

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	A wave reflected at a fixed boundary will be flipped upside down.
Refraction	Refraction occurs when a wave enters a new medium at an angle because one side of a wave front moves more slowly than the other side.
Diffraction	The larger the wavelength is compared to the size of an opening or obstacle, the more a wave diffracts.
Interference	The types of interference are constructive and destructive interference.
Standing waves	A standing wave forms only if a multiple of one half of a wavelength fits exactly into the length of the vibrating object.

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.

_____ **true** _____

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 speed of the wave will decrease.
 - c. The frequency of the wave will decrease.

Refraction (page 509)

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

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Diffraction (page 510)

4. Circle the letter of each correct sentence. What is required in order for diffraction to occur?
 - a. Waves move into a larger space.
 - b.** Waves encounter an obstacle.
 - c.** Waves pass through a narrow opening.
5. 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.

_____ **false** _____

Interference (pages 510–511)

6. Complete the table about interference.

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

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

_____ **true** _____

Standing Waves (page 512)

8. At certain frequencies, interference between a wave and its reflection can produce a(n) **standing wave**.
9. Circle the letter of the 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.
10. 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. _____ **true** _____
11. Give an example of a common standing wave. **The vibrations you can see when plucking a stringed instrument are examples of standing waves.**