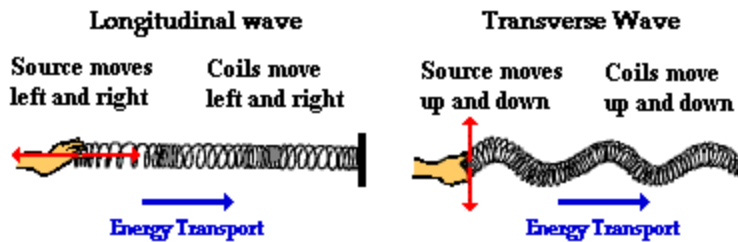


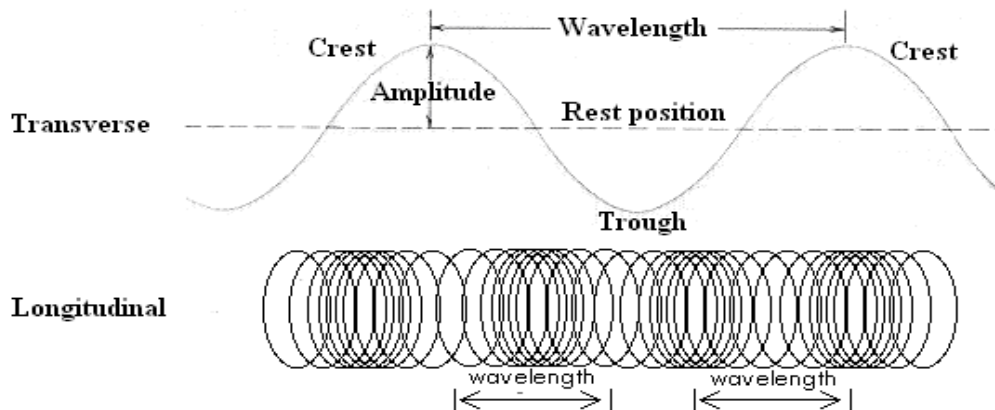
Advanced - Slinky Wave Lab

Background

A wave can be described as an energy disturbance that travels through a medium from one location to another. Waves, simply put, are **energy moving** from one place to another. As the wave moves through the **medium** (water, slinky, air), energy is being passed from one particle to the next. Waves occur around us every day. Some common places we experience waves are in sound, light, water, and earthquakes.



In addition to being a great toy, the Slinky is an excellent device for creating and studying waves. A slinky can easily demonstrate the two basic types of waves, longitudinal and transverse. In a **longitudinal wave** the particles move parallel to the direction the wave is moving. In a **transverse wave** the particles move at right angles to the direction of wave travel.



There are three basic characteristics used to describe waves.

1. **Frequency** – The number of waves produced in a given time period. This is usually measured in waves per second called Hertz (Hz).
2. **Wavelength** – The length of a wave. This can be measured easily from crest to crest or from trough to trough.
3. **Amplitude** – The height or depth of a wave. The amount of energy carried by a wave is related to amplitude. A high energy wave is characterized by high amplitude; a low energy wave by low amplitude.



Materials:

Slinky, meter stick, pencil

Purpose:

The purpose of the lab is to study the types of waves and their properties using a slinky.

Procedure:

1. Select a lab partner and gather the lab materials.
2. On a smooth floor, stretch the slinky out between you and your partner, to a length of about four meters. (*Caution – Do not over stretch the slinky!*)
3. Send a single wave to your partner (see below).



4. Observe what happens to the wave when it reaches your partner's end. Observe the reflected wave.
5. Move one end of the slinky back and forth on the floor repeatedly (see diagram below). Observe what happens as you vary the rate at which your hand moves or vibrates.



6. Next create a series of waves by moving your hand towards and away from your partner (see the diagram below). Observe this wave and how it travels.



7. Answer the questions on the answer sheet.

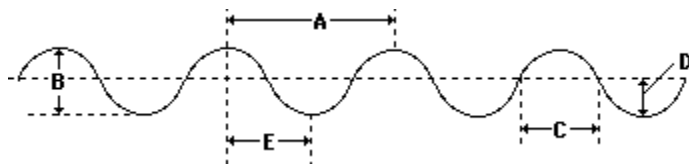
Slinky Wave Lab - Answer Sheet

Questions:

1. In your own words, explain the difference between a compressional and transverse wave.
2. Label the diagrams below with the appropriate wave type.



3. Identify the parts of the wave below



- a. _____
- b. _____
- c. _____
- d. _____
- e. _____

4. Explain what happens to the frequency of the waves when you increased the rate of vibration (how fast your hand moved back and forth).
5. Explain what happens to the wavelength when you increase the rate of vibration (how fast your hand moved back and forth).
6. How would you explain the relationship between wavelength and frequency?
7. Are the waves created in step 5 transverse or longitudinal? Give evidence to support your reasoning.
8. Are the waves created in step 6 transverse or longitudinal? Give evidence to support your reasoning.

9. If the spring coils do not actually move from one end of the slinky to the other, then what is traveling through the slinky as the wave moves? Explain.
10. Explain how amplitude and energy are related. Give evidence to support your reasoning.

Discussion:

1. Give examples of a transverse wave in a real-life situation:
2. Give examples of a compressional wave on a real-life situation.

Extension:

1. USE BYOT to go to <http://www.physicsclassroom.com/class/waves/Lesson-1/Categories-of-Waves>
2. From the information gathered at this site, explain the propagation of an electromagnetic wave.