Trigonometric Identity Review

Simplify the following expressions:

1. $\cos(x) + \tan(x) \bullet \sin(x)$

2. $\cos^2(x)\left(1 + \tan^2(x)\right)$

3. $\dfrac{\cot(\theta) \bullet \sec(\theta)}{\csc(\theta)}$

4. $\dfrac{\tan(x) + \cot(x)}{\csc(x)}$

5. Verify the following identities:

a. $\dfrac{\cos^2 x - \tan^2 x}{\sin^2 x} = \cot^2 x - \sec^2 x$

b. $\dfrac{\cot x \sec x}{\csc x} = 1$

c. $9\sec^2\theta - 5\tan^2\theta = 5 + 4\sec^2\theta$

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

e. $\tan\left(\dfrac{\pi}{4} + \Omega\right) = \dfrac{1 + \tan\Omega}{1 - \tan\Omega}$

f. $(\cot\alpha + \tan\alpha)^2 = \csc^2\alpha + \sec^2\alpha$

6. Find the exact value for each after sketching a reference triangle:

a) $\cos 165°$

b) $\tan 285°$

7. If $\cos x = -\dfrac{12}{13}$ in quadrant III, find the y-value in the unit circle. Then determine the value of the $\sin 2\theta$.

For #'s 8-13, find the exact value of the expression. Do not use a calculator unless you are checking your answer.

8. $\sin 5^\circ \cos 55^\circ + \cos 5^\circ \sin 55^\circ$

9. $2\cos^2 22.5 - 1$

10. $\dfrac{\tan 53^\circ - \tan 23^\circ}{1 + \tan 53^\circ \tan 23^\circ}$

11. $\sin(105^\circ)$

12. $\cos(\dfrac{7\pi}{12})$

13. $\tan(\dfrac{7\pi}{16})$

Verify the following identities.

14. $(\cos(\theta) - \sin(\theta))^2 = 1 - \sin(2\theta)$

15. $\csc(2\theta) = \dfrac{\cot(\theta) + \tan(\theta)}{2}$

16. $\sin(4\theta) = 4\sin(\theta)\cos^3(\theta) - 4\sin^3(\theta)\cos(\theta)$

Flash back

17. What is the period of the tangent and cotangent functions? If a tangent function has a period of $\frac{2\pi}{7}$, what is the b-value? Show work necessary to find this value.

18.

Covert the given measurement into radians, degrees, and revolutions.

a. $\frac{35\pi}{6}$

b. $645°$

c. $1050°$

d. $-\frac{2\pi}{9}$

19. Sketch the reference triangle, then

Find the exact value of each trigonometric function.

a. $\cos \frac{10\pi}{3}$

b. $\sec \frac{9\pi}{2}$

c. $\tan -3\pi$

d. $\sec -\frac{17\pi}{4}$

20.

Solve each equation for $0 \le \theta < 2\pi$.
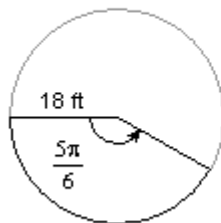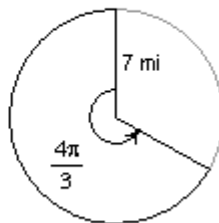
a. $0 = 2 + \csc \theta$

b. $-3 = -2 - \cot \theta$

c. $2 + 3\csc \theta = -4$

d. $2 + 4\sin \theta = 4$

21.

Find the area of each sector. Round your answers to the nearest tenth.

a.

18 ft

$\dfrac{5\pi}{6}$

b.

7 mi

$\dfrac{4\pi}{3}$

22.

Show using any strategy that the two angles are coterminal.

a. $40°$ and $19{,}120°$

b. $-200°$ and $40120°$

c. $-120°$ and $22{,}700°$

d. $\dfrac{\pi}{3}$ and $\dfrac{73\pi}{3}$