

Every trigonometry formula you need for Class 11 Maths, JEE Main, JEE Advanced and CBSE boards — on one printable sheet. Keep it handy for quick revision in the last few days before your exam.

1. The Six Basic Trigonometric Ratios (SOHCAHTOA)

For a right triangle and angle θ : **SOH** — $\sin\theta = \text{Opposite}/\text{Hypotenuse}$ **CAH** — $\cos\theta = \text{Adjacent}/\text{Hypotenuse}$ **TOA** — $\tan\theta = \text{Opposite}/\text{Adjacent}$

Ratio	Formula	Reciprocal of
$\sin\theta$	Opposite / Hypotenuse	$\text{cosec}\theta$
$\cos\theta$	Adjacent / Hypotenuse	$\sec\theta$
$\tan\theta$	Opposite / Adjacent = $\sin\theta / \cos\theta$	$\cot\theta$
$\text{cosec}\theta$	Hypotenuse / Opposite = $1 / \sin\theta$	$\sin\theta$
$\sec\theta$	Hypotenuse / Adjacent = $1 / \cos\theta$	$\cos\theta$
$\cot\theta$	Adjacent / Opposite = $1 / \tan\theta = \cos\theta / \sin\theta$	$\tan\theta$

★ Every other formula on this sheet is built from these six ratios.

2. Trigonometric Ratios of Standard Angles

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	$\sqrt{3}$	undefined
$\text{cosec}\theta$	undefined	2	$\sqrt{2}$	$2/\sqrt{3}$	1
$\sec\theta$	1	$2/\sqrt{3}$	$\sqrt{2}$	2	undefined
$\cot\theta$	undefined	$\sqrt{3}$	1	$1/\sqrt{3}$	0

★ One of the most frequently tested recall tables in Class 11 exams and JEE Main.

3. Pythagorean & Reciprocal Identities

Pythagorean Identity

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

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

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

Reciprocal Identity

$$\sin\theta = 1/\text{cosec}\theta$$

$$\cos\theta = 1/\sec\theta$$

$$\tan\theta = 1/\cot\theta$$

★ Derived directly from the Pythagorean theorem — the most used formulas in simplification and proof questions.

4. Sign Convention (Quadrant Rule)

Quadrant	Positive Ratios
I (0° – 90°)	All (sin, cos, tan and their reciprocals)
II (90° – 180°)	sin, cosec
III (180° – 270°)	tan, cot
IV (270° – 360°)	cos, sec

★ Mnemonic: "All Silver Tea Cups" for quadrants I $\rightarrow$ IV.

5. Complementary & Supplementary Angle Formulas

Angle Transformation	Formula
$\sin(90^\circ - \theta)$	$\cos \theta$
$\cos(90^\circ - \theta)$	$\sin \theta$
$\tan(90^\circ - \theta)$	$\cot \theta$
$\sin(180^\circ - \theta)$	$\sin \theta$
$\cos(180^\circ - \theta)$	$-\cos \theta$
$\tan(180^\circ - \theta)$	$-\tan \theta$
$\sin(-\theta)$	$-\sin \theta$
$\cos(-\theta)$	$\cos \theta$
$\tan(-\theta)$	$-\tan \theta$

6. Compound Angle (Sum & Difference) Formulas

Formula
$\sin(A + B) = \sin A \cos B + \cos A \sin B$
$\sin(A - B) = \sin A \cos B - \cos A \sin B$
$\cos(A + B) = \cos A \cos B - \sin A \sin B$
$\cos(A - B) = \cos A \cos B + \sin A \sin B$
$\tan(A + B) = (\tan A + \tan B) / (1 - \tan A \tan B)$
$\tan(A - B) = (\tan A - \tan B) / (1 + \tan A \tan B)$

★ Frequently tested in JEE Main Chapterwise PYQs.

