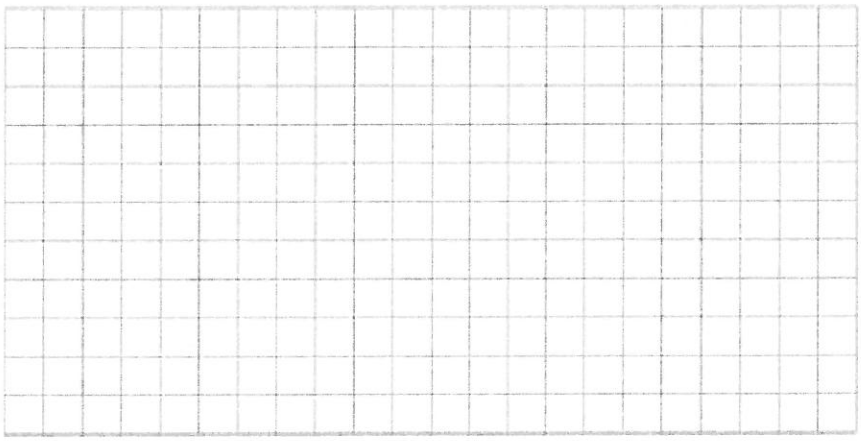
Name _____ Algebra **II H**

6.3 - Modeling with Trigonometric Functions Homework

1. The motion of a pendulum can be modeled by the function $d = 4\cos(8\pi t)$, where *d* is the horizontal displacement (in inches) of the pendulum relative to its position at rest and *t* is the time (in seconds). Find and interpret the period and amplitude in the context of the situation.

2. The height *h* (in feet) of a swing above the ground can be modeled by the function $h = -8\cos\theta + 10$ where the pivot is 10 feet above the ground, the rope is 8 feet long, and θ is the angle that the rope makes with the vertical. Graph the function. What is the height of the swing when θ is 45° ?



3. The water depth *d* (in feet) for the Bay of Fundy can be modeled by $d = 35 - 28\cos\left(\frac{\pi}{6.2}t\right)$, where *t* is the time in hours and $t = 0$ represents midnight. Use a graphing calculator to graph the function. At what time(s) is the water depth 7 feet?

4. As you ride a bicycle, the distance between your foot and the pavement varies sinusoidally with time. Suppose that you start with your right foot in the middle of the highest and the lowest point and you push down. When you have gone 1 second, your right foot first reaches its lowest point, 11 cm about the pavement. The high points are 45 cm above the pavement.

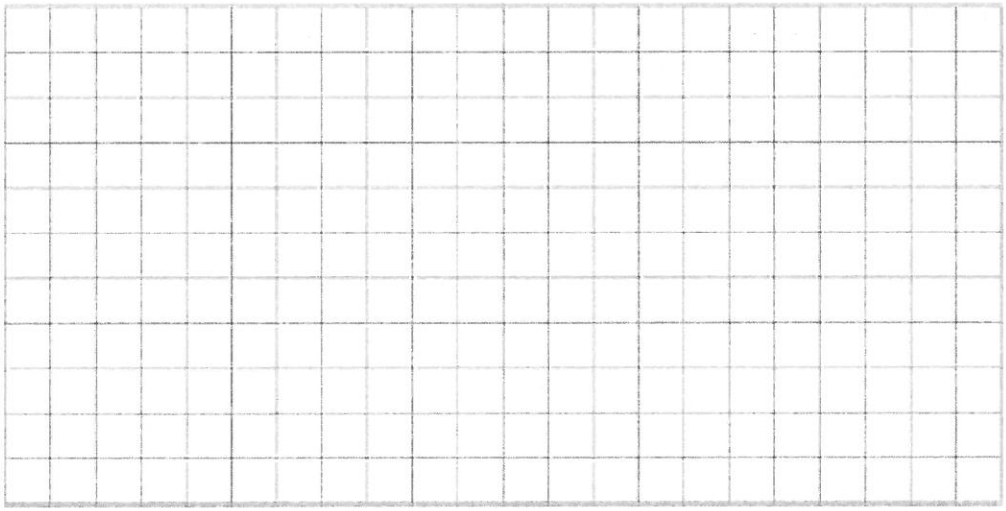
a. Write an equation of this function based on the information above.

b. How long did it take for your right foot to get back to where it started when it began pedaling?

c. Find the first two positive times that the bike has traveled when your right foot is 35 cm above the pavement.

5. One of the largest Ferris Wheels in the world is the London Eye, a wheel that is 135 meters high and provides a 30 minute, slow-moving "flight" over the Thames River. Suppose that we assume that the London Eye has a diameter of 130 meters and that the lowest point of the wheel is 5 meters above the Thames River. The wheel makes one complete revolution every 30 minutes. Dorothy and her friends begin their ride at the lowest point at 12 noon (t = 0 minutes).

a. Sketch a graph that relates Dorothy's height above the Thames to time.



b. Write an equation that models Dorothy's height off the ground at any time.

c. How high is Dorothy off the Thames at each of the following times?

i. 12:15

ii. 12:10

iii. 12:20

d. When the London Eye is more than 110 meters above the Thames, the riders have a view of Trafalger Square. How long will riders have this view each revolution?