Using the approximation $\sqrt{3} = 1.7321$, we arrive at the following decimal approximations for $\sin \theta$:

$$\sin \theta = \frac{-1 + 1.7321}{2} \qquad \text{or} \qquad \sin \theta = \frac{-1 - 1.7321}{2}$$

$$\sin \theta = 0.3661 \qquad \text{or} \qquad \sin \theta = -1.3661$$

We will not obtain any solutions from the second expression, $\sin \theta = -1.3661$, since $\sin \theta$ must be between -1 and 1. For $\sin \theta = 0.3661$, we use a calculator to find the angle whose sine is nearest to 0.3661. That angle is $21.5°$, and it is the reference angle for θ. Since $\sin \theta$ is positive, θ must terminate in quadrant I or II (Figure 8). Therefore,

$$\theta = 21.5° \qquad \text{or} \qquad \theta = 180° - 21.5° = 158.5°$$

Figure 8

GETTING READY FOR CLASS

After reading through the preceding section, respond in your own words and in complete sentences.

a. State the multiplication property of equality.

b. What is the solution set for an equation?

c. How many solutions between $0°$ and $360°$ does the equation $2 \sin x - 1 = 0$ contain?

d. Under what condition is factoring part of the process of solving an equation?

PROBLEM SET 6.1

Solve each equation for θ if $0° \le \theta < 360°$. Do not use a calculator.

1. $2 \sin \theta = 1$
2. $2 \cos \theta = 1$
3. $2 \cos \theta - \sqrt{3} = 0$
4. $2 \cos \theta + \sqrt{3} = 0$
5. $2 \tan \theta + 2 = 0$
6. $\sqrt{3} \cot \theta - 1 = 0$

Solve each equation for t if $0 \le t < 2\pi$. Give all answers as exact values in radians. Do not use a calculator.

7. $4 \sin t - \sqrt{3} = 2 \sin t$
8. $\sqrt{3} + 5 \sin t = 3 \sin t$
9. $2 \cos t = 6 \cos t - \sqrt{12}$
10. $5 \cos t + \sqrt{12} = \cos t$
11. $3 \sin t + 5 = -2 \sin t$
12. $3 \sin t + 4 = 4$

Find all solutions in the interval $0° \le \theta < 360°$. Use a calculator on the last step and write all answers to the nearest tenth of a degree.

13. $4 \sin \theta - 3 = 0$
14. $4 \sin \theta + 3 = 0$
15. $2 \cos \theta - 5 = 3 \cos \theta - 2$
16. $4 \cos \theta - 1 = 3 \cos \theta + 4$
17. $\sin \theta - 3 = 5 \sin \theta$
18. $\sin \theta - 4 = -2 \sin \theta$

Solve for x, if $0 \le x < 2\pi$. Write your answers in exact values only.

19. $(\sin x - 1)(2 \sin x - 1) = 0$
20. $(\cos x - 1)(2 \cos x - 1) = 0$
21. $\tan x (\tan x - 1) = 0$
22. $\tan x (\tan x + 1) = 0$
23. $\sin x + 2 \sin x \cos x = 0$
24. $\cos x - 2 \sin x \cos x = 0$
25. $2 \sin^2 x - \sin x - 1 = 0$
26. $2 \cos^2 x + \cos x - 1 = 0$