

FUNDAMENTAL IDENTITIES — $2(x+3) = 2x+6$ — true for any angle.

Reciprocal

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

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

$$2) \sec \theta = \frac{1}{\cos \theta}$$

$$3) \cot \theta = \frac{1}{\tan \theta}$$

Ratio

$$4) \tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$5) \cot \theta = \frac{\cos \theta}{\sin \theta}$$

Pythagorean

$$6) \sin^2 \theta + \cos^2 \theta = 1$$

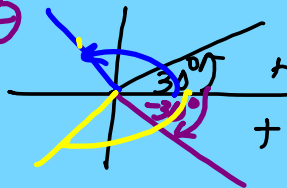
$$7) 1 + \tan^2 \theta = \sec^2 \theta$$

$$8) 1 + \cot^2 \theta = \csc^2 \theta$$

$$\sin(-\theta) = -\sin \theta$$

$$\sec \cos(-\theta) = \cos \theta$$

$$\tan(-\theta) = -\tan \theta$$



Simplify.

$$\begin{aligned} & \csc x \tan x \\ &= \frac{1}{\cancel{\sin x}} \cdot \frac{\cancel{\sin x}}{\cos x} \\ &= \frac{1}{\cos x} \\ &= \sec x \end{aligned}$$

$$\begin{aligned} & \frac{\tan(-\theta)}{\sec \theta} \\ &= \frac{-\tan \theta}{\sec \theta} \\ &= \frac{-\frac{\sin \theta}{\cos \theta}}{\frac{1}{\cos \theta}} \\ &= -\frac{\sin \theta}{\cancel{\cos \theta}} \cdot \frac{\cancel{\cos \theta}}{1} \\ &= -\sin \theta \end{aligned}$$

$$\begin{aligned} & \left. \begin{aligned} 1 + \tan^2 x &= \sec^2 x \\ 1 &= \sec^2 x - \tan^2 x \end{aligned} \right\} \\ & \frac{\sec^2 x - \tan^2 x - \cos^2 x}{1 - \cos^2 x} \\ &= \sin^2 x \end{aligned}$$

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

$$\frac{(1+\cos x)\cos x}{(1+\cos x)\sin x} + \frac{\sin x (\sin x)}{1+\cos x (\sin x)}$$

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

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

$$= \frac{1}{\sin x} \text{ OR } \csc x$$

Match.

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B 1. $\csc^2 x - 1 = \cot^2 x$

D 2. $\cos^2 x + 1$

C 3. $\frac{\tan x}{\sin x} = \frac{\frac{\sin x}{\cos x}}{\frac{\sin x}{1}} = \frac{\cancel{\sin x} \cdot 1}{\cos x \cancel{\sin x}} = \frac{1}{\cos x} = \sec x$

A 4. $\sin x \sec x \cot x$

$$\begin{aligned} \sin x \cdot \frac{1}{\cos x} \cdot \frac{\cos x}{\sin x} \\ = 1 \end{aligned}$$

A. 1

B. $\frac{\cos^2 x}{\sin^2 x} = \cot^2 x$

C. $\sec x$

$$\begin{aligned} \sin^2 x \cot^2 x + \sec x \cos x \\ \sin^2 x \left(\frac{\cos^2 x}{\sin^2 x} \right) + \frac{1}{\cos x} \cdot \cos x \\ \cos^2 x + 1 \end{aligned}$$