

1.28.16
Basic Trig Identities
Lesson 9
7.1

**Reciprocal
Identities**

The following trigonometric identities hold for all values of θ where each expression is defined.

$$\begin{array}{ll} \sin \theta = \frac{1}{\csc \theta} & \cos \theta = \frac{1}{\sec \theta} \\ \csc \theta = \frac{1}{\sin \theta} & \sec \theta = \frac{1}{\cos \theta} \\ \tan \theta = \frac{1}{\cot \theta} & \cot \theta = \frac{1}{\tan \theta} \end{array}$$

$$\sec^2 \theta = \frac{1}{\cos^2 \theta}$$

**Pythagorean
Identities**

The following trigonometric identities hold for all values of θ where each expression is defined.

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

**Quotient
Identities**

The following trigonometric identities hold for all values of θ where each expression is defined.

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

I do:

Given $\sec\theta = \frac{3}{2}$, solve for $\cos\theta$.

Use identities to simplify. <i>Reciprocal Identity</i>	$\sec\theta = \frac{1}{\cos\theta}$ $\frac{1}{\cos\theta} = \frac{3}{2}$ $\cos\theta = \frac{2}{3}$
---	---

I do:

If $\csc\theta = \frac{4}{3}$, solve for $\tan\theta$.

Use identities to link <i>csc</i> and <i>tan</i> (hint* you need 2)	

We do:

Given $\csc\theta = \frac{\sqrt{11}}{3}$, $\frac{\pi}{2} < \theta < \pi$, find $\cot\theta$.

Find the identities	
Simplify	
Use Unit Circle Restrictions	

You do with your partner on whiteboards:

1) Given $\cot\theta = -\frac{4}{3}$, $270^\circ < \theta < 360^\circ$, Find $\sin\theta$

2) Given $\sin\theta = -\frac{1}{5}$, $\pi < \theta < \frac{3\pi}{2}$, Find $\cos\theta$

Simplifying trig expressions:

I do:

Simplify

$$\frac{\csc\theta}{\cot\theta}$$

I do:

Simplify: $\cos x \cot x + \sin x$

We do:

Simplify

$$\cos x \csc x \tan x$$

We do:
Simplify
 $\sin x + \sin x \cot^2 x$

You do with your partner:

Simplify:

1) $\frac{\sec x}{\tan x}$

2) $(\sin x + \cos x)^2 + (\sin x - \cos x)^2$

I Try:

Prove with a counter example that the following is not a trig identity.

$\sin \theta \cos \theta = \cot \theta$

Simplify expression	
Use a real value to counter.	

We Try:

$\sin \theta + \cos \theta = \tan \theta$

Simplify expression	
Use a real value to counter.	

You Try with your partner:

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

Exit Slip:

1) $\sin \theta = -\frac{1}{3}, \pi < \theta < \frac{3\pi}{2}$, Find $\tan \theta$

Prove that the following is not an identity with a counterexample

2) $\sin x \tan x = \cos x$