



SECTION 1: VISUAL & CORE FUNDAMENTALS

Before moving to sectors and segments, let's establish the fundamental geometry and formulas for a circle.

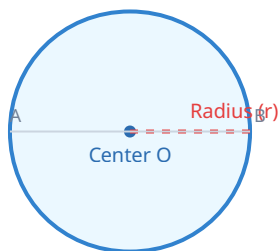


Figure 1.1: Standard Circle with Center O, Radius r , and Diameter $AB = 2r$

Core Formulas

- Diameter (d): $d = 2r$
- Circumference (C): $C = 2\pi r = \pi d$
- Area (A): $A = \pi r^2$
- Area of Semi-Circle: $A_{semi} = \frac{1}{2} \pi r^2$
- Perimeter of Semi-Circle: $P_{semi} = \pi r + 2r = r(\pi + 2)$

Feature	Formula	Standard Units
Circumference	$C = 2\pi r$	cm, m
Area	$A = \pi r^2$	cm^2, m^2
Perimeter of Semicircle	$P = r(\pi + 2)$	cm, m
Area of Ring (Annulus)	$A = \pi(R^2 - r^2)$	cm^2, m^2

WARNING / COMMON MISTAKE:

The perimeter of a semi-circle is **NOT** πr ! That is only the curved boundary length. You must add the straight diameter $2r$ to close the region: $P = \pi r + 2r$.



SECTION 2: MATHEMATICS-FIRST EXPLANATIONS

1. Sector of a Circle

- ① **WHAT?** A sector is the region enclosed by two radii and the subtended arc (like a slice of pizza).
- ② **WHY?** The entire circle subtends 360° at the center with area πr^2 . A sector with central angle θ represents a fraction $\theta/360^\circ$ of the entire circle.

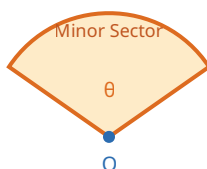


Figure 2.1: Minor Sector with Central Angle θ

$$\text{Area of Sector: } A = (\theta / 360^\circ) \times \pi r^2$$

$$\text{Arc Length (l): } l = (\theta / 360^\circ) \times 2\pi r$$

TINKU SIR TRICK: DIRECT SECTOR-ARC RELATIONSHIP

Did you know you can write the Area of a Sector without knowing θ if you know arc length l ?

$$\text{Area of Sector} = \frac{1}{2} \times l \times r$$

Think of it like a triangle with base = arc length (l) and height = radius (r)!

ONEPATH HACK: CLOCK NEEDLE SPEED HACK

- **Minute hand:** Moves 360° in 60 mins $\Rightarrow 6^\circ$ per minute
- **Hour hand:** Moves 360° in 12 hours (720 mins) $\Rightarrow 0.5^\circ$ per minute

Quick application: Angle swept by minute hand in 20 minutes = $20 \times 6^\circ = 120^\circ$!

2. Segment of a Circle

WHAT? A segment is the region bounded by a chord and the corresponding arc.

$$\text{Area of Segment} = \text{Area of Sector} - \text{Area of Central Triangle}$$

$$A_{\text{segment}} = (\theta / 360^\circ) \pi r^2 - \frac{1}{2} r^2 \sin \theta$$

Central Angle (θ)	Triangle Type	Triangle Area Formula ($\frac{1}{2} r^2 \sin \theta$)
$\theta = 60^\circ$	Equilateral Triangle	$A = (\sqrt{3} / 4) r^2$
$\theta = 90^\circ$	Right-Angled Triangle	$A = \frac{1}{2} r^2$

Central Angle (θ)	Triangle Type	Triangle Area Formula ($\frac{1}{2} r^2 \sin \theta$)
$\theta = 120^\circ$	Isosceles Triangle	$A = (\sqrt{3} / 4) r^2$

