

Advanced Algebra w/Trig  
Trig Identities Worksheet #1

Name \_\_\_\_\_  
Date \_\_\_\_\_ Period \_\_\_\_\_

**Simplify.**

1.  $\sin \theta(1 + \cot^2 \theta)$

2.  $\frac{1 - \sin^2 \theta}{\sin^2 \theta}$

3.  $\frac{\cos \theta \csc \theta}{\tan \theta}$

4.  $\csc^2 \alpha - \cot^2 \alpha$

5.  $\tan \theta \csc \theta$

6.  $\frac{1}{\sin^2 \theta} - \frac{\cos^2 \theta}{\sin^2 \theta}$

Verify each identity.

$$7. \frac{\sin x}{\csc x} + \frac{\cos x}{\sec x} = 1$$

$$8. \frac{\sin x \csc x}{\cot x} = \tan x$$

Challenge Problem

$$9. \frac{1 - \tan^2 x}{\cot^2 x - 1} = \tan^2 x$$

**Verify each identity.**

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

2.  $\frac{\cot x \sec x}{\csc x} = 1$

3.  $\tan \theta \sin \theta + \cos \theta = \sec \theta$

4.  $\cot^2 \theta - \csc^2 \theta = -1$

5.  $\sin x + \cos x \cot x = \csc x$

6.  $\frac{\sec x - \cos x}{\sec x} = \sin^2 x$

### Challenge

7.  $\frac{1 - \cot^2 x}{\tan^2 x - 1} = \cot^2 x$

### Review Material:

Convert the following angles from degrees to radians (leave in terms of pi) or from radians to degrees.

8.  $\frac{13\pi}{17}$

9.  $72^\circ$

Find the EXACT value of the following.

10.  $\cos -405^\circ$

11.  $\sin 180^\circ$

**Verify each identity.**

1.  $\frac{1 - \cos^2 x}{\cos^2 x} = \tan^2 x$

2.  $\frac{1 - (\sin x - \cos x)^2}{\sin x} = 2 \cos x$

3.  $\frac{\csc x}{\cot x + \tan x} = \cos x$

4.  $\sin^2 x - \cos^2 x = 1 - 2 \cos^2 x$

5.  $\frac{1 - \csc x}{1 + \csc x} = \frac{\sin x - 1}{\sin x + 1}$

6.  $\frac{1 - \cos x}{1 + \cos x} = \frac{\sec x - 1}{\sec x + 1}$

$$7. \sec x - 2 \sin x = \frac{(\sin x - \cos x)^2}{\cos x}$$

$$8. \frac{1}{\sin \theta \cos \theta} - \frac{\cos \theta}{\sin \theta} = \tan \theta$$

### Challenge

$$9. \frac{\cos x}{1 - \sin x} + \frac{\cos x}{1 + \sin x} = 2 \sec x$$

### Review:

Find the exact value of all  $\theta$  in  $[0, 2\pi)$  that satisfies the following.

$$10. \sec \theta = -\sqrt{2}$$

$$11. \tan \theta = \sqrt{3}$$

Find the EXACT indicated value given the following information.

$$12. \text{ Find } \sin \theta \text{ if } \sec \theta = \frac{26}{24}, \text{ and } \tan \theta > 0$$

$$13. \text{ Find } \sec \theta \text{ if } \cot \theta = -\frac{7}{8}, \text{ and } \sin \theta < 0$$

**Simplify each Expression.**

1.  $\cos x(\sec x - \cos x)$

2.  $\frac{1}{\cot^2 x} - \sec^2 x$

3.  $\frac{1}{\sec^2 \theta} + \frac{1}{\csc^2 \theta}$

4.  $1 - \frac{\sin \theta}{\csc \theta}$

**Verify each Identity.**

5.  $\tan^2 x - \sec^2 x = \frac{\sin^2 x - 1}{\cos^2 x}$

6.  $\frac{1}{1 - \cos^2 x} = 1 + \cot^2 x$

7.  $\frac{1 + \cot x}{1 - \cot x} = \frac{\sin x + \cos x}{\sin x - \cos x}$

8.  $\frac{\sec x}{\sin x}(1 - \cos^2 x) = \tan x$

$$9. \cos x(\tan x + \cot x) = \csc x$$

$$10. \csc^2 x(\sec^2 x - 1) = \frac{1}{\cos^2 x}$$

$$11. \frac{\csc x}{\cos x} = \tan x + \cot x$$

$$12. (\sec x - \tan x)^2 = \frac{1 - \sin x}{1 + \sin x}$$