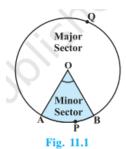# 📘 Chapter 11: Areas Related to Circles

📌 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
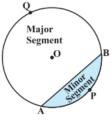   - ◆ *Major segment* – larger part
   - 📍 *(See Fig. 11.2)*

Fig. 11.2

📐 Important Formulas

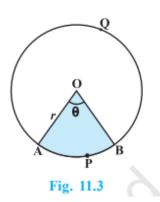◆ **Area of a Circle**

Area = πr²

◆ **Area of a Sector (angle θ in degrees)**

Area = (θ / 360) × πr²

📍 *(See Fig. 11.3)*

◆ **Length of an Arc (angle θ in degrees)**

Length = (θ / 360) × 2πr

Fig. 11.3
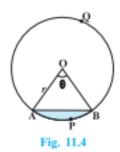
📍 (See Fig. 11.3)

◆ 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** = πr^2 – area of minor sector
- **Area of Major Segment** = πr^2 – 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)*

$$\text{Area} = (30 / 360) \times 3.14 \times 4^2$$
$$= (1/12) \times 3.14 \times 16$$
$$= 4.19 \text{ cm}^2 \text{ (approx)}$$

Major sector area = πr^2 – 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)	★★★★