Name: _____ Date: _____

Trigonometric Identities
Practice Worksheet 1

Use the quotient and reciprocal identities to simplify the given expression.

1. $\cot t \sin t$ $\frac{\cos t}{\sin t} \cdot \sin t = \cos t$

2. $\tan t \cot t$ $\frac{\sin t}{\cos t} \cdot \frac{\cos t}{\sin t} = 1$

3. $\csc t \sin t$ $\frac{1}{\sin t} \cdot \sin t = 1$

4. $\cot t \sec t$ $\frac{\cos t}{\sin t} \cdot \frac{1}{\cos t} = \frac{1}{\sin t} = \csc t$

Use the Pythagorean identities to simplify the given expression.

$\sin^2 t + \frac{\cos^2 t}{\sin^2 t} \cdot \sin^2 t$

$\sin^2 t + \cos^2 t$

1

5. $\sin^2 t + \cot^2 t \sin^2 t$

6. $1 - \sec^2 t$

$1 - (1 + \tan^2 t)$

$1 - 1 - \tan^2 t$

$-\tan^2 t$

7. $\frac{\csc^2 t - \cot^2 t}{\sin^2 t}$

$\frac{1}{\sin^2 t} - \frac{\cos^2 t}{\sin^2 t} = \frac{1 - \cos^2 t}{\sin^2 t} \cdot \frac{1}{\sin^2 t}$

$\frac{\sin^2 t}{\sin^2 t} \cdot \frac{1}{\sin^2 t} = \csc^2 t$

$\frac{1}{\sin^2 t} = \csc^2 t$

$\{1 + \cot^2 = \csc^2 \theta\}$

8. $\frac{\sin^2 t - \cos^2 t \sin^2 t}{\sin^2 t}$

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

For the following exercises, sin t = 3/5. Use the cofunction identities and the even/odd identities to evaluate each trigonometric function.

9. $\sin(-t)$ $= -\sin t = -\frac{3}{5}$

10. $\sin\left(\frac{\pi}{2} - t\right)$

11. $\sin\left(\frac{\pi}{2} - t\right) = \cos t = \frac{4}{5}$

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

$\left(\frac{3}{5}\right)^2 + \cos^2\theta = 1$

$\frac{9}{25} + \cos^2\theta = 1$

$\cos^2\theta = \frac{16}{25}$

$\cos\theta = \frac{4}{5}$

12. $\tan(-t) = -\tan t = -\frac{\sin t}{\cos t}$

$-\frac{3}{5} \div \frac{4}{5} = -\frac{3}{5} \cdot \frac{5}{4} = -\frac{3}{4}$

Use the fundamental identities and algebra to simplify the expression.

13. $(\sin t + \cos t)(\sin t - \cos t)$

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

$\sin^2 t - \cos^2 t$

14. $\frac{\sin t}{\tan t}$

15. $\left(\frac{4\cos^2 t}{\sin^2 t}\right)\left(\frac{\sin t}{4\cos t}\right)^2$

$\frac{4\cos^2 t}{\sin^2 t} \cdot \frac{\sin^2 t}{16\cos^2 t}$

$\frac{1}{4}$

16. $\frac{\cos^2 t + 4\cos t + 4}{\cos t + 2}$

$\frac{(\cos t + 2)(\cos t + 2)}{(\cos t + 2)} = \cos t + 2$

17. $\frac{1}{\cos t} - \sin t \tan t$

$\frac{1}{\cos t} - \frac{\sin t \cdot \sin t}{\cos t}$

$\frac{1}{\cos t} - \frac{\sin^2 t}{\cos t}$

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

Precalculus

Name: _____ Date: _____ Pd: _____

Homework: Using Basic Trig Identities

Part 1: Unit Circle Review

Use the unit circle and the reciprocal identities to find the *exact* values (no decimals!) for each of the trig expressions below.

1) $\sin 30°$

$\frac{1}{2}$

2) $\sec 240°$

$\frac{1}{\cos 240°}$

3) $\cot 315°$

$\frac{\cos 315°}{\sin 315°}$

4) $\tan \frac{2\pi}{3}$

$\frac{\sin\left(\frac{2\pi}{3}\right)}{\cos\left(\frac{2\pi}{3}\right)}$

5) $\csc \frac{7\pi}{4}$

$\frac{1}{\sin\left(\frac{7\pi}{4}\right)}$

6) $\cos \frac{5\pi}{6}$

$-\frac{\sqrt{3}}{2}$

Part 2: The Reciprocal and Quotient Identities

For each expression below, simplify it using the reciprocal and quotient identities.

7) $\frac{1}{\csc\theta}$

$\sin\theta$

8) $\frac{\tan\theta}{\cot\theta}$

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

$\tan^2\theta$

9) $\frac{\csc\theta}{\sec\theta}$

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

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

10) $\tan\theta \cdot \cos\theta$

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

11) $\sin\theta \cdot \csc\theta$

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

1

12) $\frac{1}{\tan\theta} \cdot \frac{\cos\theta}{\sin\theta}$

or $\cot \cdot \cot = \cot^2\theta$

$\cot\theta \cdot \frac{\cos\theta}{\sin\theta}$

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

Part 3: The Pythagorean Identities

For each expression below, simplify it using the three Pythagorean identities.

13) $1-\sin^2\theta$

$\cos^2\theta$

14) $\tan^2\theta-\sec^2\theta$

$\tan^2\theta-(1+\tan^2\theta)$

$\tan^2\theta-1-\tan^2\theta$

-1

15) $\csc^2\theta-1$

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

$\cot^2\theta$

16) $\sqrt{1-\sec^2\theta}$

$\sqrt{1-(1+\tan^2\theta)}$

$\sqrt{1-1-\tan^2\theta}$

$\sqrt{-\tan^2\theta}$

UNDEFINED

Part 4: Putting Them Together

For each expression below, simplify using any of the basic trig identities.

17) $\dfrac{1}{1-\cos^2\theta}$

$\dfrac{1}{\sin^2\theta}$

$\csc^2\theta$

18) $\dfrac{1}{\sec^2\theta}+\dfrac{1}{\csc^2\theta}$

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

1

19) $\dfrac{1+\tan^2\theta}{1+\cot^2\theta}$

$\dfrac{\sec^2\theta}{\csc^2\theta}$

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

$\dfrac{\sin^2\theta}{\cos^2\theta}$

$\tan^2\theta$

20) $\tan\theta\cdot(\csc^2\theta-1)$

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

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

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

$\dfrac{\cos\theta}{\sin\theta}=\cot\theta$