Fundamental Identities

$2(x+3) = 2x+6$ – true for any angle.

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

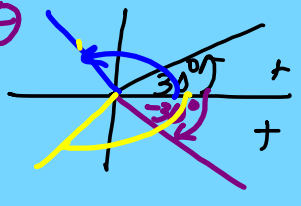
7) $1 + \tan^2\theta = \sec^2\theta$

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

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

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

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



Simplify.

$\csc x \tan x$

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

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

$= \sec x$

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

$= \frac{-\tan\theta}{\sec\theta}$

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

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

$= -\sin\theta$

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

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

$\frac{\sec^2 x - \tan^2 x, -\cos^2 x}{1 - \cos^2 x}$

$= \sin^2 x$

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

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

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

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

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

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

Match.

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

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

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

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

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

$= 1$

A. 1

B. $\frac{\cos^2 x}{\sin^2 x} = \cot^2 x$ #5

C. $\sec x$

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

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

$\cos^2 x + 1$