

In Problems 47–58, graph each function. Each graph should contain at least one period.

47. $y = 2 \sin(4x)$

49. $y = -2 \cos\left(x + \frac{\pi}{2}\right)$

51. $y = \tan(x + \pi)$

53. $y = -2 \tan(3x)$

55. $y = \cot\left(x + \frac{\pi}{4}\right)$

57. $y = \sec\left(x - \frac{\pi}{4}\right)$

In Problems 59–62, determine the amplitude and period of each function without graphing.

59. $y = 4 \cos x$

60. $y = \sin(2x)$

61. $y = -8 \sin\left(\frac{\pi}{2}x\right)$

In Problems 63–70, find the amplitude, period, and phase shift of each function. Graph each function. Show at least one period.

63. $y = 4 \sin(3x)$

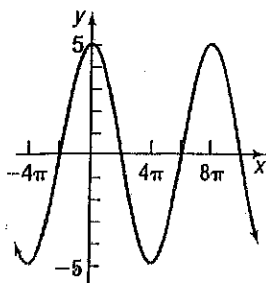
65. $y = 2 \sin(2x - \pi)$

67. $y = \frac{1}{2} \sin\left(\frac{3}{2}x - \pi\right)$

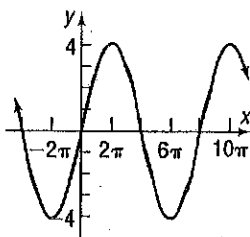
69. $y = -\frac{2}{3} \cos(\pi x - 6)$

In Problems 71–74, find a function whose graph is given.

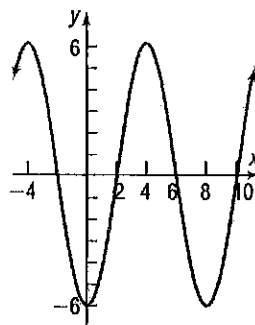
71.



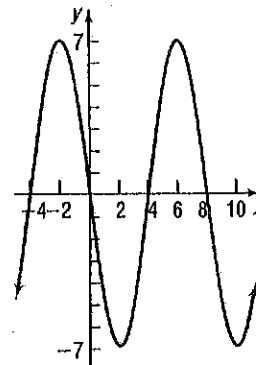
72.



73.



74.



91. **Monthly Temperature** The following data represent the average monthly temperatures for Phoenix, Arizona.

Month, m	Average Monthly Temperature, T
January, 1	51
February, 2	55
March, 3	63
April, 4	67
May, 5	77
June, 6	86
July, 7	90
August, 8	90
September, 9	84
October, 10	71
November, 11	59
December, 12	52

- Use a graphing utility to draw a scatter diagram of the data for one period.
- By hand, find a sinusoidal function of the form $y = A \sin(\omega x - \phi) + B$ that fits the data.
- Draw the sinusoidal function found in part (b) on the scatter diagram.
- Use a graphing utility to find the sinusoidal function of best fit.
- Graph the sinusoidal function of best fit on the scatter diagram.

93. **Hours of Daylight** According to the *Old Farmer's Almanac*, in Las Vegas, Nevada, the number of hours of sunlight on the summer solstice is 13.367 and the number of hours of sunlight on the winter solstice is 9.667.

(a) Find a sinusoidal function of the form

$$y = A \sin(\omega x - \phi) + B$$

that fits the data.

- (b) Draw a graph of the function found in part (a).
(c) Use the function found in part (a) to predict the number of hours of sunlight on April 1, the 91st day of the year.
(d) Look up the number of hours of sunlight for April 1 in the *Old Farmer's Almanac* and compare the actual hours of daylight to the results found in part (c).

Chapter Test **444** **CHAPTER 5** **Trigonometric Functions**

In Problems 25 and 26, graph the function by hand.

25. $y = 2 \sin\left(x - \frac{\pi}{6}\right)$

26. $y = \tan\left(-x + \frac{\pi}{4}\right) + 2$

27. Write an equation for a sinusoidal graph with the following properties:

$$A = -3 \quad \text{period} = \frac{2\pi}{3} \quad \text{phase shift} = -\frac{\pi}{4}$$