Today's Learning Goal(s):

Date: _____

By the end of the class, I will be able to:

a) prove trigonometric identities.

Last day's work: p. 310 #1 – 6

5.5 Trigonometric Identities (Day2)

Date: _____

Reciprocal Identities

$$\csc\theta = \frac{1}{\sin\theta} \qquad \sec\theta = \frac{1}{\cos\theta}$$

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

Quotient Identities

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Pythagorean Identities

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

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

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

To Prove an Identity:

* Separate the LS and RS, and work on them separately
* convert *tan* and reciprocal ratios to *sin* or *cos*
* apply the Pythagorean Identity, use common denominators & factor as required

Ex.1 Prove that $\frac{\sin^2 x}{1-\cos x} = 1+\cos x$

Ex.2 Prove that $\frac{1}{1+\sin\theta} + \frac{1}{1-\sin\theta} = \frac{2}{\cos^2\theta}$

Are there any Homework Questions you would like to see on the board?

Last day's work: p. 310 #1 – 6

Today's Homework Practice includes:

pp. 310-311 #8, 10 – 12 [14]

Worksheet a – j

8. Prove each identity. State any restrictions on the variables.

a) $\frac{\sin^2 \phi}{1 - \cos \phi} = 1 + \cos \phi$

b) $\frac{\tan^2 \alpha}{1 + \tan^2 \alpha} = \sin^2 \alpha$

c) $\cos^2 x = (1 - \sin x)(1 + \sin x)$

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

e) $\sin^4 \alpha - \cos^4 \alpha = \sin^2 \alpha - \cos^2 \alpha$

f) $\tan \theta + \frac{1}{\tan \theta} = \frac{1}{\sin \theta \cos \theta}$

b) Solution 1: LS - use the quotient identity, and then simplify the fraction.
Solution 2: LS - use version 2 of the Pythagorean identity.

d) LS - sub in $\sin^2\theta$

e) LS - factor the difference of squares

f) LS - add the fractions then sub for $\tan\theta$

12. Prove each identity. State any restrictions on the variables.

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a) $\frac{\sin^2 \theta + 2 \cos \theta - 1}{\sin^2 \theta + 3 \cos \theta - 3} = \frac{\cos^2 \theta + \cos \theta}{-\sin^2 \theta}$

b) $\sin^2 \alpha - \cos^2 \alpha - \tan^2 \alpha = \frac{2 \sin^2 \alpha - 2 \sin^4 \alpha - 1}{1 - \sin^2 \alpha}$

a) sub for $\sin^2\theta$ on both sides, then factor and divide.

b) LS - sub for $\sin^2\theta$ and use the quotient rule, then add the fractions.

Extending

14. a) Which equations are not identities? Justify your answers.
b) For those equations that are identities, state any restrictions on the variables.

i) $(1 - \cos^2 x)(1 - \tan^2 x) = \frac{\sin^2 x - 2 \sin^4 x}{1 - \sin^2 x}$

ii) $1 - 2 \cos^2 \phi = \sin^4 \phi - \cos^4 \phi$

iii) $\frac{\sin \theta \tan \theta}{\sin \theta + \tan \theta} = \sin \theta \tan \theta$

iv) $\frac{1 + 2 \sin \beta \cos \beta}{\sin \beta + \cos \beta} = \sin \beta + \cos \beta$

v) $\frac{1 - \cos \beta}{\sin \beta} = \frac{\sin \beta}{1 + \cos \beta}$

vi) $\frac{\sin x}{1 + \cos x} = \csc x - \cot x$

iv) LS - sub $\sin^2 \theta + \cos^2 \theta$ in for 1, and then factor and divide.

v) LS - multiply top and bottom by $1 + \cos\beta$

vi) RS - put in terms of sinx and cosx and then see above.