Date _____ Period _____ Name _____

14 Design Your Own Physics Lab

Waves on a Coiled Spring

Problem

How can you model the properties of transverse waves?

Hypothesis

A coiled spring toy can be used to model transverse waves and to investigate wave properties such as speed, frequency, amplitude, and wavelength.

Possible Materials

- a long coiled spring toy, such as a Slinky
- stopwatch
- meterstick

Plan the Experiment

1. Work in pairs or groups, and clear a path of about 6 meters for this activity.
2. One member of the team should grip the Slinky firmly with one hand. Another member of the team should stretch the spring to the length suggested by your teacher. Team members should take turns holding the end of the spring. **CAUTION:** *Coiled springs easily get out of control. Do not allow them to get tangled or overstretched.*
3. The second team member should then make a quick sideways snap of the wrist to produce transverse wave pulses. Other team members can assist in measuring, timing, and recording data. It is easier to see the motion from one end of the Slinky, rather than from the side.
4. Design and perform experiments to answer the following questions.
5. **Check the Plan** Make sure your teacher has approved your final plan before you proceed with your experiment.

Analyze and Conclude

1. **Interpreting Data** What happens to the amplitude of the transverse wave as it travels?

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2. **Recognizing Cause and Effect** Does the transverse wave's speed depend upon its amplitude?

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3. **Observing and Interpreting** If you put two quick transverse wave pulses into the spring and consider the wavelength to be the distance between the pulses, does the wavelength change as the pulses move?

4. **Applying** How can you decrease the wavelength of a transverse wave?

5. **Interpreting** As transverse wave pulses travel back and forth on the spring, do they bounce off each other or pass through each other?

Apply

1. How do the speeds of high frequency (short wavelength) transverse waves compare with the speeds of low frequency (long wavelength) transverse waves?