

Reciprocal Identities

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

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

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

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

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

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

Quotient (Ratio) Identities

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

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

Pythagorean Identities

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

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

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

Variations

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

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

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

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

Pythagorean Identities

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

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

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

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

Pythagorean Identities

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

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

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

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

Simplify the following expressions.

$$\tan \theta \cdot \cot \theta$$

$$\cot \theta \cdot \sec \theta$$

$$(1 + \cos \theta)(1 - \cos \theta)$$

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

Simplify the following expressions.

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

$$\frac{\sin \theta \cdot \cos \theta}{1 - \cos^2 \theta}$$

$$\sin \theta (\csc \theta - \sin \theta)$$

$$\frac{\csc^2 \theta - 1}{\cos^2 \theta}$$