Graphs of Trigonometric Functions Creation of a Mural

ACTIVITY 34 continued

ACTIVITY 34 PRACTICE

Lesson 34-1

State whether each graph in Items 1–4 shows a periodic function. If periodic, give the period, amplitude, and the equation of the midline. If not periodic, explain why not.







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- **5.** How can you use the maximum and minimum *y*-values of a periodic function to find the equation of the midline?
- **6.** Draw the graph of a periodic function that has a period of 3, an amplitude of 2.5, and a midline of y = 0.5.

Lesson 34-2

Name the period and amplitude of each function. Graph at least one period of each on a separate coordinate plane.

7.
$$y = 4 \sin x$$
 8. $y = \frac{1}{4} \sin x$

9.
$$y = \sin 4x$$
 10. $y = \sin \frac{1}{4}$

11.
$$y = \frac{5}{2} \sin \frac{2}{5} x$$

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Refer to the graph below for Items 12-14.



- **12.** What is the period and amplitude of the graph?
- **13.** What is the equation of the function?
- **14.** What is the equation of a graph that is half as wide and twice as tall as the one shown?

Lesson 34-3

Name the period and amplitude of each function. Graph at least one period of each on a separate coordinate plane.

15.
$$y = 3 \cos x$$

16. $y = \frac{2}{3} \cos x$
17. $y = \cos 3x$
18. $y = \cos \frac{2}{3}x$

9.
$$y = \frac{3}{2}\cos\frac{1}{3}x$$

Refer to the graph below for Items 20-21.



- **20.** What is the period and amplitude of the graph?
- **21.** What is the equation of the function?

Suppose a graphic designer wanted to use the cosine function to create a mural. However, she wanted it to appear three times narrower than the parent cosine function. She was not sure whether to use the graph of $y = 3 \cos x$ or the graph of $y = \cos 3x$.

- **22.** Graph $y = \cos x$ and $y = 3 \cos x$ on the same coordinate axis. Compare and contrast the graphs of the two functions.
- **23.** Graph $y = \cos x$ and $y = \cos 3x$ on the same coordinate axis. Compare and contrast the graphs of the two functions
- **24.** Which equation results in a graph three times narrower than $y = \cos x$? Explain.

ACTIVITY 34 Continued

ACTIVITY PRACTICE

- **1.** It is a periodic function; period: 2; amplitude: N/A; midline: y = -1.
- It is not a periodic function because it does not repeat at regular intervals.
- **3.** It is a periodic function; period: 4; amplitude: 3; midline: *y* = 2.
- **4.** It is a periodic function; period: 2; amplitude: 4; midline: y = -2.
- y = the average of the maximum and minimum *y*-values.
- 6. Check students' graphs.
- **7.** period: 2π ; amplitude: 4; Check students' graphs.
- 8. period: 2π ; amplitude: $\frac{1}{4}$; Check students' graphs
- Check students' graphs. 9. period: $\frac{1}{2}\pi$; amplitude: 1; Check students' graphs.
- **10.** period: 8π ; amplitude: 1; Check students' graphs.
- **11.** period: 5π ; amplitude: $\frac{5}{2}$;
- Check students' graphs. **12.** period: 4π ; amplitude: 2
- **13.** $y = 2 \sin \frac{1}{2} x$
- **14.** $y = 4 \sin x$
- **15.** period: 2π ; amplitude: 3; Check students' graphs.
- **16.** period: 2π ; amplitude: $\frac{2}{3}$; Check students' graphs.
- **17.** period: $\frac{2}{3}\pi$; amplitude: 1; Check students' graphs.
- **18.** period: 3π ; amplitude: 1; Check students' graphs.
- **19.** period: 6π ; amplitude: $\frac{3}{2}$; Check students' graphs.
- Check students' graphs. **20.** period: $\frac{\pi}{2}$; amplitude: $\frac{1}{2}$
- **21.** $y = \frac{1}{2} \sin 4x$
- **22.** Check students' graphs; the amplitude of $y = 3 \cos x$ is 3. It is stretched vertically so it is 3 times taller.
- **23.** Check students' graphs; the period of $y = \cos 3x$ is $\frac{1}{3}\pi$. It is compressed horizontally so it is $\frac{1}{3}$ as wide.
- **24.** The graph of $y = \cos 3x$ is identical to $y = \cos x$ except that it is 3 times narrower. The graph of $y = 3 \cos x$ is relatively 3 times narrower because the height is stretched by a factor of 3 and the width stays the same.