

Chapter 8: Vibrations and Waves

Mini Investigation: Observing Wave Motion, page 377

- A.** During the first type of movement, the Slinky moved back and forth across the line it originally made on the table. During the second type of motion, the Slinky stayed on the line, but the coils of the Slinky got closer together then farther apart.
- B.** When the far end was free, the Slinky moved from side to side during the first movement and in and out during the second movement.
- C.** When the far end was fixed, the Slinky did not move and it reflected the waves back to the start of the Slinky.

Section 8.1: What Is a Vibration? Section 8.1 Questions, page 380

- 1.** Answers may vary. Sample answer:
A vibration is the cyclical motion of an object about an equilibrium point. A wave is the transfer of energy through a material due to vibration. Vibration is the cause and the wave is the effect.
- 2.** Answers may vary. Sample answers:
Five everyday vibrating objects are a swinging pendulum, a stretched elastic band, a skipping rope in motion, a plucked guitar string, and the motion of a tuning fork.
- (a)** The pendulum swings back and forth across an equilibrium point. Therefore, it is a vibration. The elastic band vibrates back and forth across an equilibrium point when plucked. Therefore, it is a vibration. The skipping rope swings around an equilibrium position. Therefore, it is a vibration. A plucked guitar string vibrates back and forth about its equilibrium position. Therefore, it is a vibration. The tuning fork vibrates about its equilibrium position. Therefore, it is a vibration.
- (b)** Since the particles in the elastic band, the guitar string, and the tuning fork are disturbed, those three vibrations transmit a mechanical wave.
- (c)** The elastic band transmits mechanical waves through itself. The guitar string transmits mechanical waves through itself. The tuning fork transmits mechanical waves through itself.

- 3.** Answers may vary. Sample answer:
The density of the medium allows a wave to pass through most effectively. For example, a tuning fork is a solid with high density, so it sustains vibrations for longer time as waves pass through it more effectively.
- 4.** Answers may vary. Sample answer:
Sonar and radar use waves to detect objects and navigate ships. Mobile phones use waves to send and receive signals. Musical instruments such as guitars and pianos use vibrations to make sounds.
- 5.** Answers may vary. Sample answer:
Earthquakes can be highly destructive mechanical waves. Tidal waves (or tsunamis) can be harmful to boats and people living near the coast.
- 6.** Answers may vary. Sample answer:

