SIMPLIFYING TRIG IDENTITIES - DAY 2

Memorize the following!

Key

I. Reciprocal Identities

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

B) $\cos\theta = \frac{1}{\sec\theta}$ E) $\sec\theta = \frac{1}{\cos\theta}$

C) $\tan\theta = \frac{1}{\cot\theta}$ F) $\cot\theta = \frac{1}{\tan\theta}$

II. Quotient Identities

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

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

III. Pythagorean Identities

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

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

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

Use your strategies to simplify each expression.

1. $\csc^2\theta - 1$ $= \cot^2\theta$

Is this a Pythagorean Identity?

2. $(1-\sin x)(1+\sin x)$

FOIL IT!

$= 1 - \sin^2 x$

$= \cos^2 x$

3. $\sin^2\theta(\csc^2\theta - 1)$

Is there a P.I here?

$\sin^2\theta\,(\cot^2\theta)$

$\sin^2\theta \cdot \frac{\cos^2\theta}{\sin^2\theta}$

$= \cos^2\theta$

4. $\cos\theta\tan\theta\csc\theta$

Rewrite in terms of sin and cos

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

$= 1$

5. $\frac{\csc\theta}{1+\cot^2\theta}$ $\frac{\csc\theta}{\csc^2\theta} = \frac{1}{\csc\theta}$

Is there an identity?
Can we then write in terms of sin and cos?

$= \sin\theta$

6. $\frac{1}{\sin^2\theta} - \frac{1}{\tan^2\theta}$ $1 \div \left(\frac{\sin^2\theta}{\cos^2\theta}\right)$ $= 1 \cdot \frac{\cos^2\theta}{\sin^2\theta}$

Can you rewrite tan?

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

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

$= 1$

7. $\sin^2 x + \sin^2 x \cot^2 x$ Is there a GCF?

$\sin^2 x\,(1 + \cot^2 x)$

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

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

8. Using trigonometric identities find the values of the other four trigonometric functions given the values of two of the trigonometric functions.

A. $\sin\theta = \frac{5}{6}$ and $\cos\theta = \frac{-\sqrt{11}}{6}$

B. $\cos\theta = \frac{4}{9}$ and $\sin\theta = \frac{-\sqrt{5}}{3}$

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

$\tan = \frac{\sin}{\cos} = \frac{5}{6} \div \frac{-\sqrt{11}}{6}$

$= \frac{5}{-\sqrt{11}}$ $= \frac{-5\sqrt{11}}{11} = \tan\theta$

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

$= \frac{6}{-\sqrt{11}}$

$= -\frac{6\sqrt{11}}{11}$

$\cot = \frac{\cos}{\sin} = \frac{-\sqrt{11}}{6} \div \frac{5}{6}$

$\cot\theta = -\frac{\sqrt{11}}{5}$

$\csc = \frac{1}{\sin} = \frac{6}{5}$