1. One period of a sine or cosine function is called one _____ of the sine or cosine curve.
2. The _____ of a sine or cosine curve represents half the distance between the maximum and minimum values of the function.
3. For the function $y = a\sin(bx - c)$, $\frac{c}{b}$ represents the _____ _____ of the graph of the function.
4. For the function $y = d + a\cos(bx - c)$, d represents a _____ _____ of the graph of the function.

Finding the Period and Amplitude **In Exercises 5–18, find the period and amplitude.**

5. $y = 2\sin 5x$
6. $y = 3\cos 2x$
7. $y = \frac{3}{4}\cos\frac{x}{2}$
9. $y = \frac{1}{2}\sin\frac{\pi x}{3}$

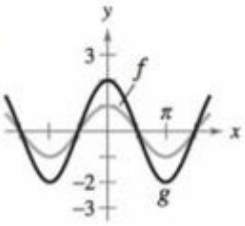
Finding the Period and Amplitude **In Exercises 5–18, find the period and amplitude.**

5. $y = 2\sin 5x$ 6. $y = 3\cos 2x$ 7. $y = \frac{3}{4}\cos\frac{x}{2}$
9. $y = \frac{1}{2}\sin\frac{\pi x}{3}$ 17. $y = \frac{1}{4}\sin 2\pi x$

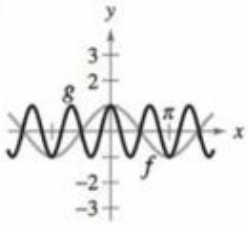
Describing the Relationship Between Graphs **In Exercises 19–30, describe the relationship between the graphs of f and g. Consider amplitude, period, and shifts.**

19. $f(x) = \sin x$, $g(x) = \sin(x - \pi)$
21. $f(x) = \cos 2x$, $g(x) = -\cos 2x$
22. $f(x) = \sin 3x$, $g(x) = \sin(-3x)$
23. $f(x) = \cos x$, $g(x) = \cos 2x$
25. $f(x) = \sin 2x$, $g(x) = 3 + \sin 2x$

27.



28.



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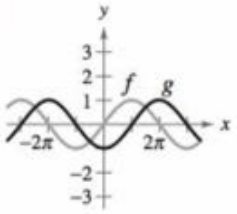

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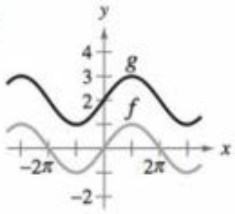
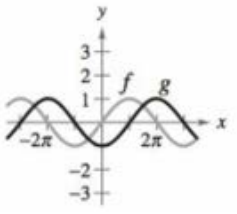


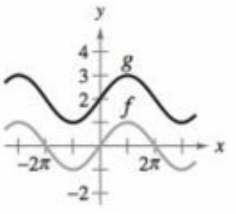
Sketching Graphs of Sine or Cosine Functions **In Exercises 31–38, sketch the graphs of f and g in the same coordinate plane. (Include two full periods.)**

31. $f(x) = -2\sin x$, $g(x) = 4\sin x$
32. $f(x) = \sin x$, $g(x) = \sin\frac{x}{3}$
33. $f(x) = \cos x$, $g(x) = 2 + \cos x$

29.



30.



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33. $f(x) = \cos x$, $g(x) = 2 + \cos x$

37. $f(x) = 2\cos x$, $g(x) = 2\cos(x + \pi)$

Sketching the Graph of a Sine or Cosine Function **In Exercises 39–60, sketch the graph of the function. (Include two full periods.)**

48. $y = -10\cos\frac{\pi x}{6}$
54. $y = -3 + 5\cos\frac{\pi t}{12}$
58. $y = -3\cos(6x + \pi)$
59. $y = \frac{2}{3}\cos\left(\frac{x}{2} - \frac{\pi}{4}\right)$

Describing a Transformation **In Exercises 61–66, g is related to a parent function $f(x) = \sin(x)$ or $f(x) = \cos(x)$. (a) Describe the sequence of transformations from f to g. (b) Sketch the graph of g. (c) Use function notation to write g in terms of f.**

62. $g(x) = \sin(2x + \pi)$

Graphing a Sine or Cosine Function **In Exercises 67–72, use a graphing utility to graph the function. (Include two full periods.) Be sure to choose an appropriate viewing window.**

68. $y = -4\sin\left(\frac{2}{3}x - \frac{\pi}{3}\right)$ **69.** $y = \cos\left(2\pi x - \frac{\pi}{2}\right) + 1$

Graphical Analysis **In Exercises 81 and 82, use a graphing utility to graph y_1 and y_2 in the interval $[-2\pi, 2\pi]$. Use the graphs to find real numbers x such that $y_1 = y_2$.**

82. $y_1 = \cos x$

$y_2 = -1$

Writing an Equation **In Exercises 83–86, write an equation for the function that is described by the given characteristics.**

84. A sine curve with a period of 4π, an amplitude of 3, a left phase shift of $\pi/4$, and a vertical translation down 1 unit

I typically give you a high and a low and expect you to figure the rest of it out.

89. Data Analysis: Meteorology The table shows the maximum daily high temperatures in Las Vegas L and International Falls I (in degrees Fahrenheit) for month t, with $t = 1$ corresponding to January. *(Source: National Climatic Data Center)*

DATA Spreadsheet at LarsonPrecalculus.com

Month, t	Las Vegas, L	International Falls, I
1	57.1	13.8
2	63.0	22.4
3	69.5	34.9
4	78.1	51.5
5	87.8	66.6
6	98.9	74.2
7	104.1	78.6
8	101.8	76.3
9	93.8	64.7
10	80.8	51.7
11	66.0	32.5
12	57.3	18.1

(a) A model for the temperatures in Las Vegas is

$$L(t) = 80.60 + 23.50\cos\left(\frac{\pi t}{6} - 3.67\right).$$

Find a trigonometric model for International Falls.

(b) Use a graphing utility to graph the data points and the model for the temperatures in Las Vegas. How well does the model fit the data?

(c) Use the graphing utility to graph the data points and the model for the temperatures in International Falls. How well does the model fit the data?

(d) Use the models to estimate the average maximum temperature in each city. Which term of the models did you use? Explain.