

List all identities equivalent to the given trig function.

1. $\sin x = \frac{1}{\csc x}$

$\sin x = \cos\left(\frac{\pi}{2} - x\right)$

2. $\cos x = \frac{1}{\sec x}$

$\cos x = \sin\left(\frac{\pi}{2} - x\right)$

$\cos x = \cos(-x)$

3. $\tan x = \frac{1}{\cot x}$

$\tan x = \cot\left(\frac{\pi}{2} - x\right)$

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

4. $\csc x = \frac{1}{\sin x}$

$\csc x = \sec\left(\frac{\pi}{2} - x\right)$

5. $\sec x = \frac{1}{\cos x}$

$\sec x = \csc\left(\frac{\pi}{2} - x\right)$

$\sec x = \sec(-x)$

6. $\cot x = \frac{1}{\tan x}$

$\cot x = \tan\left(\frac{\pi}{2} - x\right)$

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

Fill in the blanks and/or complete each trig identity.

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

8. $\sin x(\cot x) = \cos x$

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

9. $\frac{\sin x}{\cos x} = \tan x$

10. $\sin(-x) = -\sin x$

11. $\sec^2 x = \frac{1}{\cos^2 x}$

12. $\frac{1}{\cos x} = \sec x$

OR

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

Other identities can be formed by rearranging the basic trig identities.

Fill in the blanks to create other identities that you did not already list on the front side!

13. $\sin^2 x = \underline{1 - \cos^2 x}$

14. $\sin x = -\underline{\sin(-x)}$

also $-\sin x = \sin(-x)$

15. $\sin x = \left(\frac{\cos x}{\cos x} \right) \cdot \left(\frac{\sin x}{\cos x} \right)$

16. $\tan^2 x = \underline{\sec^2 x - 1}$

17. $\sin x = \frac{(\cos x)}{(\cot x)}$ $\cot x = \frac{\cos x}{\sin x}$

17. $1 + \cot^2 x = \underline{\csc^2 x}$

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

$\sin x = \cos x \left(\frac{\sin x}{\cos x} \right)$ $\sin x = \frac{\cos}{\cos/\sin}$ $\sin x = \frac{\cos}{\tan}$

By manipulating the basic trig identities, you can create nine expressions that are equivalent to 1!
Write these 9 identities that are all equivalent to 1.

$\sin x \cdot \csc x = 1$ \longleftrightarrow

$(\csc x) \sin x = \frac{1}{\csc x} (\csc x)$
 $\csc x \sin x = 1$

$\csc x \cdot \sin x = 1$
 $(\sec x) \cos x = \frac{1}{\sec x} (\sec x)$

$\cos x \cdot \sec x = 1$ \longleftrightarrow

$\sec x \cdot \cos x = 1$
 $(\cot x) \tan x = \frac{1}{\cot x} (\cot x)$

$\tan x \cdot \cot x = 1$ \longleftrightarrow

$\cot x \cdot \tan x = 1$
 $1 + \tan^2 x = \sec^2 x$
 $- \tan^2 x \quad - \tan^2 x$
1 = $\sec^2 x - \tan^2 x$
 $\sec^2 x - \tan^2 x = 1$

$\sin^2 x + \cos^2 x = 1$
 $1 + \cot^2 x = \csc^2 x$
 $- \cot^2 x \quad - \cot^2 x$
1 = $\csc^2 x - \cot^2 x$
 $\csc^2 x - \cot^2 x = 1$