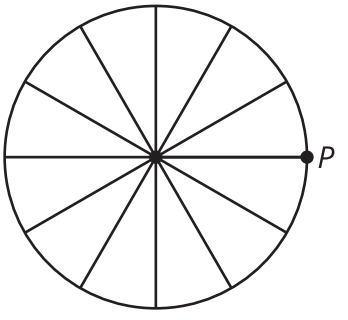
# Lesson 16 Practice Problems

1. A wheel rotates three times per second in a counterclockwise direction. The center of the wheel does not move.

   What angle does the point $P$ rotate through in one second?




   A. $\frac{2\pi}{3}$ radians

   B. $2\pi$ radians

   C. $3\pi$ radians

   D. $6\pi$ radians

2. A bicycle wheel is spinning in place. The vertical position of a point on the wheel, in inches, is described by the function $f(t) = 13.5\sin(5 \cdot 2\pi t) + 20$. Time $t$ is measured in seconds.

   a. What is the meaning of 13.5 in this context?

   b. What is the meaning of 5 in this context?

   c. What is the meaning of 20 in this context?

3. Each expression describes the vertical position, in feet off the ground, of a carriage on a Ferris wheel after $t$ minutes. Which function describes the largest Ferris wheel?

A. $100\sin\left(\frac{2\pi t}{20}\right)+110$

B. $100\sin\left(\frac{2\pi t}{30}\right)+110$

C. $200\sin\left(\frac{2\pi t}{30}\right)+210$

D. $250\sin\left(\frac{2\pi t}{20}\right)+260$

4. Which trigonometric function has period 5?

A. $f(x)=\sin\left(\frac{1}{5}x\right)$

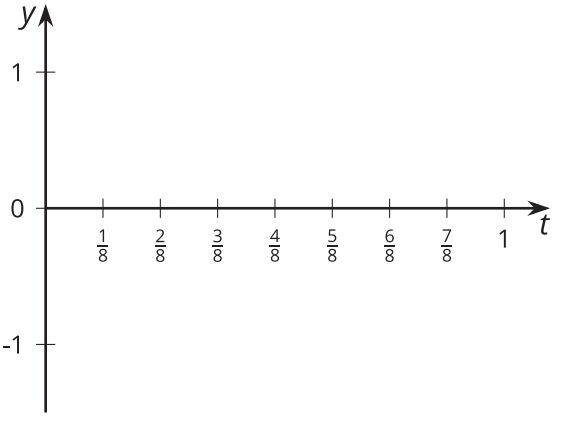
B. $f(x)=\sin(5x)$

C. $f(x)=\sin\left(\frac{5}{2\pi}x\right)$

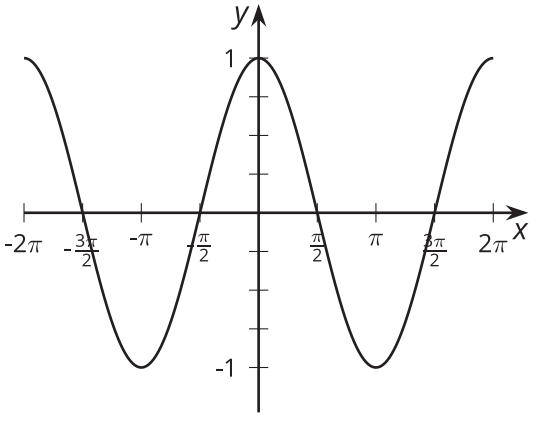
D. $f(x)=\sin\left(\frac{2\pi}{5}x\right)$

5. a. What is the period of the function $f$ given by $f(t)=\cos(4\pi t)$? Explain how you know.

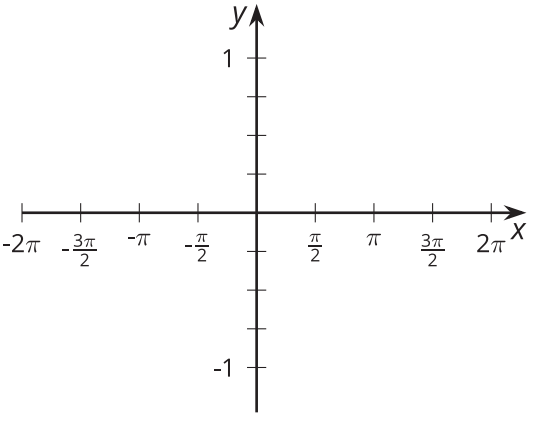
b. Sketch a graph of $f$.



6. Here is a graph of $y = \cos(x)$.




a. Sketch a graph of $\cos(2x)$.




b. How do the two graphs compare?

(From Unit 6, Lesson 15.)

7. Here is a table that shows the values of functions $f$, $g$, and $h$ for some values of $x$.

| $x$ | $f(x)$ | $g(x) = f(ax)$ | $h(x) = f(bx)$ |
|---|---|---|---|
| 0 | -125 | -125 | -125 |
| 3 | -8 | -64 | -42.875 |
| 6 | 1 | -27 | -8 |
| 9 | 64 | -8 | -0.125 |
| 12 | 343 | -1 | 1 |
| 15 | 1000 | 0 | 15.625 |
| 18 | 2197 | 1 | 64 |
| 21 | 4096 | 8 | 166.375 |

a. Use the table to determine the value of $a$ in the equation $g(x) = f(ax)$.

b. Use the table to determine the value of $b$ in the equation $h(x) = f(bx)$.

(From Unit 5, Lesson 9.)