Section 4-2 Pythagorean, Reciprocal and Quotient Properties

Reciprocal Properties (reciprocal → $\frac{1}{\quad}$)

$\sec x = \frac{1}{\cos x}$	$\csc x = \frac{1}{\sin x}$	$\cot x = \frac{1}{\tan x}$

Take sin x and divide by cos x. What is the result?

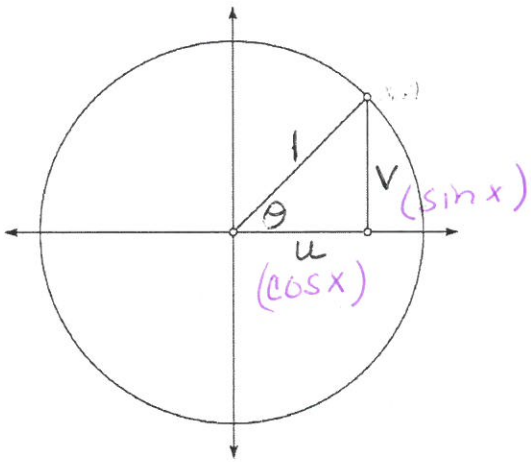
$$\frac{\sin x}{\cos x} = \frac{\frac{O}{H}}{\frac{A}{H}} = \frac{O}{H} \cdot \frac{H}{A} = \frac{O}{A} \rightarrow \frac{O}{A} = \tan x$$

* What should cot x = ?

Quotient Properties

$\tan x = \frac{\sin x}{\cos x}$	$\cot x = \frac{\cos x}{\sin x}$

Pythagorean Properties



u = cos x and v = sin x

Using the Pythagorean Theorem

$$u^2 + v^2 = 1$$

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

** $\cos^2 x$ is the same as $(\cos x)^2$

** $\cos^2 x$ DOES NOT EQUAL $\cos x^2$

Start with $\frac{\sin^2 x}{\cos^2 x} + \frac{\cos^2 x}{\cos^2 x} = \frac{1}{\cos^2 x}$ and divide both sides of equation by $\cos^2 x$

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

Start with $\frac{\sin^2 x}{\sin^2 x} + \frac{\cos^2 x}{\sin^2 x} = \frac{1}{\sin^2 x}$ and divide both sides of equation by $\sin^2 x$

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

Pythagorean Properties

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

* can rearrange these to come up with other beneficial equations.
i.e. $1 - \sin^2 x = \cos^2 x$