Trigonometry Formulas Sheet

Comprehensive trig formulas from basic ratios to advanced identities. Your complete reference for trigonometry.

SOH CAH TOA

sin(θ) = opposite / hypotenuse
cos(θ) = adjacent / hypotenuse
tan(θ) = opposite / adjacent

Reciprocal Functions

csc(θ) = 1 / sin(θ) = hyp / opp
sec(θ) = 1 / cos(θ) = hyp / adj
cot(θ) = 1 / tan(θ) = adj / opp

Pythagorean Identities

$\sin^2\theta + \cos^2\theta = 1$
$1 + \tan^2\theta = \sec^2\theta$
$1 + \cot^2\theta = \csc^2\theta$

Unit Circle Key Angles

Degrees	Radians	sin(θ)	cos(θ)	tan(θ)
0	0	0	1	0
30	π/6	1/2	3/2	3/3
45	π/4	2/2	2/2	1
60	π/3	3/2	1/2	3
90	π/2	1	0	undefined

Memory trick: For sin values at 0, 30, 45, 60, 90 think 0/2, 1/2, 2/2, 3/2, 4/2.

Trigonometry Formulas (continued)

Double angle, sum/difference formulas, and triangle laws.

Double Angle Formulas

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

$\cos(2\theta) = \cos^2\theta - \sin^2\theta$

$\cos(2\theta) = 2\cos^2\theta - 1$

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

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

Sum and Difference

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

$\cos(A \pm B) = \cos A \cos B -/+ \sin A \sin B$

$\tan(A \pm B) = (\tan A \pm \tan B) / (1 -/+ \tan A \tan B)$

Law of Sines

$a / \sin(A) = b / \sin(B) = c / \sin(C)$

Use when you know two angles and one side, or two sides and a non-included angle.

Law of Cosines

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

Use when you know two sides and the included angle, or all three sides.

Half Angle Formulas

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

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

$\tan(\theta/2) = \sin(\theta) / (1 + \cos\theta) = (1 - \cos\theta) / \sin(\theta)$

For the Law of Cosines, when C = 90 degrees, cos(C) = 0 and it reduces to the Pythagorean theorem: $c^2 = a^2 + b^2$.