Identities

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

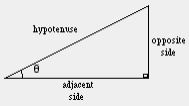
$$\cos^2\theta + \sin^2\theta = 1$$
$$1 + \tan^2\theta = \sec^2\theta$$
$$1 + \cot^2\theta = \csc^2\theta$$

SOH CAH TOA

SOH $\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$

CAH $\cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}}$

TOA $\tan\theta = \frac{\text{opposite}}{\text{adjacent}}$



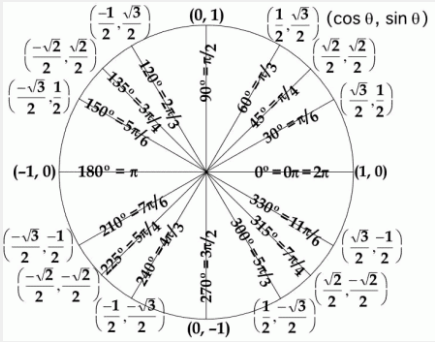
This is used to find exact cosines, tangents, or sines of angles.

Exponential ang Logarithmic

Exponential = b^x

Logarithmic = ln x

The Unit Circle



Double Angle Identities

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

Product-Sum Identities

$$\sin\alpha + \sin\beta = 2\sin\frac{\alpha+\beta}{2}\cos\frac{\alpha-\beta}{2}$$
$$\sin\alpha - \sin\beta = 2\cos\frac{\alpha+\beta}{2}\sin\frac{\alpha-\beta}{2}$$
$$\cos\alpha + \cos\beta = 2\cos\frac{\alpha+\beta}{2}\cos\frac{\alpha-\beta}{2}$$
$$\cos\alpha - \cos\beta = -2\sin\frac{\alpha+\beta}{2}\sin\frac{\alpha-\beta}{2}$$

Half-Angle Identities

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

Sum and Difference Identities

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

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