

Class 10 Mathematics

Introduction to Trigonometry – Study Material

Prepared for student practice • Suitable for Classes 9–10

1. Basic Trigonometric Ratios

In a right-angled triangle, for an acute angle θ :

$\sin \theta = \text{Perpendicular} / \text{Hypotenuse}$

$\cos \theta = \text{Base} / \text{Hypotenuse}$

$\tan \theta = \text{Perpendicular} / \text{Base}$

$\operatorname{cosec} \theta = \text{Hypotenuse} / \text{Perpendicular}$

$\sec \theta = \text{Hypotenuse} / \text{Base}$

$\cot \theta = \text{Base} / \text{Perpendicular}$

2. Important Values Table

θ	0°	30°	45°	60°	90°
$\sin \theta$	0	$1/2$	$1/\sqrt{2}$	$\sqrt{3}/2$	1
$\cos \theta$	1	$\sqrt{3}/2$	$1/\sqrt{2}$	$1/2$	0
$\tan \theta$	0	$1/\sqrt{3}$	1	$\sqrt{3}$	Not defined
$\operatorname{cosec} \theta$	Not defined	2	$\sqrt{2}$	$2/\sqrt{3}$	1
$\sec \theta$	1	$2/\sqrt{3}$	$\sqrt{2}$	2	Not defined
$\cot \theta$	Not defined	$\sqrt{3}$	1	$1/\sqrt{3}$	0

3. Important Identities

- $\sin^2 \theta + \cos^2 \theta = 1$
- $1 + \tan^2 \theta = \sec^2 \theta$
- $1 + \cot^2 \theta = \operatorname{cosec}^2 \theta$
- $\tan \theta = \sin \theta / \cos \theta$
- $\cot \theta = \cos \theta / \sin \theta$

4. Solved Examples

Example 1: If $\sin \theta = 3/5$, find $\cos \theta$ and $\tan \theta$.

Solution: Using $\sin^2 \theta + \cos^2 \theta = 1$, $\cos \theta = 4/5$. Therefore $\tan \theta = (3/5)/(4/5) = 3/4$.

Example 2: Find the value of $\sin 30^\circ + \cos 60^\circ$.

Solution: $\sin 30^\circ = 1/2$ and $\cos 60^\circ = 1/2$. Answer = 1.

Example 3: If $\tan \theta = 1$, find θ for $0^\circ < \theta < 90^\circ$.

Solution: $\tan 45^\circ = 1$. Therefore $\theta = 45^\circ$.

5. Practice Questions

1. Find $\sin 45^\circ + \cos 45^\circ$.
2. Find $\tan 30^\circ \times \tan 60^\circ$.
3. If $\cos \theta = 12/13$, find $\sin \theta$ for an acute angle.
4. If $\tan \theta = 4/3$, find $\sec \theta$.
5. Prove that $(\sin \theta / \cos \theta) = \tan \theta$.
6. Evaluate: $\sin^2 30^\circ + \cos^2 30^\circ$.
7. Evaluate: $1 + \tan^2 45^\circ$.
8. Find $\cot 60^\circ$.
9. If $\sin A = 5/13$, find $\cos A$ and $\tan A$.
10. A 10 m ladder reaches the top of a wall and makes an angle of 30° with the ground. Find the height reached on the wall.

Answer Key

1. $\sqrt{2}$
2. 1
3. $5/13$
4. $5/3$
5. Identity
6. 1
7. 2
8. $1/\sqrt{3}$
9. $\cos A = 12/13$, $\tan A = 5/12$
10. 5 m

Teaching Tip: First memorize the standard values table, then practice identities and word problems. Always draw a right-angled triangle when solving application-based questions.