🟦 Class 10 Maths – Chapter 8: Introduction to Trigonometry

📌 What is Trigonometry?

- ✨ Trigonometry is the study of **angles and sides** in a **right-angled triangle**.
- 🧠 Word origin:
  - **Tri** = 3
  - **Gon** = sides
  - **Metron** = measure

📐 Trigonometric Ratios

In **right triangle ABC**, right-angled at B (∠B = 90°):

AB = adjacent side to ∠A

BC = opposite side to ∠A

AC = hypotenuse

🎯 Basic Trigonometric Ratios:

sin A = BC / AC

cos A = AB / AC

tan A = BC / AB

cosec A = AC / BC = 1 / sin A

sec A = AC / AB = 1 / cos A

cot A = AB / BC = 1 / tan A

🔁 Relationships Between Ratios

tan A = sin A / cos A

cot A = cos A / sin A

✅ Trigonometric Identities (Always True)

$\sin^2 A + \cos^2 A = 1$

$1 + \tan^2 A = \sec^2 A$

$1 + \cot^2 A = \operatorname{cosec}^2 A$

📊 Standard Angle Values (0°, 30°, 45°, 60°, 90°)

Angle	sin	cos	tan	cosec	sec	🔹 cot
0°	0	1	0	❌ ND	1	❌ ND
30°	1/2	√3/2	1/√3	2	2/√3	√3
45°	1/√2	1/√2	1	√2	√2	1
60°	√3/2	1/2	√3	2/√3	2	1/√3
90°	1	0	❌ ND	1	❌ ND	0

👉 **ND = Not Defined**

💡 Example: If tan A = 3/4, find all other ratios

Let:

BC = 3k (opposite)

AB = 4k (adjacent)

AC = √(3k)² + (4k)² = 5k

Then:

sin A = 3/5
cos A = 4/5
tan A = 3/4
cosec A = 5/3
sec A = 5/4
cot A = 4/3

🧪 Proving an Identity Example

Q: If tan A = 1, prove 2 sin A cos A = 1

tan A = 1 ⇒ ∠A = 45°
sin A = cos A = 1/√2

2 × sin A × cos A = 2 × 1/√2 × 1/√2 = 1 ✅

🧠 Quick Summary

sin A = opposite / hypotenuse
cos A = adjacent / hypotenuse
tan A = opposite / adjacent

cosec A = 1 / sin A

sec A = 1 / cos A

cot A = 1 / tan A

📌 **Identities to Remember**:

$\sin^2 A + \cos^2 A = 1$

$1 + \tan^2 A = \sec^2 A$

$1 + \cot^2 A = \text{cosec}^2 A$