Properties of Waves: Virtual Lab

http://www.glencoe.com/sites/common_assets/science/virtual_labs/E05/E05.html

What are some characteristics of waves?

When a rhythmic disturbance passes through a medium such as a solid, liquid, or gas, a wave is formed. For example, vibrations that disturb the air create sound waves. An earthquake creates wave disturbances that pass through earth and solid rock. Water waves are ripples that travel over water, disturbing the water's calm surface. In each case, a wave travels through the medium because when one area of the medium is disturbed, it "pushes" against neighboring areas, which in turn push their neighboring areas. As the reaction continues, the wave travels away from the place where the disturbance occurred. The speed at which the wave travels through the medium depends on the properties of the medium.

Waves have three measurable characteristics: amplitude, frequency, and wavelength. The amplitude of a wave determines the magnitude of the disturbance. Amplitude is determined by measuring from the wave's rest position to its maximum height. The crest of a wave is the point of maximum disturbance above the rest position, and the trough of a wave is the point of maximum disturbance below the rest position. The amplitude measured to the crest is the same as that measured to the trough.

The frequency of a wave is a measure of how quickly or slowly the wave pattern is repeated. Scientists measure frequency by watching a single point and counting the number of wave crests that pass by it each second.

The wavelength of a wave is the distance between a point on one wave to the identical point on the next wave, such as from crest to crest or from trough to trough.

In this Virtual Lab you will explore the characteristics of waves by measuring water waves that have various frequencies and amplitudes and recording the data in the Table.

Objectives:

- Identify characteristics of waves.
- Discover the relationship between wavelength and the frequency of a wave.
- Relate the amplitude of a wave to the magnitude of disturbance of a medium.

Procedure:

1. Select a speed and a size for the plunger.
2. Click the Start Plunger button to start the plunger generating waves.
3. Click the Step button repeatedly to stop the wave and see each step of its motion. Click the Play button to return to normal motion.
4. Using the grid, measure the wave's amplitude and wavelength. Using the timer, measure the frequency of the wave. Record your measurements in the Table. Click the magnifying glass to see a detailed view of the wave.
5. Repeat steps 1-4 for various combinations of speed and size.
6. Answer the Analysis Questions

Name: _____

Period: _____

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Data Collection: How Plunger (Disturbance) Speed and Size Affects Wave Characteristics

Plunger Speed	Plunger Size	A Amplitude (cm)	ʎ Wavelength (cm)	Frequency (waves/sec)

Analysis Questions

1. What does the plunger represent?

2. How does the size of the force/disturbance affect the amplitude of the waves? Support your answer with data from your data table.

3. Does the speed of the disturbance affect the amplitude of the wave? Support your answer with data from your data table.

4. How does speed affect the frequency? How does it affect the wavelength?

5. What is the relationship between wavelength and frequency? Support your answer with data from your data table.

6. Which combination of plunger speed and size creates waves with the most energy? Why?

7. Which combination of plunger speed and size creates waves with the least energy? Why?