

Identify the frequency of each function.

1. $f(x) = 5 \sin(2x) - 1$
 period = $\frac{2\pi}{2} = \pi$

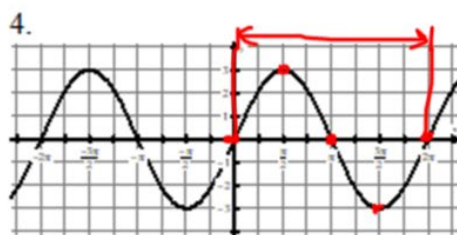
frequency = $\frac{1}{\pi}$

2. $g(x) = 4 \cos(3x) + 1$
 period = $\frac{2\pi}{3}$

frequency = $\left(\frac{2\pi}{3}\right)^{-1} = \frac{3}{2\pi}$

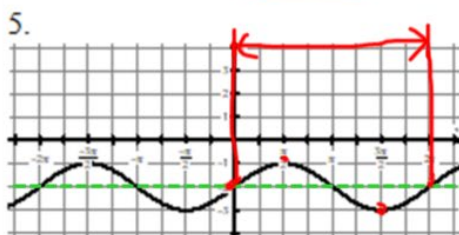
3. $y = -4 \sin\left(\frac{1}{2}x\right)$
 period = $\frac{2\pi}{\left(\frac{1}{2}\right)} = 2\pi\left(\frac{2}{1}\right) = 4\pi$

frequency = $\frac{1}{4\pi}$



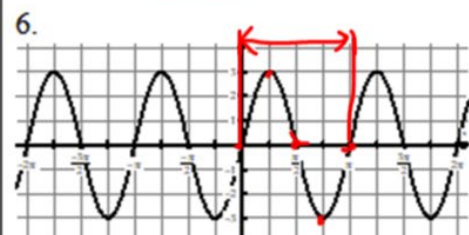
period = 2π

frequency = $\frac{1}{2\pi}$



period = 2π

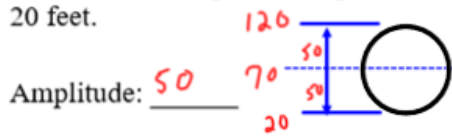
frequency = $\frac{1}{2\pi}$



period = π

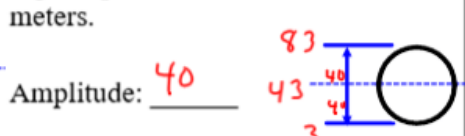
frequency = $\frac{1}{\pi}$

7. The maximum height of a person riding a Ferris Wheel is 120 feet and the minimum height of that person is 20 feet.



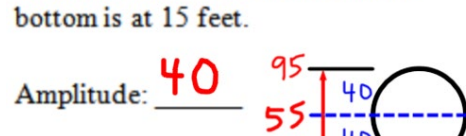
Midline: $y = 70$

8. Bob gets onto a Ferris at its lowest point of 3 meters. At his highest point of the ride, Bob is 83 meters.



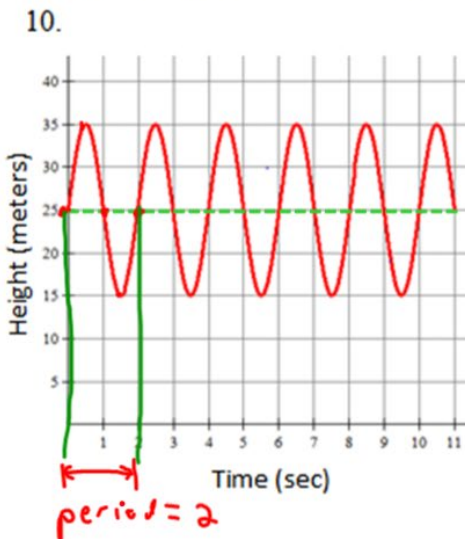
Midline: $y = 43$

9. The center of a Ferris Wheel is 55 feet off the ground. The top of the Ferris wheel is at 95 feet while the bottom is at 15 feet.



Midline: $y = 55$

The graph represents the height of a person on a Ferris Wheel over time. Answer the following.

