

# Trig Identities

Name: \_\_\_\_\_ Period: \_\_\_\_\_

Verify each identity.

1.  $\sin x \sec x = \tan x$

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

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

$$\tan x = \tan x \checkmark$$

5.  $\sin x \tan x \cos x = \sin^2 x$

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

$$\sin^2 x = \sin^2 x \checkmark$$

2.  $\cos x \csc x = \cot x$

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

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

$$\cot x = \cot x \checkmark$$

6.  $\sin x \cot x \cos x = \cos^2 x$

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

$$\cos^2 x = \cos^2 x \checkmark$$

3.  $\tan x \cos x = \sin x$

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

$$\sin x = \sin x \checkmark$$

7.  $\sec x - \sec x \sin^2 x = \cos x$

$$\sec x (1 - \sin^2 x) = \cos x$$

$$\sec x (\cos^2 x) = \cos x$$

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

$$\cos x = \cos x \checkmark$$

4.  $\cot x \sin x = \cos x$

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

$$\cos x = \cos x \checkmark$$

8.  $\csc x - \csc x \cos^2 x = \sin x$

$$\csc x (1 - \cos^2 x) = \sin x$$

$$\csc x (\sin^2 x) = \sin x$$

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

$$\sin x = \sin x \checkmark$$

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

$$\begin{aligned} &\downarrow \\ &1 - \sin^2 x - \sin^2 x = 1 - 2\sin^2 x \\ &1 - 2\sin^2 x = 1 - 2\sin^2 x \checkmark \end{aligned}$$

13.  $\sin t \tan t = \frac{1 - \cos^2 t}{\cos t}$

$$\begin{aligned} \frac{\sin t}{1} \cdot \frac{\sin t}{\cos t} &= \frac{1 - \cos^2 t}{\cos t} \\ \frac{\sin^2 t}{\cos t} &= \frac{1 - \cos^2 t}{\cos t} \\ \frac{1 - \cos^2 t}{\cos t} &= \frac{1 - \cos^2 t}{\cos t} \checkmark \end{aligned}$$

10.  $\csc \theta - \sin \theta = \cot \theta \cos \theta$

$$\begin{aligned} \frac{1}{\sin \theta} - \frac{\sin \theta}{1} &= \cot \theta \cos \theta \\ \frac{1 - \sin^2 \theta}{\sin \theta} &= \frac{\cos^2 \theta}{\sin \theta} \\ \frac{\cos^2 \theta}{\sin \theta} &= \frac{\cos^2 \theta}{\sin \theta} \checkmark \end{aligned}$$

14.  $\frac{\csc^2 t}{\cot t} = \csc t \sec t$

$$\begin{aligned} \frac{\csc t}{1} \cdot \frac{\csc t}{\cos t} \cdot \frac{1}{\sin t} &= \csc t \sec t \\ \frac{\csc t}{1} \cdot \frac{1}{\cos t} &= \csc t \sec t \\ \csc t \cdot \sec t &= \csc t \sec t \checkmark \end{aligned}$$

11.  $\frac{\tan \theta \cot \theta}{\csc \theta} = \sin \theta$

$$\begin{aligned} \frac{\frac{\sin \theta}{\cos \theta} \cdot \frac{\cos \theta}{\sin \theta} \cdot \frac{\sin \theta}{1}}{\frac{1}{\sin \theta}} &= \sin \theta \\ \sin \theta &= \sin \theta \checkmark \end{aligned}$$

15.  $\cos x (\tan x + \sin x \cot x) = \sin x + \cos^2 x$

$$\begin{aligned} \frac{\cos x}{1} \cdot \frac{\sin x}{\cos x} + \frac{\cos x}{1} \cdot \frac{\sin x}{1} \cdot \frac{\cos x}{\sin x} &= \\ \sin x + \cos^2 x &= \sin x + \cos^2 x \checkmark \end{aligned}$$

12.  $\sin^2 x (1 + \cot^2 x) = 1$

$$\begin{aligned} \sin^2 x + \sin^2 x \cot^2 x &= 1 \\ \sin^2 x + \frac{\sin^2 x \cdot \cos^2 x}{\sin^2 x} &= 1 \\ \sin^2 x + \cos^2 x &= 1 \\ 1 &= 1 \checkmark \end{aligned}$$

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

$$\begin{aligned} \frac{1}{\cos \theta} - \frac{\sin \theta}{\cos \theta} &= \sec \theta - \tan \theta \\ \sec \theta - \tan \theta &= \sec \theta - \tan \theta \checkmark \end{aligned}$$

