🟦 Chapter 11: Areas Related to Circles

📌 Key Terms

1. A **circle** is a set of all points at equal distance (radius) from a fixed point (centre).
2. A **sector** is the region enclosed by two radii and the arc between them.
   - 🔹 *Minor sector* – smaller region
   - 🔹 *Major sector* – larger region
   - 📍 *(See Fig. 11.1)*

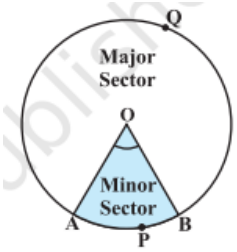

Fig. 11.1

1. A **segment** is the region enclosed between a chord and the corresponding arc.
   - 🔹 *Minor segment* – smaller part
   - 🔹 *Major segment* – larger part
   - 📍 *(See Fig. 11.2)*

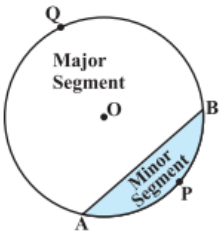

Fig. 11.2

📐 Important Formulas

🔸 Area of a Circle

$$\text{Area} = \pi r^2$$

🔸 Area of a Sector (angle θ in degrees)

$$\text{Area} = (\theta / 360) \times \pi r^2$$

📍 *(See Fig. 11.3)*

🔸 Length of an Arc (angle θ in degrees)

$$\text{Length} = (\theta / 360) \times 2\pi r$$

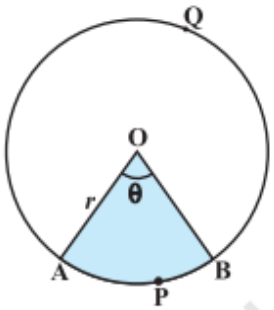

Fig. 11.3

📍 (See Fig. 11.3)

🔸 Area of a Segment

Area of Segment = Area of Sector − Area of Triangle

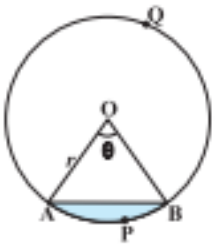

Fig. 11.4

📍 *(See Fig. 11.4)*

🧠 Extra Concepts

- **Area of Major Sector** = πr² − area of minor sector
- **Area of Major Segment** = πr² − area of minor segment
  📍 (Refer Fig. 11.3 & 11.4)

💡 Example Questions

✅ Example 1: Sector Area

Find area of a sector with:

- Radius = 4 cm
- Angle = 30°
- π = 3.14
  📍 *(See Fig. 11.5)*

Area = (30 / 360) × 3.14 × 4²
= (1/12) × 3.14 × 16
= 4.19 cm² (approx)

Major sector area = πr² − sector area
= 3.14 × 16 − 4.19 = 46.1 cm² (approx)

✅ Example 2: Segment Area

Find area of segment AYB:

- Radius = 21 cm
- Angle = 120°
- π = 22/7

  📍 *(See Fig. 11.6 & 11.7)*

Step 1:
Area of sector = (120 / 360) × (22/7) × 21² = 462 cm²

Step 2:
Use cos 60° & sin 60° to find AB and triangle area.

Step 3:
Area of segment = Sector area − Triangle area
= 462 − (441√3 / 4) cm²

🗒️ Quick Summary

Area of Circle = πr²

Area of Sector = (θ / 360) × πr²

Arc Length = (θ / 360) × 2πr

Area of Segment = Sector area − Triangle area

📊 Exam Focus

Question Type	Asked Often
Sector area (angle + radius)	★★★★★
Arc length calculation	★★★★
Segment area (needs triangle subtraction)	★★★★
Real-world applications (fields, clocks)	★★★★