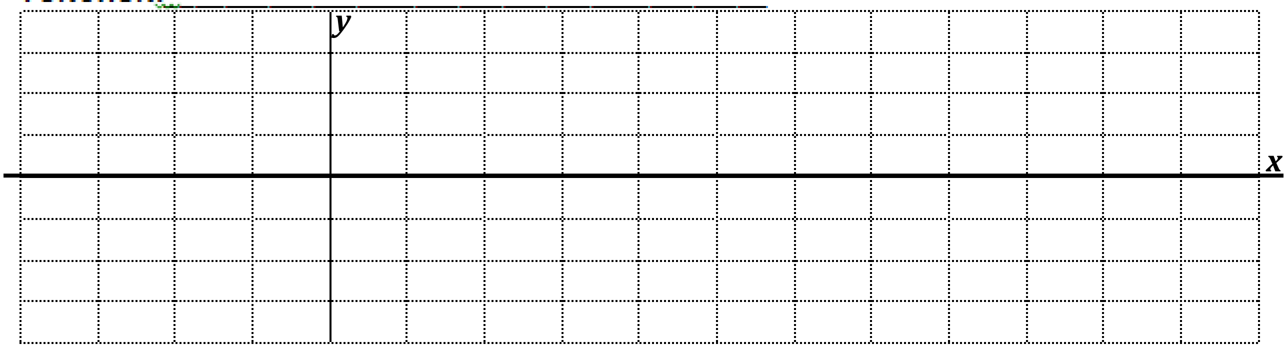
Sine and Cosine Models Name______________________ Date_____________ Period_____
AA5 Day 9 Classwork

1. The **height *h(t)* meters of the tide above mean sea level** on January 24th at Outer Harbor is modeled approximately by $h(t) = 3\sin(30t)$ where ***t* is the number of hours after midnight.**

a. Graph $y = h(t)$ for $0 \le t \le 24$ (Label your x axis from 0 to 24 and determine how to break it up evenly)

FUNCTION:_______________________________________



b. When was high tide (MAX) and what was the maximum height (y-value at MAX)?

c. What was the height at 2pm (y-value when x= 2pm or 14 hours after midnight)?

d. If a ship can cross the harbor provided the tide is at least 2m above mean sea level, when is crossing possible on January 24? (give all time intervals when the y-value is 2m or greater between)

2. The model for the height of a light on a Ferris Wheel is $H(t) = 20 - 19\sin(120t)$ where ***H(t)* is the height in meters** above the ground, ***t* is time in minutes**.

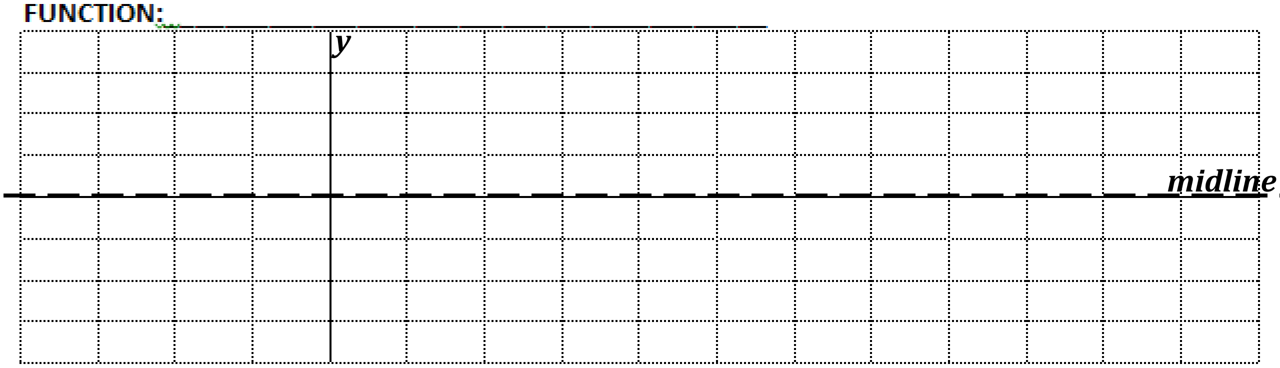
a. How high is the light (y-value) at time *t*=0?

b. At what time was the light at its lowest (x-value of first MIN) in the first revolution of the wheel?

