aligned} \text{(ii) area of sector} &= \frac{\pi r^2 \theta}{360} \\ &= \frac{22}{7} \times 21 \times 21 \times \frac{60}{360} \\ &= 231 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{(iii) area of segment} &= r^2 \left(\frac{\pi \theta}{360} - \frac{\sin \theta}{2} \right) \\ &= 21 \times 21 \left[\frac{22 \times 60}{7 \times 360} - \frac{\sin 60}{2} \right] \\ &= 441 \left(\frac{11}{21} - \frac{\sqrt{3}}{4} \right) \\ &= 441 \times \frac{44 - 21\sqrt{3}}{21 \times 4} \\ &= \frac{21}{4} (44 - 21\sqrt{3}) \text{ cm}^2 \\ &= \frac{21}{4} (44 - 21 \times 1.732) \\ &= \frac{21}{4} \times 4 (11 - 21 \times 0.433) \\ &= 21 (11 - 9.093) \\ &= 21 \times 1.907 \\ &= 40.047 \text{ cm}^2 \end{aligned}$$

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$$\begin{aligned} \text{area of minor segment} &\text{ (shaded region)} \\ &= r^2 \left(\frac{\pi \theta}{360} - \frac{\sin \theta}{2} \right) \\ &= 15 \times 15 \left[\frac{3.14 \times 60}{360} - \frac{\sin 60}{2} \right] \end{aligned}$$

$$= 225 \left(\frac{1.57}{3} - \frac{\sqrt{3}}{4} \right)$$

$$= 225 \left(\frac{1.57}{3} - \frac{1.73}{4} \right)$$

$$= 225 \left(\frac{6.28 - 5.19}{4} \right)$$

$$= \frac{75}{4} \times 1.09$$

$$= 20.4375 \text{ cm}^2$$

area of major segment
(unshaded portion)

$$= \text{area of } \odot - \text{area of minor segment}$$

$$= \pi r^2 - 20.4375$$

$$= \frac{3.14}{7} \times 15 \times 15 - 20.4375$$

$$= 706.5 - 20.4375$$

$$= 686.0625 \text{ cm}^2$$