**Waves, Sound, and Light**

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Hr. 1 2 3 4 5 6 7 8

**What are some characteristics of waves?**

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

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 through 5 for various combinations of speed and size. Record your findings in the

Table.

6. Answer the questions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Plunger speed | Plunger size | Amplitude  (cm) | Wavelength  (cm) | Frequency  (Waves / Second) |
| Slow | Small |  |  |  |
| Fast | Small |  |  |  |
| Super Fast | Small |  |  |  |
| Slow | Medium |  |  |  |
| Fast | Medium |  |  |  |
| Super Fast | Medium |  |  |  |
| Slow | Large |  |  |  |
| Fast | Large |  |  |  |
| Super Fast | Large |  |  |  |

What are some characteristics of waves?

Question 1 :How does the size of the ball on the plunger affect the amplitude of the waves?

Question 2 :What affect, if any, does increasing the speed of the plunger have on the frequency of the waves?

Question 3 :What affect, if any, does increasing the speed of the plunger have on the wavelength of the waves?

Question 4 :What is the relationship between the frequency and the wavelength of a wave?

Question 5 :What affect, if any, does frequency have on the amplitude of a wave?

Question 6 :What relationship exists between the amplitude of a wave and amount of disturbance in the water?

Graph:

Plunger Speed Plunger Speed Plunger Size Plunger Size

Frequency Amplitude Wavelength Amplitude