SECTION 3: QUESTION IDENTIFICATION SYSTEM

Question Clue	Concept / Topic	Recommended Strategy
"Clock minute hand moves x minutes..."	Sector Angle	$\theta = x \times 6^\circ$. Use $A = (\theta/360^\circ) \pi r^2$
"Area between concentric circles"	Ring / Annulus	Use $A = \pi(R^2 - r^2)$
"Horse tied to peg with rope L"	Quadrant / Sector	Rope $L = r$, Angle $\theta = 90^\circ$
"Revolutions made by wheel"	Distance & Circumference	Revolutions = Total Distance / $2\pi r$

SECTION 4: SOLVED EXAMPLES (BOARD STYLE)

★ EXAMPLE 1: Right-Angled Sector & Segment

Question: A chord of a circle of radius **10 cm** subtends a right angle at the center. Find the area of: (i) minor segment, (ii) major sector. (Use $\pi = 3.14$)

Given: $r = 10 \text{ cm}$, $\theta = 90^\circ$, $\pi = 3.14$

Solution:

(i) Area of Minor Sector:

$$A_{\text{sector}} = (90^\circ / 360^\circ) \times 3.14 \times 10 \times 10 = \frac{1}{4} \times 314 = 78.5 \text{ cm}^2$$

Area of Triangle AOB:

$$A_{\text{triangle}} = \frac{1}{2} \times 10 \times 10 = 50 \text{ cm}^2$$

Area of Minor Segment:

$$A_{\text{segment}} = 78.5 - 50 = 28.5 \text{ cm}^2$$

(ii) Area of Major Sector:

$$\text{Angle} = 360^\circ - 90^\circ = 270^\circ$$

$$A_{\text{major}} = (270^\circ / 360^\circ) \times 3.14 \times 100 = \frac{3}{4} \times 314 = 235.5 \text{ cm}^2$$

SECTION 5: VERIFIED BOARD PYQS

CBSE 2023 - 2 MARKS

Question: If the perimeter and the area of a circle are numerically equal, then find the radius of the circle.

Solution:

Given: Circumference = Area $\Rightarrow 2\pi r = \pi r^2$

Dividing both sides by πr ($r \neq 0$):

$r = 2$ units

CBSE 2024 - 3 MARKS

Question: Find the area of the segment AYB if radius is 21 cm and $\angle AOB = 120^\circ$. (Use $\pi = 22/7$)

Solution:

1. Area of sector $OAYB = (120^\circ / 360^\circ) \times (22/7) \times 21 \times 21 = 462 \text{ cm}^2$
2. Area of $\triangle AOB = \frac{1}{2} r^2 \sin 120^\circ = \frac{1}{2} \times 441 \times (\sqrt{3} / 2) = (441\sqrt{3} / 4) \text{ cm}^2$
3. Area of segment $AYB = (462 - 190.95) = 271.05 \text{ cm}^2$

SECTION 6: ONE-PAGE REVISION SHEET



ONEPATH LAST-MINUTE REVISION SHEET

- **Sector Area:** $A = (\theta / 360^\circ) \times \pi r^2 = \frac{1}{2} \times l \times r$
- **Arc Length:** $l = (\theta / 360^\circ) \times 2\pi r$
- **Segment Area:** Sector Area - Triangle Area
- **Triangle Area Shortcuts:**
 - $\theta = 60^\circ \Rightarrow (\sqrt{3} / 4) r^2$
 - $\theta = 90^\circ \Rightarrow \frac{1}{2} r^2$
 - $\theta = 120^\circ \Rightarrow (\sqrt{3} / 4) r^2$
- **Clock Speed:** Minute hand = $6^\circ / \text{min}$ | Hour hand = $0.5^\circ / \text{min}$
- **Wheel Revolutions:** Total Distance / $2\pi r$

SECTION 7: FINAL CHAPTER CHECKLIST

- ☒ All NCERT core formulas memorized
- ☒ Clock needle speed & angle calculations clear
- ☒ Triangle area shortcuts for 60° , 90° , 120° mastered
- ☒ Difference between Sector and Segment understood

✓ Verified CBSE 2023–2026 PYQs completed