Name: _____
Date: _____Period: _____

Wave Interactions Lab

Pre Lab:
Define each:

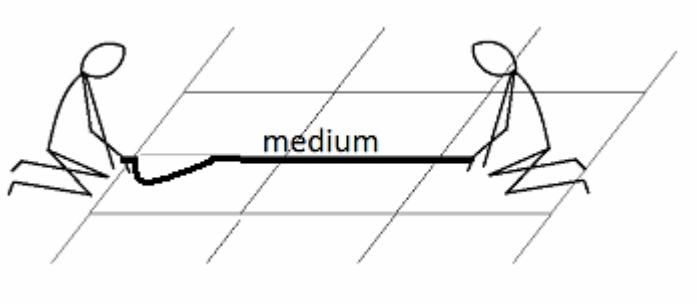
1. Reflection

2. Constructive Interference

3. Destructive Interference

4. Standing Wave

Materials: Spring



Procedure:
1. Stretch the slinky between two group members without making it too tight. Make sure the slinky is lying on the floor.

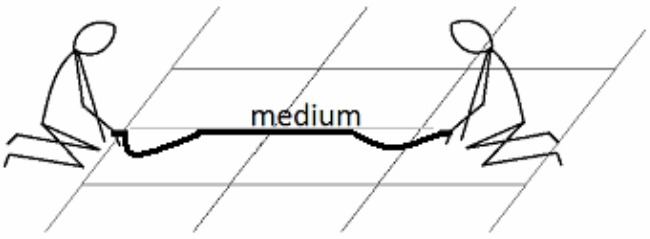
2. Create a transverse wave pulse by pushing the slinky perpendicular to the wave's motion. You should be making a single wave pulse by moving the slinky to the side and back to its original position. The wave pulse should still be along the floor, no part of the wave should be above the floor as above.

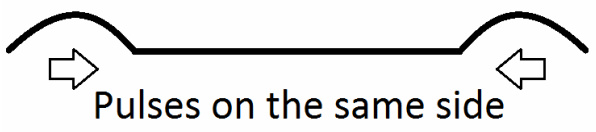
3. Only one person will make a transverse wave pulse in this step and the other should hold their end of the slinky very still. Make a single wave pulse and watch what happens as the wave hits the end of the slinky and returns.

- What happens to the wave when it reaches the second person who is holding their hand still?

- Which wave interaction (reflection, refraction, diffraction constructive or destructive interference) does this demonstrate? *Be sure to explain your answer using a definition you wrote in your pre-lab*.

4. Have two people hold each end of the slinky and each make a single transverse wave pulse on the *same side* of the slinky. One person makes a wave pulse to their left, the other to their right so that the wave pulses are on the same side of the slinky as each other like below.





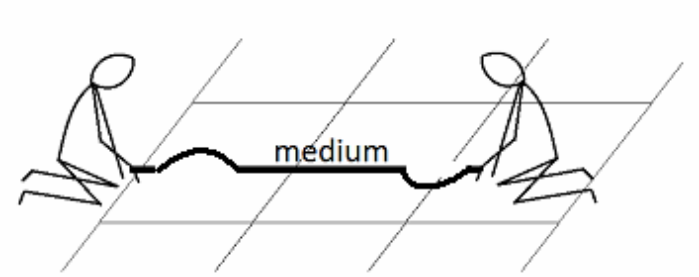
5. Observe what happens to the individual wave pulses as they meet. You may have to repeat step #4 in order to see it clearly. Watch *carefully* to see how the wave pulses behave when they meet each other and when they move past each other.

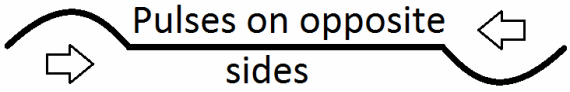
- Which wave interaction (reflection, refraction, diffraction, constructive or destructive interference) does this demonstrate? *Be sure to explain your answer using a definition you wrote in your pre-lab*.

6. Fill in this table below with drawings of what the slinky looks like from above. Add **arrows** to show which way the waves are moving like the drawing in #4:

Before the waves met each other they looked like this:	*As the waves met each other in the middle of the slinky, they looked like this:*	*After the waves met each other, they looked like this:*

7. Now, have each person holding the ends of the spring make a transverse wave pulse on *opposite sides* of the spring. For example, each person makes a wave pulse to their left so that the waves are on opposite sides, like the picture below.





- Which wave interaction (reflection, refraction, diffraction, constructive or destructive interference) does this demonstrate? *Be sure to explain your answer using a definition you wrote in your pre-lab*.

8. Fill in this table below with drawings of what the slinky looks like from above. Add **arrows** to show which way the waves are moving like the drawing in #7:

Before the waves met each other they looked like this:	*As the waves met each other in the middle of the slinky, they looked like this:*	*After the waves met each other, they looked like this:*

9. Have each person holding an end make a continuous wave (a series of wave pulses) by shaking their hands continuously. Try to make your waves with the same frequency as each other and then with very different

frequencies. You have created a *standing wave* when parts of the wave appear to be standing still so keep trying until you do.

- Describe *how* you were able to make a standing wave. Did you and your partner *both* make a wave? Was it the same frequency or a different frequency?

Conclusion Questions:

1. When a transverse wave went to the end of the slinky where it was being held still, what happened to the wave when it got there? What direction did it go afterwards? Was it on the same side as before it hit the end?

2. When two wave pulses were created by each person holding the spring they eventually met in the middle. When the two wave pulses were on the same side of the spring (step #4), what happened to the waves as they met? Discuss any changes, if any, in the three properties of a wave (amplitude, speed and length) when the waves meet. *(i.e. did they seem to get taller? Longer? Shorter? Faster? Slower?)*

3. When the two wave pulses were on the opposite side of the spring (step #7), what happened to the waves as they met? Discuss any changes, if any, in the three properties of a wave (amplitude, speed and length) when the waves meet. *(i.e. did they seem to get taller? Longer? Shorter? Faster? Slower?)*

5. Do you think that waves traveling in opposite directions in the same medium *pass through* each other or *bounce off* each other when they meet? Support your claim using observations from your lab.

6. Summarize what you learned about the amplitude of a wave when it meets another wave and what that must mean about the energy carried by each wave.