ESSENTIAL PHYSICS LAB

WAVE INTERACTIONS ON A SLINKY

Problem: Diagram common wave interactions as seen on a spring.

Procedures:

I. Fixed End Reflection

1. You and a lab partner hold both ends of a spring.
2. Send a pulse to the right down the spring.
3. Diagram the pulse before it strikes your partner's hand and afterward.

Before After.

4. What happens to the pulse after it reaches your partner's hand? (Two sentences)

II. Free End Reflection

1. Tie a length of string to one end of your spring.
2. You and a lab partner hold the string and the other end of the spring.
3. Send a pulse to the right down the spring toward the string.
4. Diagram the pulse before it strikes your partner's hand and afterward.

Before After.

5. Remove the string.
6. What happens to the pulse after it reaches your partner's hand? (Two sentences)

III. Wave Interference.

Constructive Interference

1. You and a lab partner hold both ends of a spring.
2. Send a pulse down the right-hand side of your side of the spring.
3. Your partner will send a pulse down their left-hand side of the spring.
4. Diagram the pulses before, during, and after they strike each other.

Before During After.

5. What happens to the height of the pulse as the two meet?

IV. Wave Interference.

Destructive Interference

1. You and a lab partner hold both ends of a spring.
2. Send a pulse down the right-hand side of your side of the spring.
3. Your partner will send a pulse down their right-hand side of the spring.
4. Diagram the pulses before, during, and after they strike each other.

Before During After.

5. What happens to the height of the pulse as the two meet?

V. Wave Media

1. Take one of the heavier springs. Compare a single pulse on the heavy spring to that of a pulse on the slinky.

How does the medium of propagation affect the wave shape and velocity?

2. Tie the slinky onto the heavy spring. What happens to the wave pulse velocity and the wave shape as the wave travels from one medium into another?

VI. Standing Waves

1. Use the higher tension (smaller diameter) spring for Standing waves.

2. Slowly move your hand back and forth while your partner holds their end of the spring motionless. This will generate a Single Pulse Standing Wave. This represents a ½ wavelength standing wave. Diagram this standing wave.

3. Increase the frequency at which you move your hand back and forth. Until you have two pulses on the spring simultaneously. This represents a full wavelength standing wave. Diagram this standing wave.

4. Increase the frequency at which you move your hand back and forth until you have three pulses on the spring simultaneously. This represents a 1½-wavelength standing wave. Diagram this standing wave

5. How many antinodes can you generate on the spring? Diagram this pattern.

VII. Longitudinal Waves

1. Use the Slinky spring for the Longitudinal waves.

2. Slowly move your hand Toward Your Partner while your partner holds their end of the spring motionless. This will generate a Single Pulse Compression Longitudinal Wave. Diagram this wave.

3. Slowly move your hand Away Your Partner while your partner holds their end of the spring motionless. This will generate a Single Pulse Rarefaction Longitudinal Wave. Diagram this wave.

4. Make a series of compressions on the slinky to represent a longitudinal wave pattern. Diagram this pattern.