Name _____ Date _____

LESSON 13.4

Practice B

For use with pages 874–880

Evaluate the expression without using a calculator. Give your answer in both radians and degrees.

1. $\cos^{-1}(-1)$ π, 180°
2. $\tan^{-1}\frac{\sqrt{3}}{3}$ $\frac{\pi}{6}$, 30°
3. $\sin^{-1}0$ 0π, 0°
4. $\sin^{-1}\left(-\frac{\sqrt{2}}{2}\right)$ $-\frac{\pi}{4}$, −45°
5. $\tan^{-1}1$ $\frac{\pi}{4}$, 45°
6. $\cos^{-1}2$ undefined

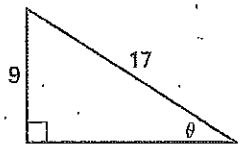
Use a calculator to evaluate the expression in both radians and degrees.

7. $\tan^{-1}(-1.7)$ −1.04, −59.5°
8. $\cos^{-1}0.24$ 1.33, 76.1°
9. $\sin^{-1}0.85$ 1.02, 58.2°
10. $\tan^{-1}(4.1)$ 1.33, 76.3°
11. $\sin^{-1}(-0.99)$ −1.43, −81.9°
12. $\cos^{-1}(-0.1)$ 1.67, 95.7°

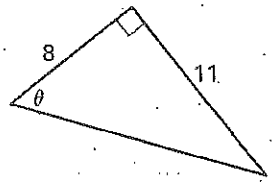
Solve the equation for θ.

13. $\sin\theta = -0.71;\ 270° < \theta < 360°$ 314.8°
14. $\tan\theta = 1.6;\ 180° < \theta < 270°$ 238°
15. $\cos\theta = 0.22;\ 270° < \theta < 360°$ 282.7°
16. $\cos\theta = -0.22;\ 180° < \theta < 270°$ 257.3°

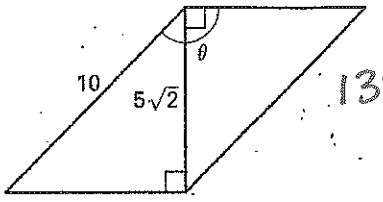
Find the measure of the angle θ.

17. 

32°

18. 

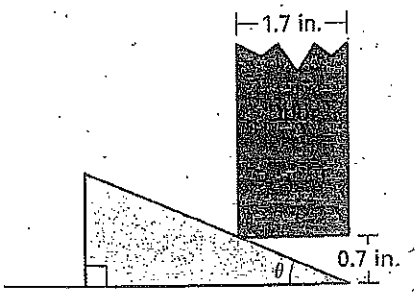
54°

19. 

135°

20. **Carpentry** You are making a door stopper from a block of wood. When the door rests against the stopper, you want the corner of the stopper to extend through the width of the door. If the bottom of the 1.7-inch wide door is 0.7 inch off the ground, what is the angle θ of the door stopper?

≈ 22.4°



21. **Flight** A falcon perched at a height of 100 feet descends straight toward a prey that is 125 feet away. At what angle does it descend? If the falcon ascends along the same path as it descended, at what angle does it ascend?

≈ 36.9°, ≈ 53.1°

Practice Level C

1. $\sin\theta = \frac{8}{17}, \cos\theta = -\frac{15}{17}, \sec\theta = -\frac{17}{15}, \csc\theta = \frac{17}{8}, \cot\theta = -\frac{15}{8}$ **2.** $\sin\theta = -\frac{4}{5}, \cos\theta = -\frac{3}{5}, \tan\theta = \frac{4}{3}, \sec\theta = -\frac{5}{3}, \cot\theta = \frac{3}{4}$

3. $\sin\theta = \frac{6\sqrt{37}}{37}, \tan\theta = 6, \sec\theta = \sqrt{37}, \csc\theta = \frac{\sqrt{37}}{6}, \cot\theta = \frac{1}{6}$ **4.** $\cos\theta = -\frac{\sqrt{3}}{2}, \tan\theta = -\frac{\sqrt{3}}{3}, \sec\theta = -\frac{2\sqrt{3}}{3}, \csc\theta = 2, \cot\theta = -\sqrt{3}$ **5.** 1 **6.** $\cos x$ **7.** $\cot^2 x$ **8.** $\sin^2 x$ **9.** $-\sec x \csc x$ **10.** $\cos^2 x$

11. $2\sec^2 x - \sec^2 x \sin^2 x - \sin^2 x - \cos^2 x =$
$2\sec^2 x(1 - \sin^2 x) - (\sin^2 x + \cos^2 x) =$
$2\sec^2 x \cos^2 x - 1 = \frac{2\cos^2 x}{\cos^2 x} - 1 = 2 - 1 = 1$

