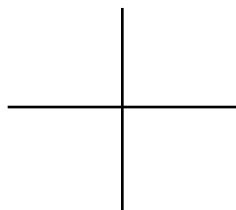


## Fundamental Trigonometric Identities

<b>Reciprocal Identities:</b>	$\sin x = \frac{1}{\csc x}$	$\cos x = \frac{1}{\sec x}$	$\tan x = \frac{1}{\cot x}$
	$\csc x = \frac{1}{\sin x}$	$\sec x = \frac{1}{\cos x}$	$\cot x = \frac{1}{\tan x}$
<b>Quotient Identities:</b>	$\tan x = \frac{\sin x}{\cos x}$	$\cot x = \frac{\cos x}{\sin x}$	
<b>Pythagorean Identities:</b>	$\sin^2 x + \cos^2 x = 1$	$1 + \tan^2 x = \sec^2 x$	$\cot^2 x + 1 = \csc^2 x$
<b>Cofunction Identities:</b>	$\sin\left(\frac{\pi}{2} - x\right) = \cos x$	$\sec\left(\frac{\pi}{2} - x\right) = \csc x$	$\tan\left(\frac{\pi}{2} - x\right) = \cot x$
$\left(\frac{\pi}{2} = 90^\circ\right)$	$\cos\left(\frac{\pi}{2} - x\right) = \sin x$	$\csc\left(\frac{\pi}{2} - x\right) = \sec x$	$\cot\left(\frac{\pi}{2} - x\right) = \tan x$
<b>Negative Angle Identities:</b>	$\sin(-x) = -\sin x$	$\cos(-x) = \cos x$	$\tan(-x) = -\tan x$
	$\csc(-x) = -\csc x$	$\sec(-x) = \sec x$	$\cot(-x) = -\cot x$

**Example 1: a.** Use the values  $\sin u = \frac{1}{3}$  and  $\cos u < 0$  to find the values of all six trigonometric functions.



$\sin u =$	$\cos u =$	$\tan u =$
$\csc u =$	$\sec u =$	$\cot u =$

**b.** Use a Pythagorean Identity to find  $\cos u$ .

## Simplifying a Trigonometric Expression

### Example 2:

$$\sin \theta \csc \theta$$

$$\cot \alpha \sin^2 \alpha$$

$$\sec \beta (\sec \beta - \cos \beta)$$

## Factoring Methods from Algebra

Difference of Squares:  $1 - a^2 =$

### Example 3:

Factor:  $1 - \cos^2 x =$

Factoring a Quadratic Trinomial  $a \neq 1$ :  $2a^2 - 7a + 6 =$

**Example 4:** Factor:  $2 \csc^2 x - 7 \csc x + 6 =$

Factoring a Quadratic Trinomial  $a = 1$ :  $a^2 + 3a + 2 =$

**Example 5:** Factor:  $\sec^2 x + 3 \tan x + 1$

**Example 6:** Simplify  $\csc t - \cos t \cot t$

**Example 7:** Simplify  $\frac{1}{1+\sin \theta} + \frac{1}{1-\sin \theta}$

**Example 8:** Simplify  $\frac{\cos^2 y}{1-\sin y}$

**Example 9:** Simplify:  $(\cot x + \csc x)(\cot x - \csc x)$

**Example 10:** Simplify:  $\frac{\tan x}{1+\sec x} + \frac{1+\sec x}{\tan x}$