

Name:

Date:

A **wave** has a repeating pattern with a specific wavelength, frequency, and amplitude. Waves can be represented with mathematical models.

- Representing a wave as a function of distance helps us find its wavelength.
- Representing a wave as a function of time can help us find its **period** and from there its **frequency**.



## **Wave Properties**

**Wave cycle:** one complete wave cycle begins and ends at the same point on the wave model. In the diagram above, one complete wave cycle would be crest-to-crest or trough-to-trough. **Amplitude (A):** the amount that a cycle moves away from equilibrium. The amplitude of a wave is related to the amount of energy it carries. The greater the amplitude, the more energy it carries.

**Wavelength** ( $\lambda$ ): the distance (in meters) of one complete wave cycle (e.g. crest to crest). **Period (T):** the time (in seconds) required for one complete wave cycle.

**Frequency (f)**: the number of wave cycles in one second; this unit (1/s) is known as a *Hertz* (Hz).

- 1. The frequency and period of a wave are inversely related. Rearrange the following equation to solve for frequency:  $T = \frac{1}{f}$
- 2. A speaker vibrates at 150 Hz. What is the period?
- 3. A grandfather clock's pendulum has a period of 4.5 seconds. What is the frequency? Round to the nearest hundredth.
- 4. Describe the motion of a swing that requires 6 seconds to complete one cycle. What is the period and the frequency? Round to the nearest hundredth.



- 5. A guitar string vibrates back and forth 88 times in one minute. Round your answers to the nearest tenth.
  - a. How many times does it vibrate per second?
  - b. What is the frequency in Hertz?
  - c. What is the period in seconds?
- 6. In previous activities you learned how amplitude is related to the energy of a wave. Look at the simple mathematical wave models below. Compare Models A and B. Which wave carries the **most** energy? **Explain your answer on the lines below.**



Motion is modeled by graphing position versus time. Use the graphs below to answer questions 7–9. Graph A Graph B



- 7. Which graph can be represented by the equation y = mx + b?
- 8. Which graph is an example of a function that is not linear? Explain your answer.
- 9. Which graph shows time and position to be directly proportional? Explain your answer.