May 10, 2024

FUNDAMENTAL TRIG IDENTITIES

$2(x+3) = 2x+6$ — true for any angle measure

Reciprocal

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

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

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

Ratio

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

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

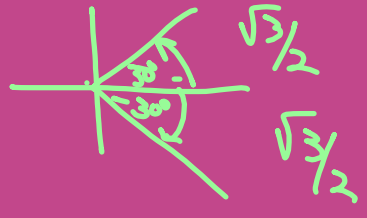
Pythagorean

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

$\sin^2\theta = 1 - \cos^2\theta$

7) $1 + \tan^2\theta = \sec^2\theta$ (÷ cos²θ, ÷ cos²θ)

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



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

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

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

Simplify.

$\csc x \tan x$

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

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

$\frac{\tan(-\theta)}{\sec\theta}$

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

#2 $\frac{1}{\frac{\cos\theta}{1}}$

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

$= -\sin\theta$

$\sec^2 x - \tan^2 x - \cos^2 x$

$= 1 - \cos^2 x$

$= \sin^2 x$

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

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

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

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

May 10, 2024

$$\tan^2 x - \frac{\sec^2 x}{\csc^2 x}$$

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

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

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

$$= 0$$

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

$$= \frac{\cos x + (\cos^2 x + \sin^2 x)}{\sin x\,(1+\cos x)} \quad \leftarrow \#6$$

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

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

May 10, 2024

Match

B 1. $\csc^2 x - 1$ #8

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

~~A~~ 1

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

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

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

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

~~C~~. $\sec x = \frac{1}{\cos x}$

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

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

$= 1$

~~D~~. $\sin^2 x \cot^2 x + \sec x \cos x$

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

$\cos^2 x + 1$