Name: ___Kevin Braza - KEY_____ Date: _____ IB Math A&A SL

Lesson 6.4 – Proving Trigonometric Identities

I. Warm-Up

1. Show that $3^{x-2} = \frac{1}{9}(3^x)$

$3^{x-2} = 3^{-2} \cdot 3^x$

$3^{x-2} = 3^{x-2}$

1. Look at both sides & similarities
(Don't change similarities)
2. Simplify harder-looking side (one side only)
3. Sine/Cosine are most comfortable

II. Proving Trigonometric Identities: Show that the two trigonometric identities are equivalent.

2. Show that

$\csc^2\theta + \sec^2\theta - \tan^2\theta - \cot\theta = 2$

$\sec^2\theta - \tan^2\theta + \csc^2\theta - \cot\theta = 2$

$1 + 1 = 2$

$2 = 2$

3. Show that

$\tan\theta + \cot\theta = \sec\theta\csc\theta$

$\frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta}$

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

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

$\sec\theta\csc\theta$

4. Show that $\frac{\cot^2\theta}{1+\csc\theta} = \frac{1-\sin\theta}{\sin\theta}$

$\frac{\csc^2\theta - 1}{1+\csc\theta}$

$\frac{(\csc\theta - 1)(\csc\theta + 1)}{1+\csc\theta}$

$\csc\theta - 1$

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

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

5. Show that $\frac{1}{1-\sin\theta} + \frac{1}{1+\sin\theta} = 2\sec^2\theta$

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

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

$2\sec^2\theta$

III. Practice: Show that the two trigonometric identities are equivalent.

6. $\sec x - \cos x = \sin x \tan x$

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

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

$\sin x \tan x$

7. $\frac{\sin\theta}{1+\cos\theta} + \frac{\cos\theta}{\sin\theta} = \csc\theta$

$\frac{\sin^2\theta+\cos\theta+\cos^2\theta}{(1+\cos\theta)\sin\theta}$

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

$\frac{1+\cos\theta}{(1+\cos\theta)\sin\theta} = \csc\theta$

8. $\frac{1}{\tan\beta} + \tan\beta = \frac{\sec^2\beta}{\tan\beta}$

$\frac{1}{\tan\beta} + \frac{\tan^2\beta}{\tan\beta}$

$\frac{1+\tan^2\beta}{\tan\beta}$

$\frac{\sec^2\beta}{\tan\beta}$

9. $\sec^2 x + \csc^2 x = (\sec^2 x)(\csc^2 x)$

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

$(\frac{\sin^2 x+\cos^2 x}{\cos^2 x \sin^2 x})$

$(\frac{1}{\cos^2 x \sin^2 x})$

$(\frac{1}{\cos^2 x})(\frac{1}{\sin^2 x})$

$(\sec^2 x)(\csc^2 x)$

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

$\cos^2\theta - (1 - \cos^2\theta)$

$\cos^2\theta - 1 + \cos^2\theta$

$2\cos^2\theta - 1$

11. $\frac{\sec x - 1}{1 - \cos x} = \sec x$

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

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

$\frac{1-\cos x}{(1-\cos x)\cos x}$

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

$\sec x$