7. Double, Triple & Half-Angle Formulas

Double Angle

Formula

$$\sin 2\theta = 2 \sin \theta \cos \theta$$

$$\cos 2\theta = \cos^2 \theta - \sin^2 \theta = 2\cos^2 \theta - 1 = 1 - 2\sin^2 \theta$$

$$\tan 2\theta = 2 \tan \theta / (1 - \tan^2 \theta)$$

Triple Angle

Formula

$$\sin 3\theta = 3 \sin \theta - 4 \sin^3 \theta$$

$$\cos 3\theta = 4 \cos^3 \theta - 3 \cos \theta$$

$$\tan 3\theta = (3 \tan \theta - \tan^3 \theta) / (1 - 3 \tan^2 \theta)$$

Half-Angle

Formula

$$\sin (\theta/2) = \pm \sqrt{(1 - \cos \theta)/2}$$

$$\cos (\theta/2) = \pm \sqrt{(1 + \cos \theta)/2}$$

$$\tan (\theta/2) = \pm \sqrt{(1 - \cos \theta)/(1 + \cos \theta)}$$

8. Sum-to-Product & Product-to-Sum Formulas

Sum-to-Product

Formula

$$\sin A + \sin B = 2 \sin[(A+B)/2] \cos[(A-B)/2]$$

$$\sin A - \sin B = 2 \cos[(A+B)/2] \sin[(A-B)/2]$$

$$\cos A + \cos B = 2 \cos[(A+B)/2] \cos[(A-B)/2]$$

$$\cos A - \cos B = -2 \sin[(A+B)/2] \sin[(A-B)/2]$$

Product-to-Sum

Formula

$$2 \sin A \cos B = \sin(A+B) + \sin(A-B)$$

$$2 \cos A \sin B = \sin(A+B) - \sin(A-B)$$

$$2 \cos A \cos B = \cos(A+B) + \cos(A-B)$$

$$2 \sin A \sin B = \cos(A-B) - \cos(A+B)$$

9. General Solutions of Trigonometric Equations

Equation	General Solution
$\sin \theta = \sin \alpha$	$\theta = n\pi + (-1)^n \alpha$, n is an integer
$\cos \theta = \cos \alpha$	$\theta = 2n\pi \pm \alpha$, n is an integer
$\tan \theta = \tan \alpha$	$\theta = n\pi + \alpha$, n is an integer

★ Essential for Class 11 trigonometric equations — a guaranteed CBSE board question type, and common in JEE Advanced Chapterwise PYQs.

10. Basic Inverse Trigonometric Formulas (Class 12 Preview)

Formula

$$\sin^{-1}x + \cos^{-1}x = \pi/2$$

$$\tan^{-1}x + \cot^{-1}x = \pi/2$$

$$\sec^{-1}x + \operatorname{cosec}^{-1}x = \pi/2$$

$$\tan^{-1}x + \tan^{-1}y = \tan^{-1}[(x+y)/(1-xy)], \text{ when } xy < 1$$

★ Formally a Class 12 topic, but it builds directly on this Class 11 formula list — worth knowing early.

Quick Solved Examples

Worked Problems

Example 1: If $\sin \theta = 3/5$ and θ is in Quadrant I, find $\cos \theta$.

Solution: $\sin^2 \theta + \cos^2 \theta = 1 \rightarrow \cos^2 \theta = 16/25 \rightarrow \cos \theta = 4/5$

Example 2: Find $\sin 75^\circ$ using $\sin(A+B)$.

Solution: $\sin(45^\circ + 30^\circ) = \sin 45^\circ \cos 30^\circ + \cos 45^\circ \sin 30^\circ = (\sqrt{6} + \sqrt{2})/4$

Example 3: If $\cos \theta = 3/5$, find $\cos 2\theta$.

Solution: $\cos 2\theta = 2\cos^2 \theta - 1 = 18/25 - 1 = -7/25$

Example 4: Solve $\sin \theta = 1/2$.

Solution: $\sin \theta = \sin 30^\circ \rightarrow \theta = n\pi + (-1)^n (\pi/6)$, n is an integer

Want derivations and guided practice? Explore the full Trigonometry Class 11 Notes, chapter-wise PYQs and test series on [esaral.com](https://www.esaral.com).