

## 5.1 Graphs of Sine, Cosine, and Tangent Functions

BLM 5-2

1. Write an equation for each function and sketch a graph for each function on the interval  $x \in [-2\pi, 2\pi]$ .
  - a) cosine function with an amplitude of 3
  - b) sine function with an amplitude of  $\frac{1}{2}$   
reflected in the  $x$ -axis
  - c) sine function with a phase shift  
of  $+\frac{5\pi}{4}$
  - d) cosine function with a phase shift  
of  $-\frac{2\pi}{3}$
  - e) sine function with a period of  $\pi$
  - f) cosine function with a period of  $\frac{\pi}{2}$
2. A sine function has an amplitude of 2, is reflected in the  $x$ -axis, and has a period of  $\frac{3\pi}{2}$ .
  - a) Write an equation of the function in the form  $y = a \sin kx$ .
  - b) Graph the function over two cycles.
3. A sine function has a maximum value of 5 and a minimum value of  $-1$ .
  - a) Determine the amplitude of the function.
  - b) Determine the vertical translation of the function.
  - c) Graph the function over two cycles.
4. One cycle of a cosine function begins at  $x = -\frac{\pi}{4}$  and ends at  $x = \frac{7\pi}{4}$ .
  - a) Determine the period of the function.
  - b) Determine the phase shift of the function.
  - c) Write the equation of the function in the form  $y = \cos[k(x - d)]$ .
  - d) Graph the function over two cycles.
5. A cosine function that has a maximum of 12 and a minimum of  $-4$ .
  - a) Determine the amplitude of the function.
  - b) Determine the vertical translation of the function.
  - c) Graph the function over two cycles.
6. **Use Technology** Using a graphing calculator to graph  $y = \sin x$  and  $y = \cos x$  on the same set of axes for  $0 \leq x \leq 2\pi$ . Round each answer to two decimal places.
  - a) For what value(s) of  $x$  is  $\sin x < \cos x$ .
  - b) For what value(s) of  $x$  is  $\sin x > \cos x$ .
  - c) For what value(s) of  $x$  is  $\sin x = \cos x$ .
7.
  - a) Is the function  $y = -2 \cos x + 3$  even, odd, or neither? Justify your answer.
  - b) Is the function  $y = \sin\left[\frac{1}{2}(x - 2)\right]$   
even, odd, or neither? Justify your answer.
  - c) Is the function  $y = \frac{1}{4} \sin x$  even, odd, or neither? Justify your answer.
8.
  - a) If  $(k, 1)$  is a point on the graph of  $y = 2 \sin\left(x - \frac{\pi}{6}\right)$ , find a possible value for  $k$ .
  - b) Is there any other possible value(s) for  $k$ ? Explain.