# Summary

**THE BIG**

**IDEA** ⋮ Waves transmit energy through space and time.

## 25.1 Vibration of a Pendulum

☑ The period of a pendulum depends on only the length of the pendulum and the acceleration of gravity.

• A repeating back-and-forth motion about an equilibrium position is a **vibration.**

• The time a pendulum takes to swing back and forth through small angles depends on the length of the pendulum—the mass has no effect.

• The time of a back-and-forth swing of a pendulum is called the **period.**

• A long pendulum has a longer period than a shorter pendulum. The longer pendulum swings back and forth more slowly—less frequently—than a short pendulum.

## 25.2 Wave Description

☑ The source of all waves is something that vibrates.

• A disturbance that is transmitted progressively from one place to the next with no actual transport of matter is a **wave.**

• The back-and-forth vibratory motion (often called oscillatory motion) of a swinging pendulum is called **simple harmonic motion.**

• A **sine curve** is a pictorial representation of a wave.

• The high points on a wave are called **crests.**

• Low points on a wave are called **troughs.**

• The term **amplitude** refers to the distance from the midpoint to the crest (or trough) of the wave.

• The **wavelength** of a wave is the distance from the top of one crest to the top of the next one. Or, equivalently, the wavelength is the distance between successive identical parts of the wave.

• The number of vibrations an object makes in a unit of time is an object's **frequency.**

• The unit of frequency is called the **hertz** (Hz). A frequency of one cycle per second is 1 hertz.

• Frequency and period are inverses of each other:

$$\text{Frequency} = \frac{1}{\text{period}} \quad \text{or} \quad \text{Period} = \frac{1}{\text{frequency}}$$

# Exercises

## 25.1 Vibration of a Pendulum (page 491)

1. The time it takes for one back-and-forth motion of a pendulum is called the _____.

2. List the two things that determine the period of a pendulum.

   _____

3. Circle the letter of each statement about a pendulum that is true.
   a. A longer pendulum has a longer period.
   b. A shorter pendulum swings with a greater frequency.
   c. Mass does not affect the period of the pendulum.
   d. All pendulums swing at the same rate.

## 25.2 Wave Description (pages 491–493)

4. What is simple harmonic motion?

   _____

5. Is the following sentence true or false? A sine curve is a pictorial representation of a wave. _____

6. Circle the letter that describes the source of all waves.

   a. a temperature change        b. a change in pressure

   c. something that vibrates      d. an electrical current

*Match each phrase with the correct word or words.*

| Term | Definition |
|------|------------|
| _____ 7. crest | a. distance between successive identical parts of a wave |
| _____ 8. trough | b. low point on a wave |
| _____ 9. amplitude | c. vibrations per unit of time |
| _____ 10. wavelength | d. high point on a wave |
| _____ 11. frequency | e. distance from a midpoint to a crest |
| _____ 12. hertz | f. unit of frequency |

13. Is the following sentence true or false? As the frequency of a vibrating source increases, the period increases. _____