SECTION 19.2  **Seismic Waves and Earth's Interior**

*In your textbook, read about seismometers and clues to Earth's interior.*

Use each of the terms below to complete the following statements.

- **mass**
- **seismometer**
- **seismogram**
- **frame**

1. A ___________ is an instrument that records earthquake vibrations.

2. All seismometers include a ___________ suspended from a wire.

3. A paper or computer record of earthquake vibrations is called a ___________.

4. All seismometers include a ___________ that is anchored to the ground and vibrates during an earthquake.

For each statement below, write true or false.

5. Seismic waves change speed and direction when they encounter different materials. ___________

6. P-waves travel through Earth's mantle. ___________

7. S-waves do not travel through Earth's mantle. ___________

8. Surface waves are the first to arrive at a seismic facility. ___________

9. P-waves are bent when they strike the core. ___________

10. On seismograms, seismic waves recorded from more distant facilities are closer together than those recorded from facilities close to the epicenter. ___________

11. S-waves do not enter the core because they cannot travel through solids. ___________

12. Seismologists have reasoned that Earth's outer core must be liquid based on the disappearance of S-waves. ___________

13. Studies of how waves reflect deep inside Earth show that Earth's inner core is solid. ___________

14. The P-wave shadow zone does not receive direct P-waves. ___________
Section 19.2 Seismic Waves and Earth's Interior (continued)

**Main Idea**

**Clues to Earth's Interior**

*Use with page 503.*

**Details**

**Sketch** a model of the interior of Earth. Label the following:

- inner core
- mantle
- outer core

Once you have drawn your model, draw an earthquake focus on the left side of your model. Then add the following:

- P-waves
- P-wave shadow zones
- S-waves

Identify on your model where there are no direct P-waves and no direct S-waves.

**SYNTHESIZE**

What would happen if S-waves encountered a lake or pond?

Explain your reasoning.
Earthquake Information

The graph below shows travel time in minutes and distance traveled for primary and secondary waves. Primary and secondary waves start at the same time but do not travel at the same speed. Study the graph. Use the graph to help answer the questions that follow.

1. How long does it take for a primary wave to travel 2000 kilometers?

2. How long does it take for a secondary wave to travel 2000 kilometers?

3. How far does a secondary wave travel in 10 minutes?

4. How far does a primary wave travel in 10 minutes?

5. What happens to the time difference between primary and secondary waves as the distance traveled gets longer?

6. Suppose a primary and secondary wave both travel a distance of 4000 kilometers before they are picked up by a seismograph. Which wave will arrive first?

7. How much time lag at 4000 km will there be between these two waves?

8. Suppose both a primary and secondary wave start together and travel for 5 minutes. Which wave will travel farther?