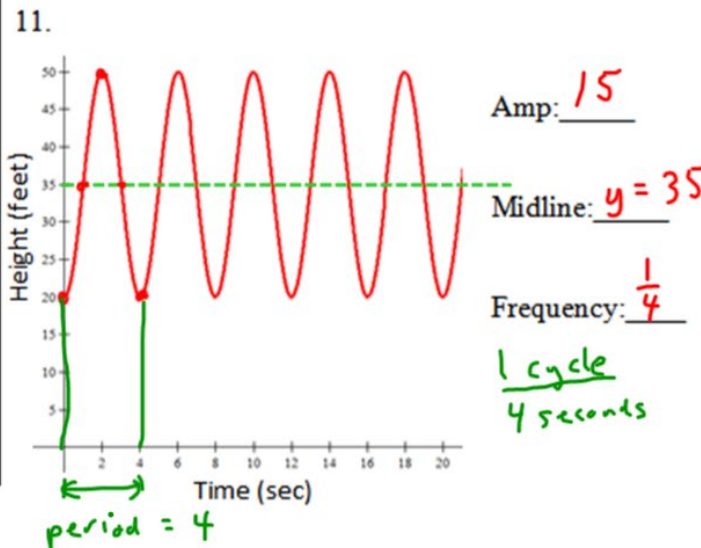


Amp: 10

Midline: $y = 25$

Frequency: $\frac{1}{2}$

1 cycle
2 seconds



Amp: 15

Midline: $y = 35$

Frequency: $\frac{1}{4}$

1 cycle
4 seconds

Use the situation to answer the following.

12. Juan's height on a Ferris Wheel is modeled by $h(t) = 25 \sin\left(\frac{\pi}{15}t\right) + 50$ where t is time in seconds and h is Juan's height in feet.

a. Find $h(2)$. Use a sentence to explain what it means in this context.

$$\frac{25 \sin(\pi/15 \times 2) + 50}{60.168416}$$

At 2 seconds, Juan's height will be 60.168 feet.

b. Find the y -intercept. Use a sentence to explain what it means in this context.

$$\frac{25 \sin(\pi/15 \times 0) + 50}{50}$$

At 0 seconds, Juan's height will be 50 feet. which means Juan starts 50 feet in the air.

c. Find the frequency. Use a sentence to explain what it means in this context.

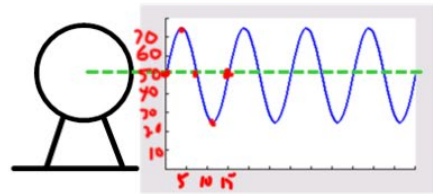
period = $\frac{2\pi}{\left(\frac{\pi}{15}\right)} = 2 \times \left(\frac{15}{1}\right) = 30$ frequency = $\frac{1}{30}$ Juan does one complete trip around the Ferris Wheel in 30 seconds.

d. What is Juan's maximum height?

$$h(t) = 25 \sin\left(\frac{\pi}{15}t\right) + 50$$

amplitude = 25
midline = $y = 50$

$\frac{25}{+50}$
75 feet



13. Breanna's height on a Ferris Wheel is modeled by $h(t) = -10 \cos\left(\frac{2\pi}{45}t\right) + 25$ where t is time in seconds and h is Breanna's height in meters.

a. Find $h(2)$. Use a sentence to explain what it means in this context.

$$\frac{-10 \cos\left(\frac{2\pi}{45} \times 2\right) + 25}{15.38738304}$$

At 2 seconds, Breanna's height will be 15.387 meters.

b. Find the y -intercept. Use a sentence to explain what it means in this context.

$$\frac{-10 \cos\left(\frac{2\pi}{45} \times 0\right) + 25}{15}$$

At 0 seconds, Breanna's height will be 15 meters. which means Breanna starts 15 meters in the air.

c. Find the frequency. Use a sentence to explain what it means in this context.

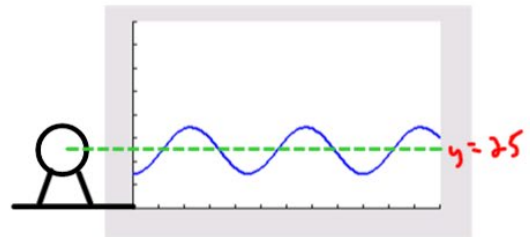
period = $\frac{2\pi}{\left(\frac{2\pi}{45}\right)} = 2 \times \left(\frac{45}{1}\right) = 45$ frequency = $\frac{1}{45}$ Breanna does one complete trip around Ferris Wheel in 30 seconds.

d. How far off the ground is the center of the Ferris Wheel?

$$h(t) = -10 \cos\left(\frac{2\pi}{45}t\right) + 25$$

midline: $y = 25$

25 meters



14. The depth at a local fishing dock changes throughout the day because of tides. The equation

$$d(t) = 6 \cos\left(\frac{2}{3}\pi t - \pi\right) + 10$$

models the depth of the water d , in feet where t represents hours since 8:00.

a. Find $d(4)$. Use a sentence to explain what it means in this context.

$$6 \cos\left(\frac{2}{3}\pi \cdot 4 - \pi\right) + 10 = 13$$

At 4 hours, or 12:00, the water will be 13 feet deep.

