

Identities you know (see notecards for details):

1. Right triangle trig (SOH-CAH-TOA) Use the letters a, o, h.
2. Right triangle trig in standard position. Use the letters x, y, r.
3. Reciprocal functions
4. $\tan \theta$ and $\cot \theta$ written in terms of sine and cosine.

New identities (can see notecards):

1. Pythagorean Identities Pythagorean Theorem $a^2 + b^2 = c^2$

What letters can we replace a, b, and c with if the triangle is in standard position?

What trig function represents x ?

What trig function represents y ?

What is the hypotenuse on a unit circle?

Now rewrite the Pythagorean theorem using the information above.

We can also rewrite this using the reciprocal functions.

Using cosecant:

Mnemonic device:

Using secant:

Mnemonic device:

2. Even/odd functions

What are the even trig functions?

What is the output if we use the positive and negative input when it is even?

What are the odd trig functions?

What is the output if we use the positive and negative input when it is odd?

Even identities:

Odd identities:

When simplifying trig identities there is no specific pattern to follow. **AND** there could be multiple ways to do it.

But here are some hints to use:

1. change everything to sine and cosine
2. rewrite using a Pythagorean identity
3. Find a common denominator
4. rewrite an identity in terms of another by manipulating the identity

Using the Pythagorean Identity, write it as $\cos x$.

Rewrite the Pythagorean Identity as $\tan^2 x$.

Now use that version of the identity to rewrite $\cot^2 x$ in terms of cosecant only.

Examples: Simplify to one trig function or number.

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

2. $\frac{\tan x \csc x}{\sec x}$

3. $\sin \alpha + \cot \alpha \cos \alpha$

4. $\csc(-x) \tan(-x)$

5. $\frac{1}{1+\cos(-\alpha)} + \frac{1}{1-\cos \alpha}$

Example: Use the identities to find the function values. Draw a picture as part of your work. (Use Pythagorean triples, when possible.)

1. If $\tan \alpha = -\frac{2}{3}$ and α is in quadrant IV, find the values of the remaining five trigonometric functions.

2. If $\tan \theta = \frac{4}{3}$ and $\pi < \theta < \frac{3\pi}{2}$, find the values of the remaining five trigonometric functions.