Compression and Transverse Waves

Target:
As you have learned, all waves have certain measurable characteristics such as speed, wavelength, frequency, and amplitude. Even though there are similarities, waves can have properties that make them different.

In this activity you will create two different types of waves and determine the rate at which each wave moves, otherwise known as wave speed.

Materials
Slinky/Spring  Stop watch  Meter stick  Pencil

Procedure
1. You and your partner should hold opposite ends of the spring/slinky. The spring/slinky must stay on the ground. Do NOT pick it up or you will be DISMISSED from the lab!!
2. Stretch the spring until it is taught.
3. Have another partner measure the length of the stretched spring. Record on your data table above.
4. Create a transverse wave by gently wiping your spring up and down one time. You partner will need to hold their end of the spring stiff and still.
5. Have a partner time how long it takes for the wave to travel the length of the spring.
6. Repeat step 5 five times and record your data. Try to generate each wave with the same amount of energy.
7. Use your spring to create a compression wave by holding the end of the spring and pushing it forward (try to use the same amount of force you use to create the transverse wave).
8. Have a partner time how long it takes for the wave to travel the length of the spring.
9. Repeat steps 7-8 five times and record your data. Try to generate each wave with the same amount of energy.
10. Calculate the average time for each type of wave. Record your data.
11. Calculate the speed of each type of wave (distance/ time or m/sec)
Data Tables:

SLINKY:

Length of Slinky: _______

<table>
<thead>
<tr>
<th>Trial number</th>
<th>Transverse wave (time in seconds)</th>
<th>Longitudinal/C ompression wave (time in seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>5</td>
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<tr>
<td>Average</td>
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</tbody>
</table>

Average speed of transverse wave:_______  Average speed of longitudinal wave:_____

SPRING:

Length of Spring: _______

<table>
<thead>
<tr>
<th>Trial number</th>
<th>Transverse wave (time in seconds)</th>
<th>Longitudinal/C ommression wave (time in seconds)</th>
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<td>1</td>
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Average speed of transverse wave:_______  Average speed of longitudinal wave:_____

Questions

1. Compare the movement of energy in a transverse wave to the movement of energy in a compression wave.

2. Compare the movement of the medium (i.e. spring/slinky) in a transverse wave versus the movement in a compression wave (longitudinal).

3. Which type of waves moves faster? Why do you think there is a difference in wave speed?

4. Draw a transverse wave with a wavelength of 2 cm and an amplitude of 15 mm below and label the following parts:
   a. Midline
   b. Wavelength
   c. Crest
   d. Trough
   e. Amplitude
   f. Height

5. Draw a longitudinal wave below and label the following parts:
   a. Compression
   b. Rarefaction