CHAPTER 14

Practice Test

State the vertical shift, amplitude, period, and phase shift of each function. Then graph the function.

1. $y = \frac{2}{3}\sin 2\theta + 5$
2. $y = 4\cos\left[\frac{1}{2}(\theta + 30°)\right] - 1$
3. $y = 7\cos\left[4\left(\theta + \frac{\pi}{6}\right)\right]$
4. **AUTOMOTIVE** The pistons in a car oscillate according to a sine function. The amplitude of the oscillation is 2, the period is 6π, and the phase shift is $\frac{\pi}{2}$ to the left. Write a formula to model the position of the piston, p, at time t seconds. Graph the equation.

Find the value of each expression.

5. $\tan\theta$, if $\sin\theta = \frac{1}{2}$; $90° < \theta < 180°$
6. $\sec\theta$, if $\cot\theta = \frac{3}{4}$; $180° < \theta < 270°$
7. $\csc\theta$, if $\sec\theta = \frac{\sqrt{5}}{2}$; $270° < \theta < 360°$

Verify that each of the following is an identity.

8. $(\sin\theta - \cos\theta)^2 = 1 - \sin 2\theta$
9. $\frac{\cos\theta}{1 - \sin^2\theta} = \sec\theta$
10. $\frac{\sec\theta}{\sin\theta} - \frac{\sin\theta}{\cos\theta} = \cot\theta$
11. $\frac{1 + \tan^2\theta}{\cos^2\theta} = \sec^4\theta$
12. **RACING** Race tracks are designed based on the average car velocity so that the angle of the track prevents sliding in the curves. The equation for the banking angle is $\tan\theta = \frac{v^2}{gr}$ where v is velocity, g is gravity, and r is the radius of the curve. Write an equivalent expression using $\sec\theta$ and $\csc\theta$.

Find the exact value of each expression.

13. $\cos 165°$
14. $\sin 255°$
15. $\sin(-225°)$
16. $\cos 480°$
17. $\cos 67.5°$
18. $\sin 75°$

Solve each equation for all values of θ if θ is measured in degrees.

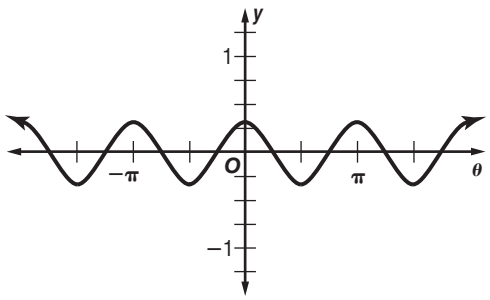
19. $\sec\theta = 1 + \tan\theta$
20. $\cos 2\theta = \cos\theta$
21. $\cos 2\theta + \sin\theta = 1$
22. $\sin\theta = \tan\theta$

GOLF For Exercises 23 and 24, use the following information.

A golf ball leaves the club with an initial velocity of 100 feet per second. The distance the ball travels is found by the formula $d = \frac{{v_0}^2}{g}\sin 2\theta$, where v_0 is the initial velocity, g is the acceleration due to gravity, and θ is the measurement of the angle that the path of the ball makes with the ground. The acceleration due to gravity is 32 feet per second squared.

23. Find the distance that the ball travels if the angle between the path of the ball and the ground measures 60°.
24. If a ball travels 312.5 feet, what was the angle the path of the ball made with the ground to the nearest degree?

25. **MULTIPLE CHOICE** Identify the equation of the graphed function.



A $y = 3\cos 2\theta$
C $y = 3\cos\frac{1}{2}\theta$
B $y = \frac{1}{3}\cos 2\theta$
D $y = \frac{1}{3}\cos\frac{1}{2}\theta$