

Name: \_\_\_\_\_

## Graphs of Sine and Cosine Functions

**Exercise 1:** The function given by  $p = 100 - 20 \cos \frac{5\pi t}{3}$  approximates the blood pressure  $p$  (in millimeters) of mercury at time  $t$  (in seconds) for a person at rest.

- 1) Find the period of the function.
- 2) Find the number of heartbeats per minute.

**Exercise 2:** After exercising for a few minutes, a person has a respiratory cycle for which the velocity of air flow is approximated by  $v = 1.75 \sin \frac{\pi t}{2}$ , where  $t$  is the time (in seconds). (Inhalation occurs when  $v > 0$ , and exhalation occurs when  $v < 0$ .)

- 1) Find the time for one full respiratory cycle
- 2) Find the number of cycles per minute
- 3) Sketch the graph of the velocity function

**Exercise 3:** The daily consumption  $C$  (in gallons) of diesel fuel on a farm is modeled by

$$c = 30.3 + 21.6 \sin \left( \frac{2\pi t}{365} + 10.9 \right)$$

Where  $t$  is the time (in days), with  $t = 1$  corresponding to January 1.

- 1) What is the period of the model? Is it what you expected? Explain
- 2) What is the average daily fuel consumption? Which term of the model did you use? Explain
- 3) Graph the model. Use the graph to approximate the time of the year when consumption exceeds 40 gallons per day

**Exercise 4:** A Ferris wheel is built such that the height  $h$  (in feet) above ground of a seat on the wheel at time  $t$  (in seconds) can be modeled by

$$h(t) = 53 + 50 \sin \left( \frac{\pi}{10} t - \frac{\pi}{2} \right)$$

- 1) Find the period of the model. What does the period tell you about the ride?
- 2) Find the amplitude of the model. What does the amplitude tell you about the ride?
- 3) Graph one cycle of the model.