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17.  $\frac{\sin t}{\tan t} + \frac{\cos t}{\cot t} = \sin t + \cos t$

$$\frac{\sin t \cdot \cancel{\cot t}}{\cancel{\sin t}} + \frac{\cos t \cdot \cancel{\tan t}}{\cancel{\cos t}}$$

$$\frac{\sin t \cdot \cos t}{\sin t} + \frac{\cos t \cdot \sin t}{\cos t}$$

$$\cos t + \sin t = \sin t + \cos t \checkmark$$

21.  $(\sec \theta + 1)(\sec \theta - 1) = \tan^2 \theta$

$$\sec^2 - 1 = \tan^2 \theta$$

$$\tan^2 \theta = \tan^2 \theta$$

18.  $1 - \frac{\sin^2 x}{1 + \cos x} = \cos x$

$$1 - \frac{(1 + \cos x)(1 - \cos x)}{1 + \cos x} = \cos x$$

$$1 - (1 - \cos x) = \cos x$$

$$\cos x = \cos x \checkmark$$

22.  $\frac{(1 - \cos u)(1 + \cos u)}{\cos^2 u} = \tan^2 u$

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

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

$$\sec^2 u - 1 = \tan^2 u$$

$$\tan^2 u = \tan^2 u$$

19.  $\csc^2 x \sec x = \sec x + \csc x \cot x$

$$(\cot^2 x + 1) \sec x$$

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

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

$$\frac{1}{\sin x} \left(\frac{\cos^2 x}{\sin x}\right) + \sec x = \csc x \cot x + \sec x \checkmark$$

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

$$\frac{1 + \tan^2 x}{1} = \sec^2 x$$

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

$$\sec^2 x = \sec^2 x$$

20.  $\sin^2 \beta (1 + \cot^2 \beta) = 1$

$$\sin^2 \beta + \frac{\sin^2 \beta (\cos^2 \beta)}{\sin^2 \beta} = 1$$

$$\sin^2 \beta + \cos^2 \beta = 1$$

$$1 = 1 \checkmark$$

24.  $\tan^2 \theta - \sin^2 \theta = \tan^2 \theta \sin^2 \theta$

$$\left(\frac{\sin^2 \theta}{\cos^2 \theta} - \sin^2 \theta\right)$$

$$\sin^2 \theta \left(\frac{1}{\cos^2 \theta} - 1\right)$$

$$\sin^2 \theta (\sec^2 \theta - 1)$$

$$\sin^2 \theta (\tan^2 \theta) = \tan^2 \theta \sin^2 \theta \checkmark$$

# Verifying Trigonometric Identities

Name: \_\_\_\_\_ Date: \_\_\_\_\_

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

$$\frac{\tan^2\theta}{\sec^2\theta} = \frac{\sin^2\theta}{\cos^2\theta} \cdot \frac{1}{\sec^2\theta} = \frac{\sin^2\theta}{\cos^2\theta} \cdot \frac{\cos^2\theta}{1} = \sin^2\theta \checkmark$$

6.  $\frac{1}{1-\sin\alpha} + \frac{1}{1+\sin\alpha} = 2\sec^2\alpha$

$$\frac{1+\sin\alpha + 1-\sin\alpha}{1-\sin^2\alpha} = \frac{2}{1-\sin^2\alpha} = \frac{2}{\cos^2\alpha} = 2\sec^2\alpha \checkmark$$

2.  $\sec\beta \cos\beta = 1$

$$\frac{1}{\cos\beta} \cdot \frac{\cos\beta}{1} = \frac{\cos\beta}{\cos\beta} = 1 \checkmark$$

7.  $\tan^2\beta \sin^2\beta = \tan^2\beta - \sin^2\beta$

$$\begin{aligned} \tan^2\beta (1 - \cos^2\beta) &= \\ \tan^2\beta - \tan^2\beta \cos^2\beta &= \\ \tan^2\beta - \frac{\sin^2\beta}{\cos^2\beta} \cdot \frac{\cos^2\beta}{1} &= \\ \tan^2\beta - \sin^2\beta &\checkmark \end{aligned}$$

3.  $2 - \sec^2\theta = 1 - \tan^2\theta$

$$\begin{aligned} 2 - (1 + \tan^2\theta) &= \\ 2 - 1 - \tan^2\theta &= \\ 1 - \tan^2\theta &\checkmark \end{aligned}$$

8.  $\frac{\tan^2\theta}{\tan^2\theta + 1} = \sin^2\theta$

$$\frac{\tan^2\theta}{\sec^2\theta} = \frac{\sin^2\theta}{\cos^2\theta} \cdot \frac{\cos^2\theta}{1} = \sin^2\theta$$

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

$$\begin{aligned} 1 - \sin^2\beta - \sin^2\beta &= \\ 1 - 2\sin^2\beta &\checkmark \end{aligned}$$

9.  $(\sin\alpha + \cos\alpha)^2 + (\sin\alpha - \cos\alpha)^2 = 2$

$$\begin{aligned} \sin^2\alpha + 2\sin\alpha\cos\alpha + \cos^2\alpha + \sin^2\alpha - 2\sin\alpha\cos\alpha + \cos^2\alpha &= \\ 2(\sin^2\alpha + \cos^2\alpha) &= 2(1) = 2 \end{aligned}$$

5.  $\frac{\csc^2\theta}{\cot\theta} = \csc\theta \sec\theta$

$$\begin{aligned} (\csc^2\theta \cdot \tan\theta) &= \\ \frac{1}{\sin^2\theta} \cdot \frac{\sin\theta}{\cos\theta} &= \\ \frac{1}{\sin\theta} \cdot \frac{1}{\cos\theta} &= \\ \csc\theta \sec\theta &\checkmark \end{aligned}$$

10.  $\cos^3\theta + \sin^2\theta \cos\theta = \cos\theta$

$$\begin{aligned} \cos\theta (\cos^2\theta + \sin^2\theta) &= \\ \cos\theta (1) &= \cos\theta \end{aligned}$$