### 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?
* 
	1. $\frac{2π}{3}$ radians
	2. $2π$ radians
	3. $3π$ radians
	4. $6π$ radians
1. A bicycle wheel is spinning in place. The vertical position of a point on the wheel, in inches, is described by the function $f(t)=13.5sin(5⋅2πt)+20$. Time $t$ is measured in seconds.
	1. What is the meaning of 13.5 in this context?
	2. What is the meaning of 5 in this context?
	3. What is the meaning of 20 in this context?
2. 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?
	1. $100sin\left(\frac{2πt}{20}\right)+110$
	2. $100sin\left(\frac{2πt}{30}\right)+110$
	3. $200sin\left(\frac{2πt}{30}\right)+210$
	4. $250sin\left(\frac{2πt}{20}\right)+260$
3. Which trigonometric function has period 5?
	1. $f(x)=sin\left(\frac{1}{5}x\right)$
	2. $f(x)=sin(5x)$
	3. $f(x)=sin\left(\frac{5}{2π}x\right)$
	4. $f(x)=sin\left(\frac{2π}{5}x\right)$
	5. What is the period of the function $f$ given by $f(t)=cos(4πt)$? Explain how you know.
	6. Sketch a graph of $f$.
* 
1. Here is a graph of $y=cos(x)$.
* 
	1. Sketch a graph of $cos(2x)$.
	+ 
	1. How do the two graphs compare?
* (From Unit 6, Lesson 15.)
1. 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
 |

* 1. Use the table to determine the value of $a$ in the equation $g(x)=f(ax)$.
	2. Use the table to determine the value of $b$ in the equation $h(x)=f(bx)$.
* (From Unit 5, Lesson 9.)



© CC BY 2019 by Illustrative Mathematics®