Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Mechanical Waves- Waves on String Lab (Phet)**

**Objective:** Explore the properties of transverse and longitudinal wave.

**Part 1: Exploring amplitude and compressional waves**

Background video: <https://www.youtube.com/watch?v=RVyHkV3wIyk>



Waves on a String Lab Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_

<https://phet.colorado.edu/sims/html/wave-on-a-string/latest/wave-on-a-string_en.html>

# Set up the Simulation

|  |
| --- |
| *v* = *f* λ |

1. Go to Schoology and open the **Waves on a String Simulation** on your iPad
2. Set the simulation to **Oscillate** (top left)
3. Set the simulation to **No End** (top right)
4. Set damping slider to **None** and tension slider to **High** (bottom middle)
5. Check the box for **Rulers** (bottom right)

# Describe

Click the “Oscillate” button. Describe what is happening

|  |  |
| --- | --- |
| Description |  |
| Drawing |  |

# Data

Measure wavelength and calculate speed in the table below. Move the Frequency and Amplitude sliders to the numbers listed in each row. Let the wave run for a few seconds and then pause the waves and use the ruler to measure the wavelength. Record your wavelength and use that value along with the frequency to calculate speed (leave in cm for this)

|  |  |  |  |
| --- | --- | --- | --- |
| Amplitude | Frequency | Wavelength (cm) | Speed (cm/s) |
| 0.75 cm | 1.50 Hz |  |  |
| 1.25 cm | 1.50 Hz |  |  |
| 0.75 cm | 2.10 Hz |  |  |
| 1.25 cm | 2.10 Hz |  |  |
| 0.75 cm | 3.00 Hz |  |  |
| 1.25 cm | 3.00 Hz |  |  |

# Analysis Questions

1. How does changing the **Frequency** affect the wavelength? (may use illustrations to help explain)
2. How does changing the **Amplitude** affect the wavelength?
3. How does changing the **Frequency** affect the wave speed?
4. How does changing the **Amplitude** affect the wave speed?
5. If you lower the frequency of a wave on a string you will
	1. Lower its speed
	2. Increase its wavelength
	3. Lower its amplitude
	4. Shorten its period

6. \_\_\_\_\_ What is the relationship between the amplitude of a wave and its speed?

1. The amplitude of a wave is independent of its speed.
2. The amplitude of a wave is directly proportional to its speed.
3. The amplitude of a wave is directly proportional to the square of the inverse of its speed.
4. The amplitude of a wave is directly proportional to the inverse of its speed

7. Consider this wave approaching a fixed end \_\_\_\_\_\_ Which shows the wave after it reflects?

****

# The Bounce

1. Set the simulation to **Pulse** (top left)
2. Set the simulation to **Fixed End** (top right)
3. Keep damping slider set to **None** and tension slider set to **High** (bottom middle)

|  |
| --- |
| Describe with words or drawings what happens when the wave makes it to the other end of the string: |

# Standing Waves

1. Keep the simulation set to **Oscillate** (top left)
2. Keep the simulation set to **Fixed End** (top right)
3. Keep damping slider set to **None** and tension slider set to **High** (bottom middle)
4. Set Amplitude to 0.10 cm
5. Set Frequency to 1.30 Hz

|  |  |  |
| --- | --- | --- |
| # of Standing Waves: |  | Draw a picture of the standing waves formed: |
| # of Wavelengths: |  |

6. Draw a compressional (longitudinal) wave and label the rarefactions and compressions