

Warm UP: Write the steps mathematically and in words to verify the following identities

$$\frac{\sec x \cdot \cos x}{\cos x} = \tan^2 x$$

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$$\frac{\sec x}{\cos x} - \frac{\cos x}{\cos x} \quad \text{SPLIT}$$

$$\frac{\sec x}{\cos x} - 1 \quad \text{Reduce}$$

$$\left(\frac{\sec x}{1}\right) \left(\frac{1}{\cos x}\right) - 1 \quad \text{SLIDE}$$

$$\sec x \cdot \sec x - 1 \quad \text{Recip.}$$

$$\sec^2 x - 1 \quad \text{Multiply}$$

$$\tan^2 x \quad \text{Pythag} \checkmark$$

LT: Verify using trig identities

5 Guidelines for Verifying Trigonometric Identities:

1. Work on the most complicated side

2. Try to factor, <sup>Distribute</sup> ~~FOIL~~, multiply by conjugate, etc... SPLIT, SLIDE

3. Look for fundamental identities

4. Try converting all to sine and cosine

5. Always TRY SOMETHING!

Ex 1) Verify:  $\frac{\sec^2 \theta - 1}{\sec^2 \theta} = \sin^2 \theta$

$\frac{\sec^2 \theta}{\sec^2 \theta} - \frac{1}{\sec^2 \theta}$  SPLIT

$1 - \frac{1}{\sec^2 \theta}$  Reduce

$1 - \cos^2 \theta$  Recip.

$\sin^2 \theta$  Pythag ✓

$\frac{\tan^2 \theta}{\sec^2 \theta}$  Pythag

$\frac{\tan^2 \theta}{1} \left( \frac{1}{\sec^2 \theta} \right)$  SLIDE

$\tan^2 \theta (\cos^2 \theta)$  Recip.

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

$\sin^2 \theta$  Reduce ✓

Ex 2) Verify:  $1 + \sin 2x = (\sin x + \cos x)^2$

Rewrite  
Distribute  
Combine like terms

Pythag

Double-Angle Formula

$(\sin x + \cos x)(\sin x + \cos x)$   
 $\sin^2 x + \sin x \cos x + \sin x \cos x + \cos^2 x$

$\sin^2 x + 2 \sin x \cos x + \cos^2 x$

$1 + 2 \sin x \cos x$

$1 + \sin 2x$  ✓

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

Ex 3) Verify:  $\sec x + \tan x = \frac{\cos x}{1 - \sin x}$

Ex 4) Verify:  $\frac{\cot^2 \theta}{(1 - \csc \theta)(1 + \csc \theta)} = \frac{\sin \theta - 1}{\sin \theta}$   
 conjugate

$\frac{\cot^2 \theta (1 - \csc \theta)}{1 - \csc^2 \theta}$  Distribute

$\frac{\cot^2 \theta (1 - \csc \theta)}{-\cot^2 \theta}$  Pythag

$-1(1 - \csc \theta)$  Reduce  
 $-1 + \csc \theta$  Distribute

$\frac{\sin \theta}{\sin \theta} \cdot \frac{-1 + \frac{1}{\sin \theta}}{1} \text{ Recip.}$

$\frac{-\sin \theta}{\sin \theta} + \frac{1}{\sin \theta}$  Common Denom

$\frac{-\sin \theta + 1}{\sin \theta}$  Combine fractions ✓

$\frac{1 + \cot^2 \theta - \csc^2 \theta}{-\csc^2 \theta - \csc^2 \theta} = 0$   
 $\frac{1 - \csc^2 \theta + \cot^2 \theta}{-\cot^2 \theta - \cot^2 \theta} = 0$   
 $10 - 5 = 5$   
 $5 - 10 = -5$

Ex 5) Verify:  $\cos 2\theta = \frac{2 - \sec^2 \theta}{\sec^2 \theta}$

Ex 6) Verify:  $\sin 2x = \frac{2 \tan x}{1 + \tan^2 x}$