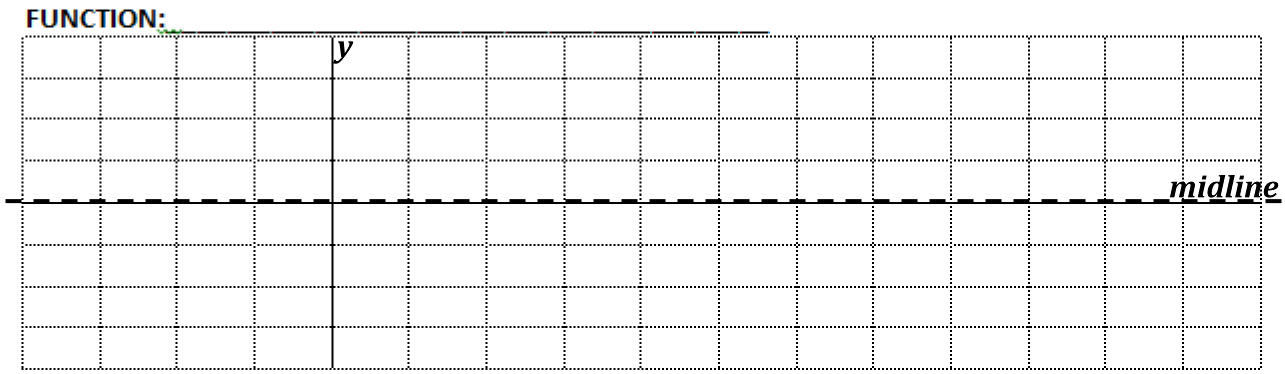
c. How long does the wheel take to complete one revolution (what is the PERIOD)?

d. Sketch the graph of the *H(t)* function over one revolution (graph 1 complete cycle).

FUNCTION:_______________________________________



3. The population of water buffalo is given by $P(t) = 400 + 250\sin(90t)$ where ***P(t)* is the number of water buffalo** and ***t* is the number of years** since the first estimate was made.



a. What was the initial estimate (y-value when x-value = 0)?

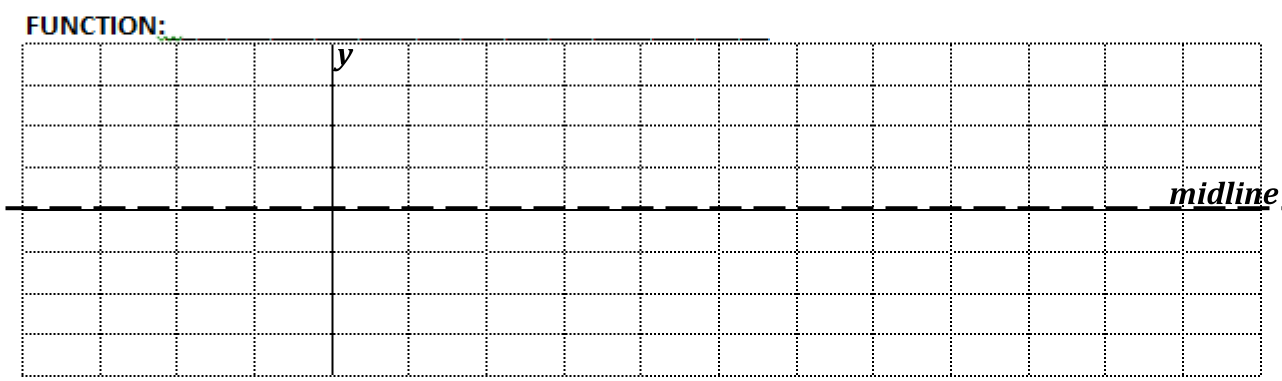
b. What was the population size (y-value) when:
   I. 6 months (when x= 0.5 years) II. two years? (when x= 2 years)

c. Find *P(1)*. What is the significance of this value?

d. Find the smallest population size and when it first occurs (first MIN).

e. Find the first time interval when the herd exceeds 500 (first interval where y-values are greater than 500).

4. Over a 28 day span, the cost per liter of gas is modeled by $C(t) = 6.8\cos(22.5t) + 107.8$ ***C(t)* is the cost in cents/liter** at any given time, and **t is time in days**. Graph y= C(t) over 28 days



a. True of false?
   I. "The cost/liter oscillates about 107.8 cents with maximum price $1.17."
   II. "Every 14 days, the cycle repeats itself."

b. What is the cost at day 7?

c. On what days was the gas priced at $1.10/liter?

d. What is the minimum cost per liter and when does it occur?