

Trig identities w/answers

Date _____ Period _____

Verify each identity.

1)
$$\frac{\cot x}{\csc^2 x} = \frac{\sin^2 x}{\tan x}$$

2)
$$\frac{\csc x}{\tan x} = \frac{\cot x}{\sin x}$$

3)
$$\cot^2 x + 1 = \frac{\csc x}{\sin x}$$

$$4) \frac{\cos x}{\cot x} = \sin x$$

$$5) \frac{\csc x}{\csc^2 x + \sec^2 x} = \frac{\sin x}{\sec^2 x}$$

$$6) \csc^2 x \cos^2 x = \csc^2 x - 1$$

$$7) \tan^2 x \csc^2 x = 1 + \tan^2 x$$

$$8) \cot x + \tan x = \frac{\sec x}{\sin x}$$

$$9) \frac{\cos x}{\sin 2x} = \frac{1}{2\sin x}$$

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

$$11) \frac{2\sin x \cos x}{1 + \cos 2x} = \tan x$$

$$12) \frac{\sin 2x}{\sin^2 x} = \frac{2}{\tan x}$$

Answers to Trig identities w/answers (ID: 1)

$$1) \frac{\cot x}{\csc^2 x} \quad \text{Use } \csc x = \frac{1}{\sin x} \quad 2) \frac{\csc x}{\tan x} \quad \text{Use } \cot x = \frac{1}{\tan x}$$

$$\sin^2 x \cot x \quad \text{Use } \cot x = \frac{1}{\tan x} \quad \csc x \cot x \quad \text{Use } \csc x = \frac{1}{\sin x}$$

$$\frac{\sin^2 x}{\tan x} \quad \blacksquare \quad \frac{\cot x}{\sin x} \quad \blacksquare$$

$$3) \cot^2 x + 1 \quad \text{Use } \cot^2 x + 1 = \csc^2 x \quad 4) \frac{\cos x}{\cot x} \quad \text{Use } \cot x = \frac{\cos x}{\sin x}$$

$$\csc^2 x \quad \text{Use } \csc x = \frac{1}{\sin x} \quad \frac{\cos x \sin x}{\cos x} \quad \text{Cancel common factors}$$

$$\frac{\csc x}{\sin x} \quad \blacksquare \quad \sin x \quad \blacksquare$$

$$5) \frac{\csc x}{\csc^2 x + \sec^2 x} \quad \text{Decompose into sine and cosine}$$

$$\frac{\frac{1}{\sin x}}{\left(\frac{1}{\sin x}\right)^2 + \left(\frac{1}{\cos x}\right)^2} \quad \text{Simplify}$$

$$\frac{\sin x \cos^2 x}{\cos^2 x + \sin^2 x} \quad \text{Use } \sin^2 x + \cos^2 x = 1$$

$$\cos^2 x \sin x \quad \text{Use } \sec x = \frac{1}{\cos x}$$

$$\frac{\sin x}{\sec^2 x} \quad \blacksquare$$

$$6) \csc^2 x \cos^2 x \quad \text{Use } \csc x = \frac{1}{\sin x}$$

$$\frac{\cos^2 x}{\sin^2 x} \quad \text{Use } \cot x = \frac{\cos x}{\sin x}$$

$$\cot^2 x \quad \text{Use } \cot^2 x + 1 = \csc^2 x$$

$$\csc^2 x - 1 \quad \blacksquare$$

7) $\tan^2 x \csc^2 x$ Decompose into sine and cosine

$$\left(\frac{\sin x}{\cos x}\right)^2 \cdot \left(\frac{1}{\sin x}\right)^2$$

Simplify

$$\frac{1}{\cos^2 x}$$

Use $\sec x = \frac{1}{\cos x}$

$$\sec^2 x$$

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

$$1 + \tan^2 x$$

■

8) $\cot x + \tan x$ Decompose into sine and cosine

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

Simplify

$$\frac{\cos^2 x + \sin^2 x}{\sin x \cos x}$$

Use $\sin^2 x + \cos^2 x = 1$

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

Use $\sec x = \frac{1}{\cos x}$

$$\frac{\sec x}{\sin x}$$

■

10) $\cos x \cdot (1 - \cos 2x)$ Use $\cos 2x = 1 - 2\sin^2 x$

$$2\cos x \sin^2 x$$

Use $\sec x = \frac{1}{\cos x}$

$$\frac{2\sin^2 x}{\sec x}$$

■

12) $\frac{\sin 2x}{\sin^2 x}$ Use $\sin 2x = 2\sin x \cos x$

$$\frac{2\sin x \cos x}{\sin^2 x}$$

Cancel common factors

$$\frac{2\cos x}{\sin x}$$

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

$$\frac{2}{\tan x}$$

■

9) $\frac{\cos x}{\sin 2x}$ Use $\sin 2x = 2\sin x \cos x$

$$\frac{\cos x}{2\sin x \cos x}$$

Cancel common factors

$$\frac{1}{2\sin x}$$

■

11) $\frac{2\sin x \cos x}{1 + \cos 2x}$ Use $\cos 2x = 2\cos^2 x - 1$

$$\frac{2\sin x \cos x}{2\cos^2 x}$$

Cancel common factors

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

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

$$\tan x$$

■