

MATHEMATICS • CLASS 10

CHAPTER 11

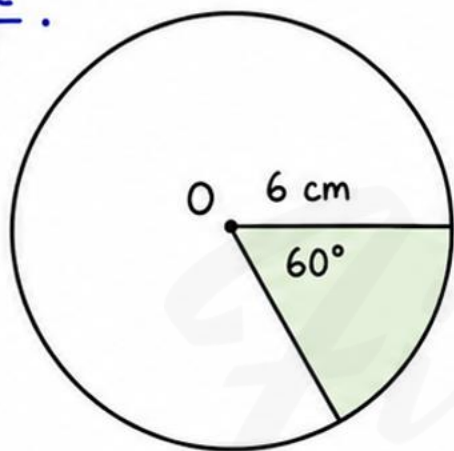
Areas Related to Circles

NCERT SOLUTIONS



EXERCISE 11.1 – Q1 & Q2

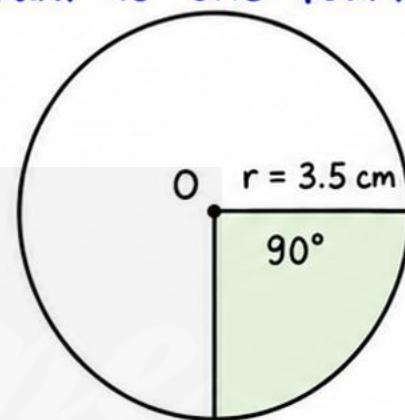
- Q1. Find the area of a sector of radius 6 cm and angle 60° .
Use $\pi = \frac{22}{7}$.



$$\begin{aligned}\text{Area} &= (\theta/360^\circ) \times \pi r^2 \\ &= \left(\frac{60}{360}\right) \times \left(\frac{22}{7}\right) \times 6^2 \\ &= \frac{132}{7} \text{ cm}^2.\end{aligned}$$

Answer: $\frac{132}{7} \text{ cm}^2$.

- Q2. Find the area of a quadrant of a circle whose circumference is 22 cm.
A quadrant is one-fourth of a circle.



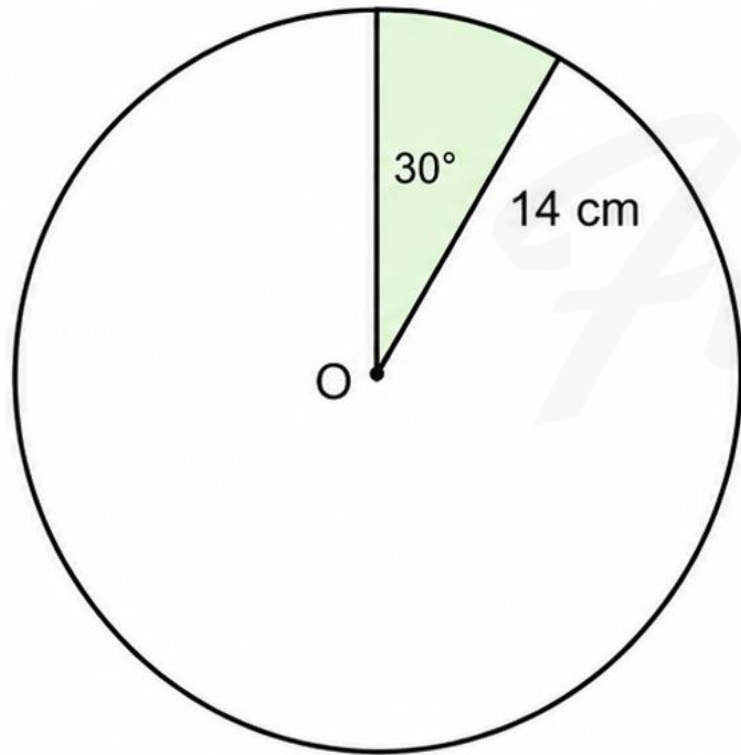
$$\begin{aligned}2\pi r &= 22 \\ r &= 22 \div \left(2 \times \frac{22}{7}\right) = 3.5 \text{ cm}\end{aligned}$$

$$\begin{aligned}\text{Area} &= \frac{1}{4} \times \pi r^2 \\ &= \frac{1}{4} \times \left(\frac{22}{7}\right) \times (3.5)^2 \\ &= 9.625 \text{ cm}^2.\end{aligned}$$

Answer: 9.625 cm^2 .

