Name: _____   Period: _____   Date: _____

Verifying Trigonometric Identities Guided Notes

Verify Trigonometric Identity

To verify an identity means to prove both sides of the equation are equal for all values of the variable for which both sides are defined.

The process is to transform one side of the equation (usually the side with more complicated expressions) to the other side by simplifying using the algebra and trigonometric identities given below:

- Reciprocal Identities

- Quotient Identities

- Pythagorean Identities

Reciprocal Identities

Reciprocal identities relate these six identities such that one identity is the reciprocal of its co-identity.

Sine and Cosecant:

$$sin(\theta) = \frac{opposite}{hypotenuse} = \frac{1}{\frac{hypotenuse}{opposite}} = \frac{1}{cosec(\theta)}$$

$$sin(\theta) = \frac{1}{cosec(\theta)} \quad ; \quad cosec(\theta) = \frac{1}{sin(\theta)}$$

Reciprocal Identities

Cosine and Secant:

$$cos(\theta) = \frac{adjacent}{hypotenuse} = \frac{1}{\frac{hypotenuse}{adjacent}} = \frac{1}{sec(\theta)}$$

$$cos(\theta) = \frac{1}{sec(\theta)} \quad ; \quad sec(\theta) = \frac{1}{cos(\theta)}$$

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Tangent and Cotangent:

$$tan(\theta) = \frac{opposite}{adjacent} = \frac{1}{\frac{adjacent}{opposite}} = \frac{1}{cot(\theta)}$$

$$tan(\theta) = \frac{1}{cot(\theta)} \quad ; \quad cot(\theta) = \frac{1}{tan(\theta)}$$

Quotient Identities

Quotient identities relate the sine and cosine with tangent and cotangent of an angle in a right-angled triangle.

Tangent:

$$tan(\theta) = \frac{opposite}{adjacent} = \frac{\frac{opposite}{hypotenuse}}{\frac{adjacent}{hypotenuse}} = \frac{sin(\theta)}{cos(\theta)}$$

Cotangent:

$$cot(\theta) = \frac{adjacent}{opposite} = \frac{\frac{adjacent}{hypotenuse}}{\frac{opposite}{hypotenuse}} = \frac{cos(\theta)}{sin(\theta)}$$

Pythagorean Identities

Pythagorean right-angled **identities** are written using the Pythagorean theorem for triangles.

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

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

$$1 + cot^2(\theta) = cosec^2(\theta)$$

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Problem 1: Verify that $(sec^2\theta - 1)cos^2\theta = sin^2\theta.$

Problem 2: Verify that $\frac{sec\theta}{sin\theta} - \frac{sin\theta}{cos\theta} = cot\theta.$

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