

Quick Reference: Common Trigonometry Formulas

Pythagorean Identities:

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

Half-Angle Formulas:

$$\sin\left(\frac{\alpha}{2}\right) = \pm \sqrt{\frac{1 - \cos(\alpha)}{2}}$$

$$\cos\left(\frac{\alpha}{2}\right) = \pm \sqrt{\frac{1 + \cos(\alpha)}{2}}$$

$$\tan\left(\frac{\alpha}{2}\right) = \frac{1 - \cos(\alpha)}{\sin(\alpha)}$$

$$\tan\left(\frac{\alpha}{2}\right) = \frac{\sin(\alpha)}{1 + \cos(\alpha)}$$

Double Angle Formulas:

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

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

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

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

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

Angle Sum and Difference Formulas:

$$\sin(\alpha + \beta) = \sin(\alpha)\cos(\beta) + \cos(\alpha)\sin(\beta)$$

$$\sin(\alpha - \beta) = \sin(\alpha)\cos(\beta) - \cos(\alpha)\sin(\beta)$$

$$\cos(\alpha + \beta) = \cos(\alpha)\cos(\beta) - \sin(\alpha)\sin(\beta)$$

$$\cos(\alpha - \beta) = \cos(\alpha)\cos(\beta) + \sin(\alpha)\sin(\beta)$$

$$\tan(\alpha + \beta) = \frac{\tan(\alpha) + \tan(\beta)}{1 - \tan(\alpha)\tan(\beta)}$$

$$\tan(\alpha - \beta) = \frac{\tan(\alpha) - \tan(\beta)}{1 + \tan(\alpha)\tan(\beta)}$$