

1) The following function describes the stock price for Facebook where m stands for the number of months since May 2012. Use technology to graph and create tables as needed.

$$f(m) = -11 \sin\left(\frac{2\pi}{4}m\right) + 38$$

- Interpret the 38 in the context of the problem.
- What does -11 mean in context of the problem and what is the significance of 11 being negative?
- How long does it take for the pattern to start repeating?
- During which months would you want to buy and sell stock in Facebook?

2) A stink bug has crawled into a box fan and sits on the tip of the blade of the fan as seen to the right. The fan starts to turn slowly due to a breeze in the room.

a) Create a function and a graph that describes its change in height from its original position based on the angle of the blade from its original position.

b) What is the height of the stink bug when the blade has rotated 2 radians counterclockwise? What is the height of the bug when the blade has rotated $11\pi/6$ radians counterclockwise?

c) How much has the blade rotated when the stink bug's height is $\frac{3}{4}$ feet below the horizontal axis? Can there be more than one answer?



3) Create a trig function from a context.

The bottom of a Ferris wheel is located 3 feet from the ground. The wheel has a diameter of 210 feet. The rider boards the wheel to the right on a platform halfway up the wheel. (Boarding at 0 radians)

a) Draw a picture of the situation described above. b) What is the maximum height of a seat on this Ferris wheel above the ground?

c) What is the minimum height of a seat on this Ferris wheel above the ground?

d) Create a sketch of a graph representing the height of the seat above ground over many revolutions.

e) What is the mid-line of this function?

f) Write a sine equation to model this Ferris wheel seat's height above the ground.

4) A frog clings to the edge of a paddle of a wheel that is spinning behind a paddle boat. The wheel has a diameter of 16 feet. The frog hops on right before the wheel goes into the water and manages to stay on for four revolutions of the wheel before falling into the water. Sketch a graph of the model of the height of the frog above water with respect to the number of revolutions. Then write a function that represents this scenario.

5) The number of hours of daylight in Chicago, IL can be modeled by the function $d(t) = 3.05 \sin\left(\frac{2\pi}{365}t\right) + 12.18$, where t is time in days since the spring equinox (about March 21st) and d is the number of hours of daylight on day t .

a) What is the period of this function? What does this mean in the context of the problem?

b) What is the amplitude? What does it mean in the context of the problem?

c) How much longer is the longest day compared to the shortest day? How can you see this in the graph? How can you see this in the equation?

6) Domingo decides to ride the Ferris wheel at the carnival. The radius of the wheel is 30 feet. Passengers board the wheel on the right side of the ride at the level of the horizontal axis. The Ferris wheel rotates 150° counterclockwise and stops to let other passengers on. How high above the ground is Domingo when he stops?