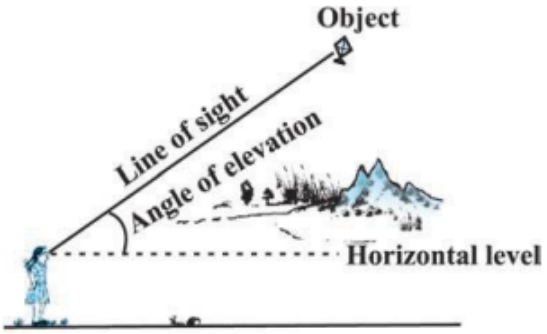
🟦 Chapter 9: Some Applications of Trigonometry

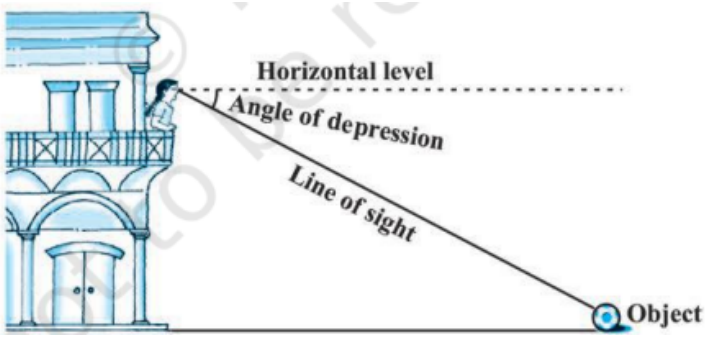
📌 What is this chapter about?

- You'll learn how **trigonometry** helps us in **real life**, like:
  - Finding **height** of buildings/towers
  - Calculating **distance** across rivers or roads
  - Using **angle of elevation** and **angle of depression**

👀 Key Terms



1. **Line of Sight**: Line from the **observer's eye** to the **object being seen**
2. **Angle of Elevation**:
   ➕ When the object is **above horizontal level** (you look **up**)
   ➤ Formed **between horizontal line and line of sight**
3. **Angle of Depression**:
   ➖ When the object is **below horizontal level** (you look **down**)
   ➤ Formed **between horizontal line and line of sight**



🧠 How to Apply Trigonometry?

Use right-angled triangle concepts to solve problems using these formulas:

$\tan \theta$ = Opposite / Adjacent

$\sin \theta$ = Opposite / Hypotenuse

$\cos \theta$ = Adjacent / Hypotenuse

👉 Choose the correct ratio based on **known** and **unknown** sides.

💡 Common Diagrams You May See

- Triangle formed by **tower/building**, **ground**, and **line of sight**
- Observer is either:
  - Standing on the ground
  - On a building
  - On a bridge looking down (depression)

🧮 Example Formulas Used

- **Height of tower**:
- tan θ = height / distance from foot
- ⇒ height = distance × tan θ

- **Length of ladder or rope** (hypotenuse):
- sin θ = height / length
- ⇒ length = height / sin θ

- **Distance between objects**:
- tan θ = height / distance
- ⇒ distance = height / tan θ

🔥 Most Important Concepts from Examples

- 🔹 Find height using **angle of elevation** and distance
- 🔹 Find length of ladder/rope using **angle & height**
- 🔹 Use **angle of depression** when object is **below** observer
- 🔹 Combine two triangles when two angles or two heights are involved
- 🔹 Convert answers to decimal using:
- √3 ≈ 1.732
- √2 ≈ 1.414

✅ Formulas to Remember

tan θ = Opposite / Adjacent

sin θ = Opposite / Hypotenuse

cos θ = Adjacent / Hypotenuse

📊 Previous Year Question Pattern

Type of Question	Frequency
Find height using angle and distance	★★★★★
Use two angles (e.g., 30° & 45°) to find unknown	★★★★
Angle of depression problems (lighthouse, bridge)	★★★★
Two slides/ropes with different angles	★★★

🗒️ Summary

- Line of sight = line from eye to object
- Angle of elevation = look **up**
- Angle of depression = look **down**
- Use **trigonometric ratios** in right triangles to find heights, lengths, and distances