

## Pythagorean Identities - Guided Lesson Explanation

### Explanation#1

We will work on the left side of the equation.

$$(\sin x) \left[ \frac{\cos x}{\sin x} + \left( \cos x \times \frac{\sin x}{\cos x} \right) \right] = \cos x + \sin^2 x$$

$$(\sin x) \left[ \frac{\cos x}{\sin x} + \frac{\sin^2 x}{\sin x} \right]$$

Now we will add the common denominators.

$$\cos x + 2 \sin^2 x = \cos x + \sin^2 x$$

### Explanation#2

Now, we will start factoring:

$$\frac{1 - \cos^2 x}{\sec^2 - 1} = \frac{\sin^2 x}{\tan^2 x}$$

$$= \frac{\sin^2 x}{\frac{\sin^2 x}{\cos^2 x}} = \frac{\sin^2 x}{1} \times \frac{\cos^2 x}{\sin^2 x} = \cos^2 x$$

### Explanation#3

We will work on the left side of the equation:

$$\frac{1 + \sec x}{\csc x} = \frac{1}{\csc x} + \frac{\sec x}{\csc x}$$

$$= \sin x + \frac{\frac{1}{\cos x}}{\frac{1}{\sin x}}$$

$$= \sin x + \left( \frac{1}{\cos x} \right) \left( \frac{\sin x}{1} \right)$$

$$= \sin x + \tan x$$

