Name _____ Date _____ Class _____

LESSON 14-3

Practice B

Fundamental Trigonometric Identities

Prove each trigonometric identity.

1. $\sin^2\theta + \sin^2\theta\cot^2\theta = 1$

2. $\cot^2\theta\cos^2\theta = \cot^2\theta - \cos^2\theta$

3. $\tan^2\theta - \tan^2\theta\sin^2\theta = \sin^2\theta$

4. $\dfrac{\sin\theta + \cos\theta}{\sin\theta\cos\theta} = \sec\theta + \csc\theta$

Rewrite each expression in terms of $\cos\theta$. Then simplify.

5. $2\sin\theta\cos\theta\cot\theta$

6. $\dfrac{1+\cot\theta}{\cot\theta(\sin\theta+\cos\theta)}$

7. $\cos^4\theta - \sin^4\theta + \sin^2\theta$

Solve.

8. Use the equation $mg\sin\theta = \mu mg\cos\theta$ to determine the angle at which a waxed wood block on an inclined plane of wet snow begins to slide. Assume $\mu = 0.17$.

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

$1+\cos^2\theta$

8. 48°

Practice B

1. $\sin^2\theta+\sin^2\theta\cot^2\theta=1$

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

   $\sin^2\theta(\csc^2\theta)=1$

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

   $1=1$

2. $\cot^2\theta\cos^2\theta=\cot^2\theta-\cos^2\theta=$

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

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

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

   $\cot^2\theta(\cos^2\theta+\sin^2\theta-\sin^2\theta)=\cot^2\theta\cos^2\theta$

3. $\tan^2\theta-\tan^2\theta\sin^2\theta=\sin^2\theta$

   $\tan^2\theta(1-\sin^2\theta)=\sin^2\theta$

   $\tan^2\theta(\cos^2\theta)=\sin^2\theta$

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

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

   $\sin^2\theta=\sin^2\theta$

4. $\frac{\sin\theta+\cos\theta}{\sin\theta\cos\theta}=\sec\theta+\csc\theta$

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

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

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

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

   $\sec\theta+\csc\theta=\sec\theta+\csc\theta$

5. $2\sin\theta\cos\theta\cot\theta=$

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

6. $\frac{1+\cot\theta}{\cot\theta(\sin\theta+\cos\theta)}=$

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

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

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

7. $\cos^4\theta-\sin^4\theta+\sin^2\theta=(\cos^2\theta+\sin^2\theta)(\cos^2\theta-\sin^2\theta)+\sin^2\theta(1)(\cos^2\theta-\sin^2\theta)+\sin^2\theta=\cos^2\theta$

8. 9.6°

Practice C

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

   $\frac{\cos\theta}{1+\sin\theta}\left(\frac{1-\sin\theta}{1-\sin\theta}\right)=\frac{1-\sin\theta}{\cos\theta}$

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

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

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

2. $\tan\theta\sec\theta=\frac{\sec\theta+\tan\theta}{\cos\theta+\cot\theta}=\frac{\sec\theta+\frac{\sin\theta}{\cos\theta}}{\cos\theta+\frac{\cos\theta}{\sin\theta}}$