

Trigonometric Identities

Quotient Identities

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

Reciprocal Identities

$$\csc \theta = \frac{1}{\sin \theta} \qquad \sec \theta = \frac{1}{\cos \theta} \qquad \cot \theta = \frac{1}{\tan \theta}$$

Pythagorean Identities

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

Even and Odd Identities

$$\begin{array}{ll} \sin(-\theta) = -\sin \theta & \csc(-\theta) = -\csc \theta \\ \cos(-\theta) = \cos \theta & \sec(-\theta) = \sec \theta \\ \tan(-\theta) = -\tan \theta & \cot(-\theta) = -\cot \theta \end{array}$$

Sum and Difference Identities

$$\begin{array}{ll} \cos(\alpha + \beta) = \cos \alpha \cos \beta - \sin \alpha \sin \beta & \tan(\alpha + \beta) = \frac{\tan \alpha + \tan \beta}{1 - \tan \alpha \tan \beta} \\ \cos(\alpha - \beta) = \cos \alpha \cos \beta + \sin \alpha \sin \beta & \\ \sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta & \tan(\alpha - \beta) = \frac{\tan \alpha - \tan \beta}{1 + \tan \alpha \tan \beta} \\ \sin(\alpha - \beta) = \sin \alpha \cos \beta - \cos \alpha \sin \beta & \end{array}$$

Double-Angles

$$\begin{array}{ll} \sin 2\theta = 2 \sin \theta \cos \theta & \cos 2\theta = 1 - 2 \sin^2 \theta \\ \cos 2\theta = \cos^2 \theta - \sin^2 \theta & \cos 2\theta = 2 \cos^2 \theta - 1 \\ & \tan 2\theta = \frac{2 \tan \theta}{1 - \tan^2 \theta} \end{array}$$

