

Trigonometry Cheat Sheet

Essential Formulas, Identities, and Definitions

1. Right Triangle Definitions

Consider a right-angled triangle with angle θ , opposite side O , adjacent side A , and hypotenuse H .

$$\sin(\theta) = \frac{O}{H}, \quad \csc(\theta) = \frac{H}{O}$$

$$\cos(\theta) = \frac{A}{H}, \quad \sec(\theta) = \frac{H}{A}$$

$$\tan(\theta) = \frac{O}{A}, \quad \cot(\theta) = \frac{A}{O}$$

2. Special Angle Values

θ (Deg)	θ (Rad)	$\sin$	$\cos$	$\tan$
0°	0	0	1	0
30°	$\frac{\pi}{6}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{3}}$
45°	$\frac{\pi}{4}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	1
60°	$\frac{\pi}{3}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$
90°	$\frac{\pi}{2}$	1	0	Undef.

3. Fundamental Identities

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

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

$$1 + \cot^2(\theta) = \csc^2(\theta)$$

4. Sum & Difference Formulas

$$\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$$

$$\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$$

$$\tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$$

5. Double & Half Angle Formulas

$$\sin(2A) = 2 \sin A \cos A$$

$$\cos(2A) = \cos^2 A - \sin^2 A = 2 \cos^2 A - 1 = 1 - 2 \sin^2 A$$

$$\tan(2A) = \frac{2 \tan A}{1 - \tan^2 A}$$

$$\sin^2(A) = \frac{1 - \cos(2A)}{2}, \quad \cos^2(A) = \frac{1 + \cos(2A)}{2}$$

6. Product-to-Sum Formulas

$$\sin A \cos B = \frac{1}{2} [\sin(A + B) + \sin(A - B)]$$

$$\cos A \sin B = \frac{1}{2} [\sin(A + B) - \sin(A - B)]$$

$$\cos A \cos B = \frac{1}{2} [\cos(A + B) + \cos(A - B)]$$

$$\sin A \sin B = -\frac{1}{2} [\cos(A + B) - \cos(A - B)]$$

7. Triangles (Non-Right)

Law of Sines:

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Law of Cosines:

$$c^2 = a^2 + b^2 - 2ab \cos C$$