

## 7.7 EXERCISES

In Problems 1–24, solve each equation on the interval  $0 \leq \theta < 2\pi$ .

1.  $\sin \theta = \frac{1}{2}$

2.  $\tan \theta = 1$

3.  $\tan \theta = -\frac{\sqrt{3}}{3}$

4.  $\cos \theta = -\frac{\sqrt{3}}{2}$

5.  $\cos \theta = 0$

6.  $\sin \theta = \frac{\sqrt{2}}{2}$

7.  $\sin(3\theta) = -1$

8.  $\tan \frac{\theta}{2} = \sqrt{3}$

9.  $\cos(2\theta) = -\frac{1}{2}$

10.  $\tan(2\theta) = -1$

11.  $\sec \frac{3\theta}{2} = -2$

12.  $\cot \frac{2\theta}{3} = -\sqrt{3}$

13.  $\cos\left(2\theta - \frac{\pi}{2}\right) = -1$

14.  $\sin\left(3\theta + \frac{\pi}{18}\right) = 1$

15.  $\tan\left(\frac{\theta}{2} + \frac{\pi}{3}\right) = 1$

16.  $\cos\left(\frac{\theta}{3} - \frac{\pi}{4}\right) = \frac{1}{2}$

17.  $2 \sin \theta + 1 = 0$

18.  $\cos \theta + 1 = 0$

19.  $\tan \theta + 1 = 0$

20.  $\sqrt{3} \cot \theta + 1 = 0$

21.  $4 \sec \theta + 6 = -2$

22.  $5 \csc \theta - 3 = 2$

23.  $3\sqrt{2} \cos \theta + 2 = -1$

24.  $4 \sin \theta + 3\sqrt{3} = 0$

In Problems 25–32, use a calculator to solve each equation on the interval  $0 \leq \theta < 2\pi$ . Round answers to two decimal places.

25.  $\sin \theta = 0.4$

26.  $\cos \theta = 0.6$

27.  $\tan \theta = 5$

28.  $\cot \theta = 2$

29.  $\cos \theta = -0.9$

30.  $\sin \theta = -0.2$

31.  $\sec \theta = -4$

32.  $\csc \theta = -3$

The following discussion of **Snell's Law of Refraction** (named after Willebrord Snell, 1580–1626) is needed for Problems 33–36. Light, sound, and other waves travel at different speeds, depending on the media (air, water, wood, and so on) through which they pass. Suppose that light travels from a point A in one medium, where its speed is  $v_1$ , to a point B in another medium, where its speed is  $v_2$ . Refer to the figure, where the angle  $\theta_1$  is called the **angle of incidence** and the angle  $\theta_2$  is the **angle of refraction**. Snell's Law, which can be proved using calculus, states that

$$\frac{\sin \theta_1}{\sin \theta_2} = \frac{v_1}{v_2}$$

The ratio  $v_1/v_2$  is called the **index of refraction**. Some values are given in the following table.