

Chapter 17 Mechanical Waves and Sound

Section 17.3 Behavior of Waves

(pages 508–512)

This section describes different interactions that can occur when a mechanical wave encounters an obstacle, a change in medium, or another wave. These interactions include reflection, refraction, diffraction, and interference.

Reading Strategy (page 508)

Identifying Main Ideas Complete the table below. As you read, write the main idea of each topic. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

| Wave Interactions | |
|-------------------|-----------|
| Topic | Main Idea |
| Reflection | |
| Refraction | |
| Diffraction | |
| Interference | |
| Standing waves | |

Reflection (page 508)

1. Is the following sentence true or false? Reflection occurs when a wave bounces off a surface that it cannot pass through.

2. Circle the letter of the results that occur when a wave reflects off a fixed boundary.
 - a. The reflected wave will be turned upside down.
 - b. The amplitude will double as it strikes the surface.
 - c. The speed of the wave will decrease.
 - d. The frequency of the wave will decrease.

Refraction (page 509)

3. Why does refraction occur when a wave enters a new medium at an angle? _____

4. Is the following sentence true or false? Refraction always involves a change in the speed and direction of a wave. _____

Chapter 17 Mechanical Waves and Sound

Diffraction (page 510)

5. What is required in order for diffraction to occur? _____

6. Is the following sentence true or false? A wave diffracts more if its wavelength is small compared to the size of an opening or obstacle. _____

Interference (pages 510–511)

7. What causes wave interference? _____

8. Complete the table about interference.

| Interference | | |
|--------------|---|---|
| Type | Alignment | Displacement Change |
| Constructive | Crests align with crests; troughs align with troughs | |
| | | Displacements combine to produce a reduced amplitude. |

9. Is the following sentence true or false? Destructive interference can result in wave displacements that are above the rest position.

10. How can an increased depth of a trough be considered constructive interference? _____

Standing Waves (page 512)

11. At certain frequencies, interference between a wave and its reflection can produce a(n) _____.
12. Circle each letter of a sentence that is true about standing waves.
 - a. A node is a point that has no displacement from the rest position.
 - b. Standing waves appear to move through a medium, such as a string.
 - c. Complete destructive interference occurs at antinodes.
 - d. A standing wave will form for any wavelength, as long as two ends of a rope or string are stretched tightly between two points.
13. Is the following sentence true or false? If a standing wave occurs in a medium at a given frequency, another standing wave will occur if this frequency is doubled. _____
14. Give an example of a common standing wave. _____