12. $\frac{1 + \sec(-x)}{\sin(-x) + \tan(-x)} = \frac{1 + \sec x}{-\sin x - \tan x} =$
$\frac{1 + \frac{1}{\cos x}}{-\sin x - \frac{\sin x}{\cos x}} = \frac{\cos x + 1}{-\sin x \cos x - \sin x} =$
$\frac{\cos x + 1}{-\sin x(\cos x + \sin x)} = \frac{1}{-\sin x} = -\csc x$

13. $2 + \cos^2 x - 3\cos^4 x =$
$(2 + 3\cos^2 x)(1 - \cos^2 x) =$
$(2 + 3\cos^2 x)(\sin^2 x) = \sin^2 x(2 + 3\cos^2 x)$

14. $\frac{\tan^3 x - 1}{\tan x - 1} = \frac{(\tan x - 1)(\tan^2 x + \tan x + 1)}{\tan x - 1} =$
$\tan^2 x + \tan x + 1$ **15.** $\sec x + \tan x =$
$\frac{1}{\cos x} + \frac{\sin x}{\cos x} = \frac{1 + \sin x}{\cos x} = \frac{1 + \sin x}{\cos x} \cdot \frac{1 - \sin x}{1 - \sin x} =$
$\frac{1 - \sin^2 x}{\cos x(1 - \sin x)} = \frac{\cos^2 x}{\cos x(1 - \sin x)} = \frac{\cos x}{1 - \sin x}$

16. $\sec^2 x + \csc^2 x = \frac{1}{\cos^2 x} + \frac{1}{\sin^2 x} =$
$\frac{\sin^2 x + \cos^2 x}{\sin^2 x \cos^2 x} = \frac{1}{\sin^2 x \cos^2 x} = \csc^2 x \sec^2 x$

17. *Sample answer:* Because (x, y) is on a circle centered at the origin with a radius 1, $x^2 + y^2 = 1$. From Lesson 13.3, we know $\sin\theta = x$ and $\cos\theta = y$. So, $\sin^2\theta + \cos^2\theta = 1$.

18. *Sample answer:* $x = \frac{3\pi}{2}$

19. *Sample answer:* $x = \frac{3\pi}{4}$

1. $\frac{\pi}{3} + 2n\pi, \frac{5\pi}{3} + 2n\pi$ **2.** $\frac{\pi}{6} + n\pi, \frac{5\pi}{6} + n\pi$

3. $\frac{\pi}{6} + 2n\pi, \frac{5\pi}{6} + 2n\pi$ **4.** $\frac{\pi}{4} + n\pi$

5. $\frac{\pi}{3} + 2n\pi, \frac{2\pi}{3} + 2n\pi, \frac{4\pi}{3} + 2n\pi, \frac{5\pi}{3} + 2n\pi$

6. $\frac{\pi}{6} + 2n\pi, \frac{5\pi}{6} + 2n\pi, \frac{3\pi}{2} + 2n\pi$ **7.** $\frac{\pi}{3}, \frac{2\pi}{3}$

8. $\frac{\pi}{3}, \frac{5\pi}{3}, \pi$ **9.** $0, \pi, \frac{\pi}{6}, \frac{11\pi}{6}$

10. $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$ **11.** $\left(\frac{\pi}{2}, 1\right)$ **12.** $(0,1), (\pi, 1)$

13. $\left(\frac{\pi}{6}, \frac{8}{3}\right), \left(\frac{5\pi}{6}, \frac{8}{3}\right), \left(\frac{7\pi}{6}, \frac{8}{3}\right), \left(\frac{11\pi}{6}, \frac{8}{3}\right)$

14. There are no intersection points.

15. High tides of 8 feet occur at 6:00 A.M. and 6:00 P.M., low tides of 2 feet occur at 12:00 A.M. and 12:00 P.M.

16. a. $\left(\frac{3\sqrt{3}}{2} - \frac{1}{2}, \frac{3}{2} + \frac{\sqrt{3}}{2}\right)$ **b.** $\frac{\pi}{4}$

Practice Level C

1. $y = 6\sin\frac{1}{4}x$ **2.** $y = 4\cos 2x$

3. $y = -5\cos 3x$ **4.** $y = \frac{1}{2}\sin \pi x + 2$

5. $y = 2\cos 2\pi x - 1$ **6.** $y = -\sin\frac{\pi x}{2} + 3$

7. $y = 4\cos 2x$ **8.** $y = -2\cos 4\pi x$

9. $y = 2\cos\frac{1}{3}x + 1$ **10.** $y = 3\sin\frac{1}{2}x$

11. $y = -5\sin x$ **12.** $y = \frac{3}{2}\sin 2\pi x - \frac{3}{2}$

13. a. $T = 2.46\sin(0.47t + 1.40) + 13.6$
b. $T = 2.46\cos(0.47(t - 0.36)) + 13.6$