

TRIG IDENTITIES

Quotient Identities

$$\tan \theta = \frac{\sin \theta}{\cos \theta} \quad \cot \theta = \frac{\cos \theta}{\sin \theta}$$

Pythagorean Identities

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

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

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

Reciprocal Identities

$$\csc \theta = \frac{1}{\sin \theta} \quad \sin \theta = \frac{1}{\csc \theta}$$

$$\sec \theta = \frac{1}{\cos \theta} \quad \cos \theta = \frac{1}{\sec \theta}$$

$$\cot \theta = \frac{1}{\tan \theta} \quad \tan \theta = \frac{1}{\cot \theta}$$

Double Angle Formulas

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

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

Power Reducing Identities

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

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

Sum and Difference Formulas

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

$$\cos(\alpha \pm \beta) = \cos \alpha \cos \beta \mp \sin \alpha \sin \beta$$

$$\tan(\alpha \pm \beta) = \frac{\tan \alpha \pm \tan \beta}{1 \mp \tan \alpha \tan \beta}$$

Half-Angle Identities

$$\sin \frac{u}{2} = \pm \sqrt{\frac{1 - \cos u}{2}}$$

$$\cos \frac{u}{2} = \pm \sqrt{\frac{1 + \cos u}{2}}$$

$$\tan \frac{u}{2} =$$

$$\pm \sqrt{\frac{1 - \cos u}{1 + \cos u}}$$

$$\frac{1 - \cos u}{\sin u}$$

$$\frac{\sin u}{1 + \cos u}$$

Cofunction Identities

$$\sin\left(\frac{\pi}{2} - \theta\right) = \cos \theta$$

$$\cos\left(\frac{\pi}{2} - \theta\right) = \sin \theta$$

$$\tan\left(\frac{\pi}{2} - \theta\right) = \cot \theta$$

$$\cot\left(\frac{\pi}{2} - \theta\right) = \tan \theta$$

$$\sec\left(\frac{\pi}{2} - \theta\right) = \csc \theta$$

$$\csc\left(\frac{\pi}{2} - \theta\right) = \sec \theta$$

Even-Odd Identities

$$\cos(-x) = \cos x$$

$$\sec(-x) = \sec x$$

$$\sin(-x) = -\sin x$$

$$\csc(-x) = -\csc x$$

$$\tan(-x) = -\tan x$$

$$\cot(-x) = -\cot x$$