# 14-3 Study Guide and Intervention *(continued)*

## *Trigonometric Identities*

**Simplify Expressions** The simplified form of a trigonometric expression is written as a numerical value or in terms of a single trigonometric function, if possible. Any of the trigonometric identities on page 849 can be used to simplify expressions containing trigonometric functions.

**Example 1** **Simplify $(1 - \cos^2 \theta) \sec \theta \cot \theta + \tan \theta \sec \theta \cos^2 \theta$.**

$$\begin{aligned}(1 - \cos^2 \theta) \sec \theta \cot \theta + \tan \theta \sec \theta \cos^2 \theta &= \sin^2 \theta \cdot \frac{1}{\cos \theta} \cdot \frac{\cos \theta}{\sin \theta} + \frac{\sin \theta}{\cos \theta} \cdot \frac{1}{\cos \theta} \cdot \cos^2 \theta \\ &= \sin \theta + \sin \theta \\ &= 2 \sin \theta\end{aligned}$$

**Example 2** **Simplify $\dfrac{\sec \theta \cdot \cot \theta}{1 - \sin \theta} - \dfrac{\csc \theta}{1 + \sin \theta}$.**

$$\begin{aligned}\frac{\sec \theta \cdot \cot \theta}{1 - \sin \theta} - \frac{\csc \theta}{1 + \sin \theta} &= \frac{\frac{1}{\cos \theta} \cdot \frac{\cos \theta}{\sin \theta}}{1 - \sin \theta} - \frac{\frac{1}{\sin \theta}}{1 + \sin \theta} \\ &= \frac{\frac{1}{\sin \theta}(1 + \sin \theta) - \frac{1}{\sin \theta}(1 - \sin \theta)}{(1 - \sin \theta)(1 + \sin \theta)} \\ &= \frac{\frac{1}{\sin \theta} + 1 - \frac{1}{\sin \theta} + 1}{1 - \sin^2 \theta} \\ &= \frac{2}{\cos^2 \theta}\end{aligned}$$

**Exercises**

**Simplify each expression.**

**1.** $\dfrac{\tan \theta \cdot \csc \theta}{\sec \theta}$

**2.** $\dfrac{\sin \theta \cdot \cot \theta}{\sec^2 \theta - \tan^2 \theta}$

**3.** $\dfrac{\sin^2 \theta - \cot \theta \cdot \tan \theta}{\cot \theta \cdot \sin \theta}$

**4.** $\dfrac{\cos \theta}{\sec \theta - \tan \theta}$

**5.** $\dfrac{\tan \theta \cdot \cos \theta}{\sin \theta} + \cot \theta \cdot \sin \theta \cdot \tan \theta \cdot \csc \theta$

**6.** $\dfrac{\csc^2 \theta - \cot^2 \theta}{\tan \theta \cdot \cos \theta}$

**7.** $3 \tan \theta \cdot \cot \theta + 4 \sin \theta \cdot \csc \theta + 2 \cos \theta \cdot \sec \theta$

**8.** $\dfrac{1 - \cos^2 \theta}{\tan \theta \cdot \sin \theta}$

NAME _____ DATE _____ PERIOD _____

# 14-3 Skills Practice

## *Trigonometric Identities*

**Find the value of each expression.**

**1.** $\sin\theta$, if $\cos\theta = -\frac{4}{5}$ and $90° < \theta < 180°$

**2.** $\cos\theta$, if $\tan\theta = 1$ and $180° < \theta < 270°$

**3.** $\sec\theta$, if $\tan\theta = 1$ and $0° \le \theta < 90°$

**4.** $\cos\theta$, if $\tan\theta = \frac{1}{2}$ and $0° \le \theta < 90°$

**5.** $\tan\theta$, if $\sin\theta = -\frac{\sqrt{2}}{2}$ and $180° < \theta < 270°$

**6.** $\cos\theta$, if $\sec\theta = 2$ and $270° < \theta < 360°$

**7.** $\cos\theta$, if $\csc\theta = -2$ and $180° < \theta < 270°$

**8.** $\tan\theta$, if $\cos\theta = -\frac{2\sqrt{5}}{5}$ and $180° < \theta < 270°$

**9.** $\cos\theta$, if $\cot\theta = -\frac{3}{2}$ and $90° < \theta < 180°$

**10.** $\csc\theta$, if $\cos\theta = \frac{8}{17}$ and $0° < \theta < 90°$

**11.** $\cot\theta$, if $\csc\theta = -2$ and $180° < \theta < 270°$

**12.** $\tan\theta$, if $\sin\theta = -\frac{5}{13}$ and $180° < \theta < 270°$

**Simplify each expression.**

**13.** $\sin\theta\sec\theta$

**14.** $\csc\theta\sin\theta$

**15.** $\cot\theta\sec\theta$

**16.** $\frac{\cos\theta}{\sec\theta}$

**17.** $\tan\theta + \cot\theta$

**18.** $\csc\theta\tan\theta - \tan\theta\sin\theta$

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

**20.** $\csc\theta + \cot\theta$

**21.** $\frac{\sin^2\theta + \cos^2\theta}{1 - \cos^2\theta}$

**22.** $1 + \frac{\tan^2\theta}{1 + \sec\theta}$