Name(s): _____ Date: _____ Period: ____

ACTIVITY #11: REVIEW - SLINKY™ WAVES

PURPOSE:

_____

_____

MATERIALS & PROCEDURES:

1. Hold a super slinky™ stretched 2/3 of the way across the room.
2. Create a transverse wave in the slinky™.
3. Create a longitudinal wave in the slinky™. Record the differences.
4. Create different size transverse waves in the slinky™. Time them going the same distance. Compare them. Record any differences.
5. Generate high frequency and then low frequency waves in the slinky™. Compare the wavelengths. Record the relative wavelength sizes.
6. At the same time have the partners send pulses toward each other from opposite sides. (Several pulses form a wave.) Record their interaction point data.
7. Send a pulse in towards one end of the slinky™ while the partner holds that end rigid. Record the reflected wave data.
8. Send a pulse in towards one end of the slinky™ to which a long string has been attached. (Less rigid medium) Record the reflected wave data.
9. Connect two coils (Slinky™ & Snaky) together and send several pulses down from the large diameter coil to the longer one. Record your wave-transfer observations.

DATA:

Transverse vs. Longitudinal Waves:

1. The medium vibrates _____ to the direction of propagation in a transverse wave. Mechanical waves such as _____ or _____ waves are transverse. One wave that is transverse but not mechanical is a/an _____ wave. It has no _____.
2. The medium vibrates _____ to the direction of propagation in a longitudinal wave. Mechanical waves such as _____ waves are longitudinal. There are no longitudinal waves, which are not _____ waves.

Speed of Waves:

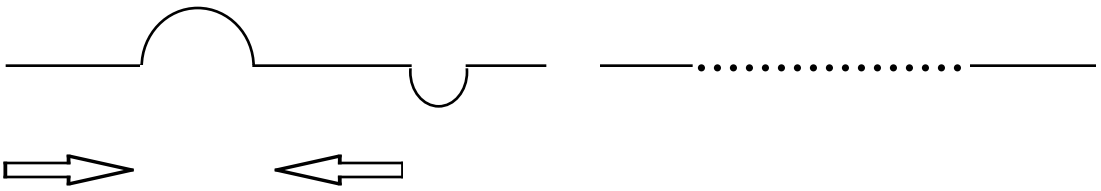
1. If the slinky™ is kept at a constant tension and transverse pulses are sent down the slinky™, it takes _____ seconds for a large amplitude pulse to go about _____ meters. It takes a small amplitude pulse _____ seconds to go the same distance. The speed of the pulse (wave) is _____ (independent of, dependent upon) the amplitude. Vary the frequency of the pulse. When the frequency is high, the wavelength is _____. What is the relationship between frequency and wavelength? _____ What is the equation, which shows this relationship? _____ The speed of a pulse in a particular medium is _____.

   a) determined by frequency b) determined by amplitude c) determined by the medium
2. The speed of any wave in a particular medium, v, equals the _____ , f, times the _____ , λ.

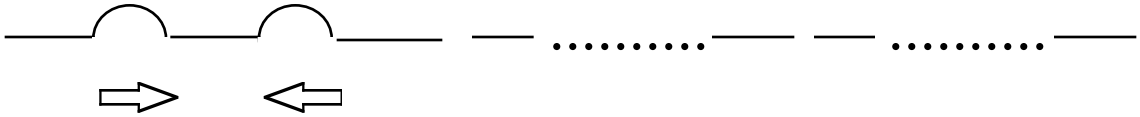
Interference of Waves:

1. When two waves meet, their amplitudes _____. So two equal pulses on the right side of the slinky™ meet and form a/an _____ _____ . But two equal pulses, which meet coming from opposite sides of the slinky™ form a _____ when they meet.
2. After the pulses meet, they _____ each other and are _____ (unchanged, different). Draw the "after" sides.

BEFORE **AFTER**



BEFORE **DURING** **AFTER**



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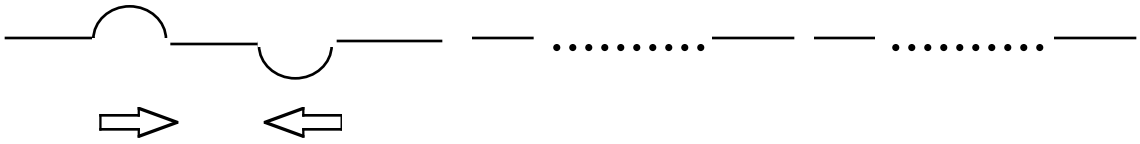
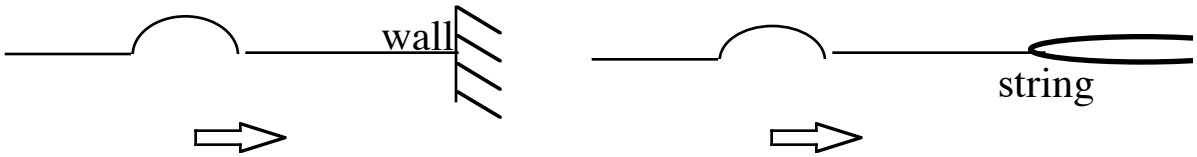


Reflection of Waves:

1. If there is a significant difference between the two media, a wave will show much reflection at the boundary. A transverse wave reflected from a rigid boundary _____. a.) does not change phase (0^o change) b.) does change phase (180^o change)
2. A transverse wave that reflects off a less rigid boundary ____. a.) does not change phase (0^o change) b.) does change phase (180^o change)
   Draw the reflected pulse in the diagram below.



3. A slinky™ pulse as shown in the diagram below, meets a string at the boundary. There is _____ reflection and partial _____ at the boundary. The reflected wave will return on the _____ (top, bottom).

Transference of Waves into a New Medium:

1. When a wave reaches a boundary, there is partial _____ and partial _____.
2. A wave entering a new medium changes its _____, but it retains its original _____; therefore the _____ changes too.

QUESTIONS:

1. Slinky™ waves are ____. a.) mechanical b.) electromagnetic

2.  is a _____ wave.

   a.) longitudinal b.) transverse

3.  is a _____wave.

a.) longitudinal b.) transverse

4. The speed of a wave is equal to _____ times _____ and _____ (does, does not) change if the wave remains in a particular medium. However, if the wave goes into a new medium; the _____ changes as well as the _____. The _____ stays the same.

5. Waves can pass through each other without being _____ .

CONCLUSION:

List several/many universal behavioral characteristics of waves.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

The Surfer's Handbook (Rules of Wave Behavior)

1. The speed of a wave is a function of the medium. All waves of the same kind travel though a given medium at the same speed regardless of their wavelength, frequency or amplitude.
2. Two waves can pass through one another (i.e., interfere) but are completely undisturbed by the event. After the waves have passes through each other, they are exactly the same as they were before meeting.
3. Whenever a wave reached as boundary, it is always partially reflected and practically transmitted. (Light and Sound behaves this way.)
4. A wave reflected from a more rigid medium (A medium where the wave travels slower.) returns inverted, waves reflected from a less rigid medium (A medium where the wave travels faster) return erect.
5. When a wave enters a new medium its frequency cannot change because it is generated by the original wave and must, therefore have the same frequency as the original wave. Since the wave has a different speed in the new medium, and $v = f\lambda$, the wavelength must change, and is proportional to the speed.