

TRIG Identities

Basic

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

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

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

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

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

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

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

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

Pythagorean Ident:

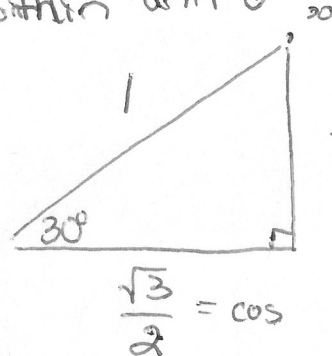
$$\textcircled{1}^* \cos^2 \theta + \sin^2 \theta = 1$$

$$\textcircled{2} 1 + \tan^2 \theta = \sec^2 \theta$$

$$\textcircled{3} \cot^2 \theta + 1 = \csc^2 \theta$$

Pythagorean Identities

within unit θ



$$a^2 + b^2 = c^2$$
$$\left(\frac{\sqrt{3}}{2}\right)^2 + \left(\frac{1}{2}\right)^2 = 1^2$$

$$\frac{3}{4} + \frac{1}{4} = 1^2$$

$$\frac{4}{4} = 1$$

$$\textcircled{1} \cos^2 \theta + \sin^2 \theta = 1$$

alt forms

$$\begin{cases} \cos^2 \theta = 1 - \sin^2 \theta \\ \sin^2 \theta = 1 - \cos^2 \theta \end{cases}$$

$$\frac{\cos^2 + \sin^2}{\cos^2} = \frac{1}{\cos^2}$$

$$\frac{\cos^2 + \sin^2}{\sin^2} = \frac{1}{\sin^2}$$

$$\textcircled{2} 1 + \tan^2 = \sec^2$$

$$\textcircled{3} \cot^2 + 1 = \csc^2$$

Simplify Trig Expressions

Ex: $\sec x \cos x$ * Multi reciprocal
 $\frac{1}{\cos x} \cdot \cos x = 1$
 $= 1$

$\sec x \cdot \frac{1}{\sec x} = 1$

Ex: $(1 - \sin \theta)(1 + \sin \theta)$

$1 + \sin \theta - \sin \theta - \sin^2 \theta$

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

Ex: $\frac{\tan^2 \theta}{\sec^2 \theta} = \frac{\frac{\sin^2}{\cos^2}}{\frac{1}{\cos^2}} = \frac{\sin^2}{1} = \sin^2 \theta$

Ex: $\cos \theta + \sin \theta \tan \theta$

$\cos \theta + \frac{\sin \theta}{1} \cdot \frac{\sin \theta}{\cos \theta}$

$\frac{\cos \theta}{\cos \theta} \frac{\cos \theta}{1} + \frac{\sin^2 \theta}{\cos \theta}$

$\frac{\cos^2 \theta}{\cos \theta} + \frac{\sin^2 \theta}{\cos \theta}$

$\frac{\cos^2 \theta + \sin^2 \theta}{\cos \theta}$

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

simplifies

* ex: $\frac{\sin \theta}{(1 + \cos \theta)} + \frac{\sin \theta (1 + \cos \theta)}{(1 - \cos \theta)}$

$\frac{(1 - \cos) \sin + \sin (1 + \cos)}{(1 + \cos)(1 - \cos)}$

$\frac{2 \sin}{\sin^2} = \frac{\sin - \cos \sin + \sin + \cos \sin}{1 - \cos^2}$

$\frac{2}{\sin} = \boxed{2 \csc \theta}$