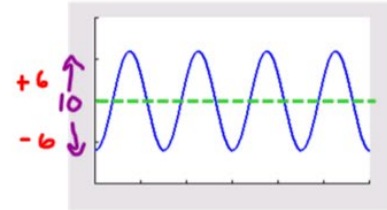
b. What is the minimum depth of water?

$$d(t) = \underline{6} \cos\left(\frac{2}{3}\pi t - \pi\right) + \underline{10}$$

amplitude: 6

midline: $y = 10$

$$\begin{array}{r} 10 \\ - 6 \\ \hline 4 \text{ feet} \end{array}$$



Use the situation to answer the following.

15. The population of deer in a small forest is modeled by the equation $d(t) = 8000 + 200 \sin\left(\frac{\pi t}{12} - \frac{\pi}{2}\right)$ where d is the number of deer in the forest and t is the time in months.

a. Find $d(8)$. Use a sentence to explain what it means in this context.

$$8000 + 200 \sin\left(\frac{\pi \cdot 8}{12} - \frac{\pi}{2}\right) = 8100$$

At 8 months, there will be 8100 deer in the forest.

b. How many deer were there in the forest to start?

$$8000 + 200 \sin\left(\frac{\pi \cdot 0}{12} - \frac{\pi}{2}\right) = 7800$$

At 0 months, there are 7800 deer in the forest.

c. What is the maximum deer population of the forest?

$$d(t) = \underline{8000} + \underline{200} \sin\left(\frac{\pi t}{12} - \frac{\pi}{2}\right)$$

midline: $y = 8000$

amplitude: 200

$$8000 + 200 = 8200 \text{ deer}$$

16. The temperature of Mathville for one day is shown on the graph to the right.

a. What is the amplitude? 15

b. What is the frequency?

period = 24 seconds

frequency = $\frac{1}{24}$

c. Write the equation that models the temperature.

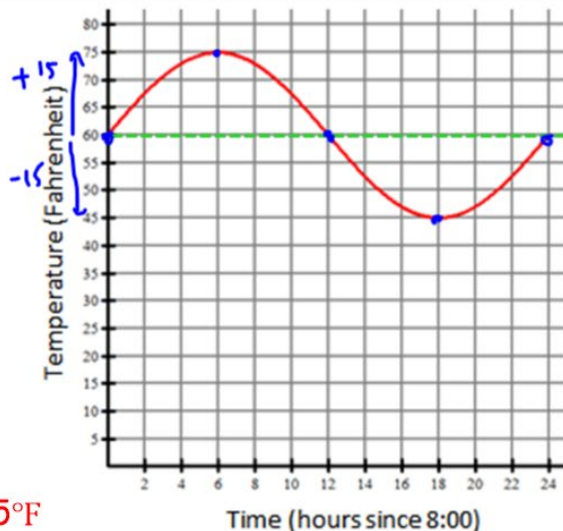
$$24 = \frac{2\pi}{b}$$

$$b = \frac{2\pi}{24}$$

$$F(t) = 15 \sin\left(\frac{\pi}{12} t\right) + 60$$

d. Find $F(6)$. Use a sentence to explain what it means.

At 6 hours, or 2:00, the temperature will be 75°F



17. The displacement of a mass by a spring is modeled by the equation graphed to the right.

a. What is the amplitude? 4

b. What is the frequency?

period = 0.5

frequency = $\frac{1}{0.5}$

c. Write the equation that models the temperature.

$$0.5 = \frac{2\pi}{b}$$

$$b = \frac{2\pi}{0.5}$$

$$h(t) = 4 \cos(4\pi t) + 10$$

d. Find $h(1.25)$. Use a sentence to explain what it means.

At 1.25 seconds, the height of the spring is 6 cm.

