Name: _____

Directions: Complete the following practice problems. They are the same problems that will be completed on the board. Be sure to write each step down as we go!

1. Simplify the expression: $csc^2\theta(1-cos^2\theta)$

$$csc^2\theta(1-cos^2\theta)$$
$$csc^2\theta \; sin^2\theta$$
$$\frac{1}{sin^2\theta} \cdot sin^2\theta$$
$$= \frac{sin^2\theta}{sin^2\theta} = 1$$

2. Simplify the expression: $cos\theta + sin\theta tan\theta$

$$cos\theta + sin\theta\left(\frac{sin\theta}{cos\theta}\right)$$
$$cos\theta + \frac{sin^2\theta}{cos\theta} = \left(\frac{cos\theta}{cos\theta}\right)cos\theta + \frac{sin^2\theta}{cos\theta}$$
$$\frac{cos^2\theta}{cos\theta} + \frac{sin^2\theta}{cos\theta} = \frac{cos^2\theta+sin^2\theta}{cos\theta} = \frac{1}{cos\theta} = sec\theta$$

3. Simplify the expression: $tan^2\theta + sin^2\theta + cos^2\theta$

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

4. Simplify the expression: $cos\theta \; sin\theta \; sec\theta$

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

5. Simplify the expression: $cot\theta tan\theta + tan^2\theta$

$$cot\theta tan\theta + tan^2\theta$$
$$\frac{cos\theta}{sin\theta} \cdot \frac{sin\theta}{cos\theta} + tan^2\theta$$
$$1 + tan^2\theta = sec^2\theta$$

6. Simplify the expression: $(1-sin\theta)(1+sin\theta)$

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

7. Simplify the expression: $\frac{1-sin^2\theta}{1-cos^2\theta}$

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

8. Simplify the expression: $\frac{1}{sec^2\theta} + \frac{1}{csc^2\theta}$

$$\frac{1}{sec^2\theta} + \frac{1}{csc^2\theta} = cos^2\theta + sin^2\theta$$
$$= 1$$

9. Simplify the expression: $\cos\theta\sec\theta - \cos^2\theta$

$\cos\theta\sec\theta - \cos^2\theta$

$\cos\theta \cdot \dfrac{1}{\cos\theta} - \cos^2\theta$

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

10. Simplify: $(1 - \sin^2\theta) + (1 - \cos^2\theta) - 2$

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

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

$1 - 2$

$= \boxed{-1}$

Practice: Complete the following problems on your own!

1. Simplify the expression: $\cos\theta + \sin\theta\tan\theta$

$\cos\theta + \sin\theta \cdot \dfrac{\sin\theta}{\cos\theta}$

$\dfrac{\cos^2\theta}{\cos\theta} + \dfrac{\sin^2\theta}{\cos\theta} = \dfrac{1}{\cos\theta} = \boxed{\sec\theta}$

2. Simplify the expression: $\tan\theta(\cot\theta + \tan\theta)$

$\tan\theta\cot\theta + \tan^2\theta$

$\dfrac{\sin\theta}{\cos\theta} \cdot \dfrac{\cos\theta}{\sin\theta} + \tan^2\theta$

$1 + \tan^2\theta = \boxed{\sec^2\theta}$

3. Simplify the expression: $\sin\theta(1 + \cot^2\theta)$

$\sin\theta(1 + \cot^2\theta)$

$\sin\theta\,\csc^2\theta$

$\sin\theta \cdot \dfrac{1}{\sin^2\theta} = \dfrac{1}{\sin\theta} = \boxed{\csc\theta}$

4. Simplify the expression: $\dfrac{\csc\theta}{\sin\theta + \cos\theta\cot\theta}$

$\dfrac{\frac{1}{\sin\theta}}{\sin\theta + \cos\theta \cdot \cos\theta} = \dfrac{\frac{1}{\sin\theta}}{\sin\theta + \frac{\cos^2\theta}{\sin\theta}} = \dfrac{\frac{1}{\sin\theta}}{\frac{\sin^2\theta + \cos^2\theta}{\sin\theta}}$

$\dfrac{\frac{1}{\sin\theta}}{\frac{1}{\sin\theta}} = \dfrac{1}{\sin\theta} \cdot \dfrac{\sin\theta}{1} = \boxed{1}$

5. Simplify the expression: $\csc^2\theta(1 - \cos^2\theta)$

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

$\csc^2\theta\,\sin^2\theta$

$\dfrac{1}{\sin^2\theta} \cdot \sin^2\theta = \boxed{1}$

6. Simplify the expression: $\dfrac{\cos\theta\csc\theta}{\cot\theta}$

$\dfrac{\cos\theta \cdot \frac{1}{\sin\theta}}{\cot\theta} = \dfrac{\frac{\cos\theta}{\sin\theta}}{\cot\theta} = \dfrac{\cot\theta}{\cot\theta}$

$= \boxed{1}$

7. Simplify the expression: $\csc\theta\cos\theta\tan\theta$

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

$= \boxed{1}$

8. Simplify the expression: $\sin^2\theta + \cos^2\theta + \tan^2\theta$

$\sin^2\theta + \cos^2\theta + \tan^2\theta$

$1 + \tan^2\theta$

$\boxed{\sec^2\theta}$