**Slinky Lab**

Name Period \_\_\_\_\_\_\_\_\_

**A. Transverse and Longitudinal Waves**

Have your lab partner hold one end of the slinky and stretch it along a smooth floor until it is about 6-m long. Practice shaking your end of the slinky sideways on the floor until you are able to send a clear pulse along its length. Several pulses together will form a *transverse wave* train. Notice the direction in which the pulses travel and the direction in which the coils of the slinky move.

1. In a transverse wave the particles of the medium vibrate

*(in the same, perpendicular to the)* direction in which the wave travels.

2. Other examples of transverse waves are \_\_\_and .

Reach a short distance down the slinky's length and gather the coils toward you and then quickly release them. The pulse that travels along the spring is a *longitudinal* pulse.

3. In a longitudinal pulse the particles of the medium vibrate

*(in the same, perpendicular to the)* direction in which the wave travels.

**B. The Speed of all Waves of the Same Kind in a Given Medium are the Same**

Generate a transverse pulse in the slinky. Keep the stretch of the slinky constant. Estimate the speed of the pulse in the medium. Generate a second pulse but make it larger or smaller than the previous pulse. Compare the speeds of the pulses. Try to generate a pulse that travels along the slinky at a different speed.

4. The speeds of different pulses in a particular medium are *(the same, different).*

**C. Wavelength and Frequency**

Shake the slinky back and forth rapidly to generate wave trains in the slinky. The wavelength of a wave in the slinky is the distance from a crest on one side of the slinky to the next crest on the same side. The frequency of the wave is the same as the frequency at which you shake the slinky. Try shaking the slinky regularly but slowly and then regularly but rapidly. Observe the wavelengths of the waves.

5. Higher frequency waves have *(long, short)* wavelengths.

6. Low frequency waves have *(long, short)* wavelengths.

7. If groups of pulses form waves and the speed of all the pulses you generated in the coil are the same then the speed of all the waves generated in the slinky should be

*(the same, different).*

8. The speed of any wave in any medium is equal to the frequency of the wave times its wavelength *(v* = *fλ*). All the waves that you generated in the slinky travel at the same speed. Write a symbolic statement that shows the relationship between frequency and wavelength for a given constant medium. Also state this relationship in words.

**D. The Interference of Waves**

You and your partner can practice sending pulses towards each other at the same time. Try this and closely observe the pulses when they come together and also after they pass through one another. Try pulses of the same and different shapes. Send a pulse down one side of the slinky while your partner sends a pulse down the other side. Describe what happens when they meet.

9. When two pulses of about equal displacements approach each other from the same sides of the slinky their displacements \_\_\_\_\_\_\_\_\_\_*(add up, are the same as one displacement).*

10. When two pulses of about equal displacements approach each other from different sides of the slinky they \_\_\_\_\_\_\_\_\_\_\_\_\_*(add up, cancel)* while they meet.

11. After the pulses pass through one another they are *(changed, unchanged).*

**E. Reflected Waves**

Have your partner hold one end of the slinky very rigidly. Send a pulse to the rigid end and observe the reflected pulse.

12. A pulse reflected from a rigid medium is reflected \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ *(right side up, upside down).*

Now tie a long thread to one end of the slinky. Have your partner hold the thread and send a pulse toward the end supported by the string.

13. A pulse reflected from a less rigid medium than the one in which it has been traveling is reflected *(right side up, upside down).*

**F. Wave Transfer From One Medium to Another**

Connect the slinky with the other coil spring. Stretch the slinky as before. Have your partner hold the end of the spring and you hold the end of the slinky. Try sending pulses and short waves down each spring. Observe their behavior at the boundary between the two springs. Observe how a wave changes as it passes from one medium into the other.

14. Each time a wave reaches the boundary between the two springs it is *(partially, totally)* reflected and *(partially, totally)* transmitted.

15. When a wave enters a new medium its speed is *(the same, different).*

1. When a wave enters a new medium its wavelength is *(the same, different).*
2. When a wave enters a new medium its frequency is *(the same, different).*