PC – Trig Name___________________

The Trigonometric Identities

Locate the Pythagorean identities on the "Trigonometric Identities" worksheet.

We will change a trigonometric function in terms of another for simplifying equations in calculus. Besides, algebra and substitution is just plain fun.

Side note: $\sin^2 t = (\sin t)^2$ it is almost always written the first way since the second version might make some people think that they were squaring the angle if the parentheses were missing.

Example 1

Directions: Write $\cos t$ in terms of $\sin t$ in quadrant IV. The function that follows the phrase "**in terms of**" becomes the independent variable so to speak. That means we solve for $\cos t$ (get $\cos t$ by itself).

1st start with an identity that has both functions

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

2nd complete the algebra to get cosine by itself, subtract $\sin^2 t$ from both sides and then square root.

$$\cos t = \pm\sqrt{1 - \sin^2 t}$$

3rd consider the function in the given quadrant, $\cos t = \frac{x}{r}$, is positive in quadrant IV, so

$$\cos t = +\sqrt{1 - \sin^2 t}$$

This shows cosine in terms of sine.

Example 2

Write $\csc^2 t * \cos^2 t$ in terms of sin t

Replace $\csc t$ with $\frac{1}{\sin t}$

We also know how to write $\cos t$ in terms of $\sin t$

From the $\sin^2 t + \cos^2 t = 1$ identity above
We'll use this one a lot

It's all in terms of sine! Wahoo!

$$\csc^2 t * \cos^2 t$$

$$\left(\frac{1}{\sin t}\right)^2 * \cos^2 t$$

$$\left(\frac{1}{\sin t}\right)^2 * \left(1 - \sin^2 t\right)$$

Write the first expression "**in terms of**" the second, where *t* is a terminal point in the given quadrant.

1. $\sin t, \cos t$; *t is in quadrant II*

2. $\tan t, \sin t$; *t is in quadrant IV*

3. $\tan t, \cos t$; *t is in quadrant III*

4. $\sec t, \tan t$; *t is in quadrant II*

5. $\csc t, \cot t$; *t is in quadrant III*

6. $\tan t, \sec t$; *t is in quadrant III*

7. $\sin t, \sec t$; *t is in quadrant IV*

8. $\tan^2 t, \sec t$; *t is in any quadrant*

9. $\sec^2 t \sin^2 t, \cos t$; *t is in any quadrant*