EXERCISE 11.1 — Q3

Q3. The minute hand of a clock is 14 cm long. Find the area swept by it in 5 minutes. Use $\pi = \frac{22}{7}$.



Not to scale.

The minute hand turns through 360° in 60 minutes.
Angle in 5 minutes:

$$\theta = \frac{5}{60} \times 360^\circ = 30^\circ$$

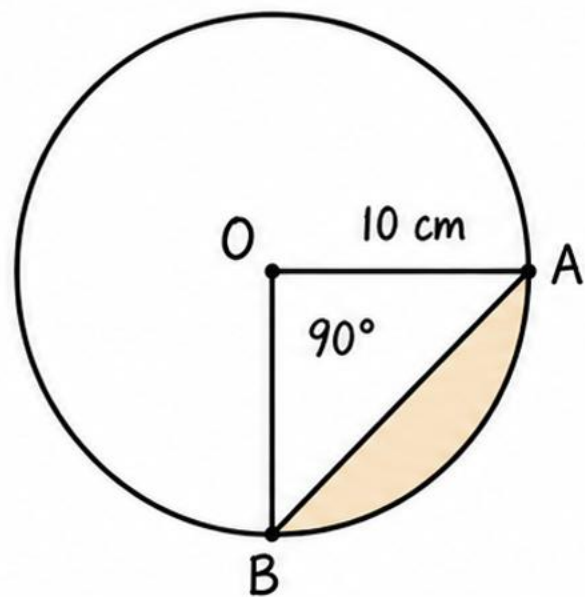
The swept region is a sector of radius 14 cm.

$$\begin{aligned} \text{Area} &= \frac{\theta}{360^\circ} \times \pi r^2 \\ &= \frac{30}{360} \times \frac{22}{7} \times 14^2 \\ &= \frac{154}{3} \text{ cm}^2. \end{aligned}$$

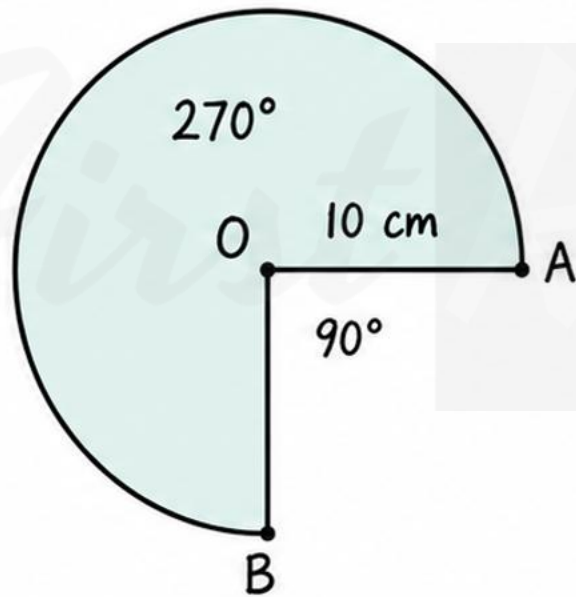
Answer: $\frac{154}{3} \text{ cm}^2$ ($51\frac{1}{3} \text{ cm}^2$).

EXERCISE 11.1 – Q4

Q4. A chord of a circle of radius 10 cm subtends 90° at the centre. Find (i) the minor segment area and (ii) the major sector area. Use $\pi = 3.14$.



(i) Minor segment



(ii) Major sector

Not to scale.

