

NCERT CHAPTER 3

Trigonometric Functions

Radian measure, ASTC quadrant rule, compound angle formulas, double/triple angles, and C-D identities.

🕒 Revision Time: 35 mins 🎯 Target: 8–10 Marks 📖 Textbook: [kemh103.pdf](#)

⚡ Essential Formulas & Concept Summary

1. RADIAN MEASURE & QUADRANTS

θ in radians, $180^\circ = \pi$ radians.

- **Quadrant I:** All positive.
- **Quadrant II:** Sine & Cosecant positive.
- **Quadrant III:** Tangent & Cotangent positive.
- **Quadrant IV:** Cosine & Secant positive.

2. COMPOUND ANGLE FORMULAS

$$\sin(x \pm y) = \sin x \cos y \pm \cos x \sin y$$

$$\cos(x \pm y) = \cos x \cos y \mp \sin x \sin y \quad \text{ext(Notice sign flip)}$$

$$\sin(x \pm y) = \sin x \cos y \pm \cos x \sin y$$

3. DOUBLE & TRIPLE ANGLE FORMULAS

$$\sin 2x = 2 \sin x \cos x = \frac{2 \tan x}{1 + \tan^2 x} \quad \cos 2x = \cos^2 x - \sin^2 x = 2 \cos^2 x - 1 = 1 - 2 \sin^2 x = \frac{1 - \tan^2 x}{1 + \tan^2 x}$$

$$1 - \cos 2x = 2 \sin^2 x \quad \text{extend} \quad 1 + \cos 2x = 2 \cos^2 x$$

$$\tan 2x = \frac{2 \tan x}{1 - \tan^2 x}$$

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

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

$$\tan 3x = \frac{3 \tan x - \tan^3 x}{1 - 3 \tan^2 x}$$

4. TRANSFORMATION & C-D FORMULAS

$$\begin{aligned} \sin C + \sin D &= 2 \sin \frac{C+D}{2} \cos \frac{C-D}{2} & \sin C - \sin D &= 2 \cos \frac{C+D}{2} \sin \frac{C-D}{2} \\ \cos C + \cos D &= 2 \cos \frac{C+D}{2} \cos \frac{C-D}{2} & \cos C - \cos D &= -2 \sin \frac{C+D}{2} \sin \frac{C-D}{2} \end{aligned}$$

🎯 Top Expected Exam Questions (Step-by-Step Solutions)

Question 1: Standard Identity Proof

4 Marks

Prove that: $\frac{\sin 5x - 2 \sin 3x + \sin x}{\cos 5x - \cos x} = \tan x$

Question 2: Half-Angle Evaluation

3–4 Marks

If $\sin x = -\frac{4}{3}$ and x is in Quadrant II, find $\sin \frac{x}{2}$, $\cos \frac{x}{2}$, and $\tan \frac{x}{2}$.

⚠ Exam Traps & Silly Mistakes**⚠ Trap 1: Minus Sign in $\cos C - \cos D$**

Remember $\cos C - \cos D = -2\sin \frac{C+D}{2} \sin \frac{C-D}{2}$. Missing the minus sign ruins the whole proof.

⚠ Trap 2: $\cos(x + y)$ Sign Mistake

$\cos(x + y) = \cos x \cos y - \sin x \sin y$. Note the minus sign!

☑ Quick Self-Check

Quiz 1: What is $\cos 75^\circ$?

Quiz 2: What is $1 + \cos 4x$?