Introduction to Trigonometry

Choose the reference angle before naming the opposite and adjacent sides. The hypotenuse is always opposite the right angle.

Formulas and methods

For an acute angle θ in a right triangle: sin θ = opposite/hypotenuse, cos θ = adjacent/hypotenuse, tan θ = opposite/adjacent.

cosec θ = 1/sin θ, sec θ = 1/cos θ, cot θ = 1/tan θ wherever the denominators are nonzero.

$\sin^2\theta + \cos^2\theta = 1$; $1 + \tan^2\theta = \sec^2\theta$; $1 + \cot^2\theta = \operatorname{cosec}^2\theta$, wherever defined.

Angles 0°,30°,45°,60°,90°: sin values 0,1/2,1/√2,√3/2,1; cos values 1,√3/2,1/√2,1/2,0; tan values 0,1/√3,1,√3,undefined.

Worked examples

If tan θ = 3/4 for an acute angle, find sin θ and cos θ.

Take opposite = 3k and adjacent = 4k, k > 0. Pythagoras gives hypotenuse = 5k. Hence sin θ = 3/5 and cos θ = 4/5.

Why does $\sin^2\theta + \cos^2\theta = 1$?

For opposite p, adjacent b and hypotenuse h, Pythagoras gives $p^2 + b^2 = h^2$. Divide by h^2: $(p/h)^2 + (b/h)^2 = 1$. Substitute the definitions of sine and cosine.

Common mistake

$\sin^2\theta$ means $(\sin\theta)^2$, not $\sin(\theta^2)$. Never cancel terms across addition. tan 90° is undefined, not zero.

Introduction to Trigonometry — practice

Try these without looking at the answers. Show substitutions and units. Difficulty labels describe these questions, not official CBSE classifications.

1. [Foundation] Evaluate $\sin 30° + \cos 60°$.

2. [Core] Find $\sec^2 45° - \tan^2 45°$.

3. [Core] For acute θ, $\sin \theta = 5/13$. Find $\cos \theta$.

4. [Challenge] Simplify $(1 - \cos^2 \theta)/\sin \theta$ where $\sin \theta \neq 0$.

Introduction to Trigonometry — answers

1. Evaluate sin 30° + cos 60°.

1/2 + 1/2 = 1.

2. Find sec² 45° − tan² 45°.

The identity sec² θ − tan² θ = 1 gives 1.

3. For acute θ, sin θ = 5/13. Find cos θ.

cos² θ = 1 − 25/169 = 144/169. Since θ is acute, cos θ = 12/13.

4. Simplify (1 − cos² θ)/sin θ where sin θ ≠ 0.

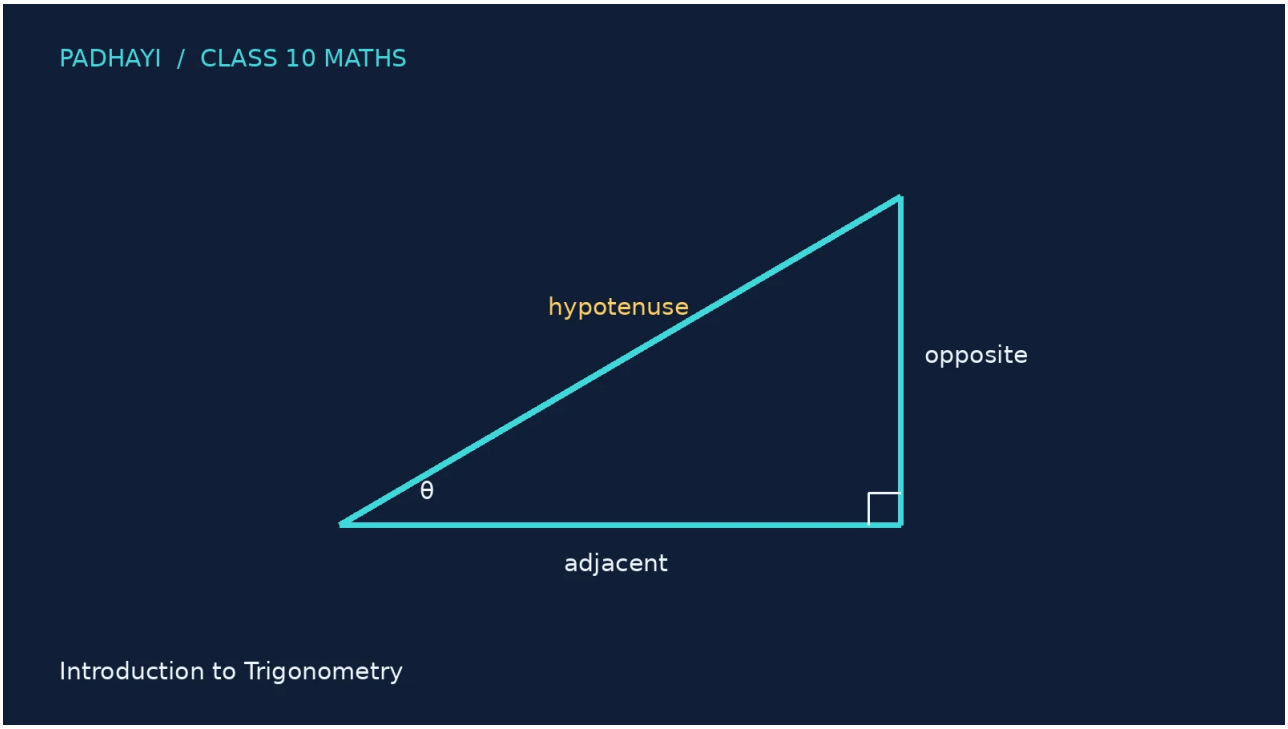
1 − cos² θ = sin² θ. Dividing by sin θ gives sin θ.

Next step: explain one method aloud, then solve a question from your NCERT textbook without using this sheet.

Original Padhayi revision material. Independent study aid; not an official CBSE or NCERT publication. Syllabus reference: CBSE Mathematics, Class X, 2026–27.

Official CBSE syllabus | NCERT textbooks

Visual reminder



Schematic illustration; diagrams are not necessarily drawn to scale.