(i) Join the radii OA and OB.

$$\text{Sector area} = \frac{90}{360} \times 3.14 \times 10^2 = 78.5 \text{ cm}^2$$

Triangle OAB is right-angled at O.

$$\text{Triangle area} = \frac{1}{2} \times 10 \times 10 = 50 \text{ cm}^2$$

$$\begin{aligned} \text{Minor segment} &= \text{sector} - \text{triangle} \\ &= 78.5 - 50 = 28.5 \text{ cm}^2. \end{aligned}$$

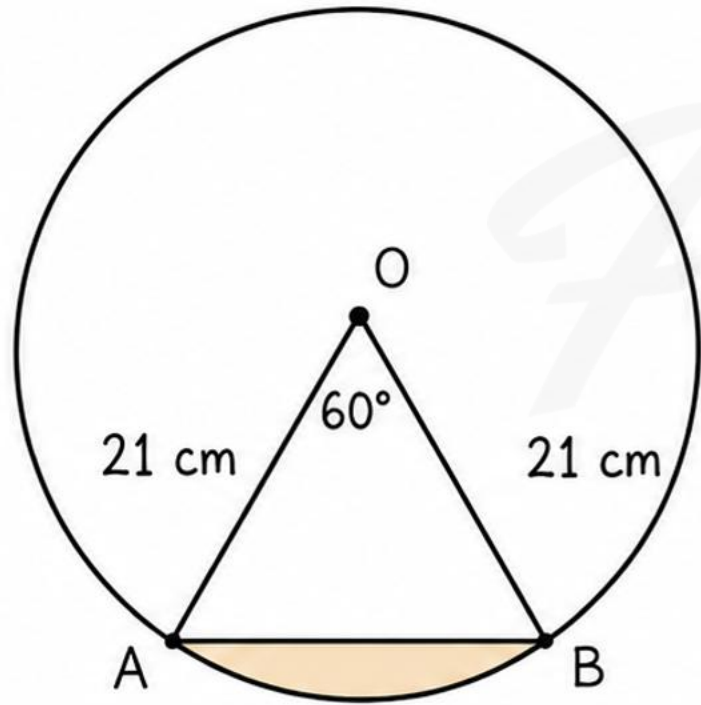
(ii) Major sector angle $= 360^\circ - 90^\circ = 270^\circ$

$$\begin{aligned} \text{Major sector area} &= \frac{270}{360} \times 3.14 \times 10^2 \\ &= 235.5 \text{ cm}^2. \end{aligned}$$

Answers: (i) 28.5 cm^2 ; (ii) 235.5 cm^2 .

EXERCISE 11.1 — Q5

Q5. In a circle of radius 21 cm, an arc subtends 60° at the centre. Find (i) arc length, (ii) sector area and (iii) area of the segment formed by its chord. Use $\pi = \frac{22}{7}$.



Shaded region: minor segment
Not to scale.

$$\begin{aligned} \text{(i) Arc length} &= \frac{60}{360} \times 2 \times \frac{22}{7} \times 21 \\ &= 22 \text{ cm.} \end{aligned}$$

$$\begin{aligned} \text{(ii) Sector area} &= \frac{60}{360} \times \frac{22}{7} \times 21^2 \\ &= 231 \text{ cm}^2. \end{aligned}$$

(iii) $OA = OB$ and $\angle AOB = 60^\circ$.
So triangle OAB is equilateral, with side 21 cm.

$$\text{Triangle area} = \frac{\sqrt{3}}{4} \times 21^2 = \frac{441\sqrt{3}}{4} \text{ cm}^2$$

$$\begin{aligned} \text{Segment area} &= \text{sector} - \text{triangle} \\ &= 231 - \frac{441\sqrt{3}}{4} \text{ cm}^2. \end{aligned}$$

$$\text{Answers: } 22 \text{ cm; } 231 \text{ cm}^2; \left(231 - \frac{441\sqrt{3}}{4}\right) \text{ cm}^2.$$



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