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Date \_\_\_\_\_  
Algebra II

## Reciprocal and Quotient Identities

For #1-6, express each as a single function

Express everything in terms of sin and cos

1.  $\cos \theta \csc \theta$

$$\cos \theta \cdot \frac{1}{\sin \theta} = \frac{\cos \theta}{\sin \theta} = \cot \theta$$

2.  $\tan \theta \cot \theta$

$$\frac{\sin \theta}{\cos \theta} \cdot \frac{\cos \theta}{\sin \theta} = 1$$

$$\csc \theta = \frac{1}{\sin \theta}$$

$$\sec \theta = \frac{1}{\cos \theta}$$

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

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

3.  $\cot \theta \sec \theta$

$$\frac{\cos \theta}{\sin \theta} \cdot \frac{1}{\cos \theta} = \frac{1}{\sin \theta} = \csc \theta$$

4.  $\sec \theta \csc \theta \cos \theta$

$$\frac{1}{\cos \theta} \cdot \frac{1}{\sin \theta} \cdot \cos \theta$$

$$\frac{1}{\sin \theta} = \csc \theta$$

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

$$\frac{1}{\sin \theta} \cdot \frac{\sin \theta}{\cos \theta} \cdot \cos \theta = 1$$

6.  $\csc \theta \cot \theta \sin \theta$

$$\frac{1}{\sin \theta} \cdot \frac{\cos \theta}{\sin \theta} \cdot \sin \theta$$

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

7.  $\frac{\cos \theta}{\sec \theta}$

$$\frac{\cos \theta}{\frac{1}{\cos \theta}}$$

$$\cos^2 \theta$$

$$\frac{\cos \theta}{1} \cdot \frac{\cos \theta}{1}$$

$$\cos^2 \theta$$

8.  $\frac{\csc \theta}{\cot \theta}$

$$\frac{\frac{1}{\sin \theta}}{\frac{\cos \theta}{\sin \theta}}$$

$$\frac{1}{\cos \theta} = \sec \theta$$

$$\frac{1}{\sin \theta} \cdot \frac{\sin \theta}{\cos \theta}$$

$$\frac{1}{\cos \theta} = \sec \theta$$

9.  $\frac{\tan \theta}{\sin \theta}$

$$\frac{\frac{\sin \theta}{\cos \theta} \cdot \frac{1}{\sin \theta}}{\frac{\sin \theta}{1}} = \frac{\frac{1}{\cos \theta}}{\sin \theta} = \sec \theta$$

10.  $\frac{\cot \theta}{\cos \theta}$

$$\frac{\frac{\cos \theta}{\sin \theta}}{\frac{\cos \theta}{1}} = \frac{\cos \theta}{\sin \theta} \cdot \frac{1}{\cos \theta} = \frac{1}{\sin \theta} = \csc \theta$$

11. Express  $\frac{\cot x \sin x}{\sec x}$  as a single trigonometric function, in simplest form, for all values of  $x$  for which it is defined.

$$\frac{\frac{\cos x}{\sin x} \cdot \sin x}{\frac{1}{\cos x}} = \frac{\cos x}{1} \cdot \frac{\cos x}{1} = \cos^2 x$$

12. Show that  $\sec \theta \sin \theta \cot \theta = 1$  is an identity.

$$\frac{1}{\cos \theta} \cdot \sin \theta \cdot \frac{\cos \theta}{\sin \theta} = 1$$

$$1 = 1$$

13. The expression  $\frac{\cot x}{\csc x}$  is equivalent to

- 1)  $\sin x$
- 2)  $\cos x$
- 3)  $\tan x$
- 4)  $\sec x$

~~cot~~

$$\frac{\frac{\cos x}{\sin x}}{\frac{1}{\sin x}}$$

$$\frac{\cos x}{\sin x} \cdot \frac{\sin x}{1} = \cos x$$