

A trigonometric identity is a relationship that is true for any angle.

We will use two basic identities to prove more complicated identities:

Quotient Identity

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

Pythagorean Identity

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

In order to prove an identity we may apply one or more of the following strategies and show that LS = RS.

Strategy #1: Write all ratios in terms of $\sin \theta$ and $\cos \theta$.

Ex. Prove that $\sin \theta + \tan \theta = \tan \theta(1 + \cos \theta)$

Strategy #2: Instead of dividing by a fraction, multiply by its reciprocal.

Ex. Prove that $\sin^2 \theta = 1 - \frac{\sin^2 \theta}{\tan^2 \theta}$

Strategy #3: Combine two terms into one by finding a common denominator.

Ex. Prove that $\sin \theta \tan \theta - \cos \theta = \frac{1 - 2 \cos^2 \theta}{\cos \theta}$

Strategy #4: Factor any common terms in order to simplify an expression.

Ex. Prove that $\sin \theta (\tan \theta - 1) = \tan \theta (\sin \theta - \cos \theta)$

Ex. Prove that a) $\cos \theta = \frac{\sin \theta}{\tan \theta}$ b) $\sin^2 \theta - \cos^2 \theta = 2 \sin^2 \theta - 1$ c) $\sin^2 \theta + \tan^2 \theta = \tan^2 \theta (\cos^2 \theta + 1)$