Name__Asrar / Sara / yasmeen__   Date_____

14/15

Learning Goals:
- You will be able to measure wavelength on a transverse wave.
- you will be able to explain how amplitude is not related to frequency or wavelength.
- you will be able to explain how frequency and wavelength are inversely related.
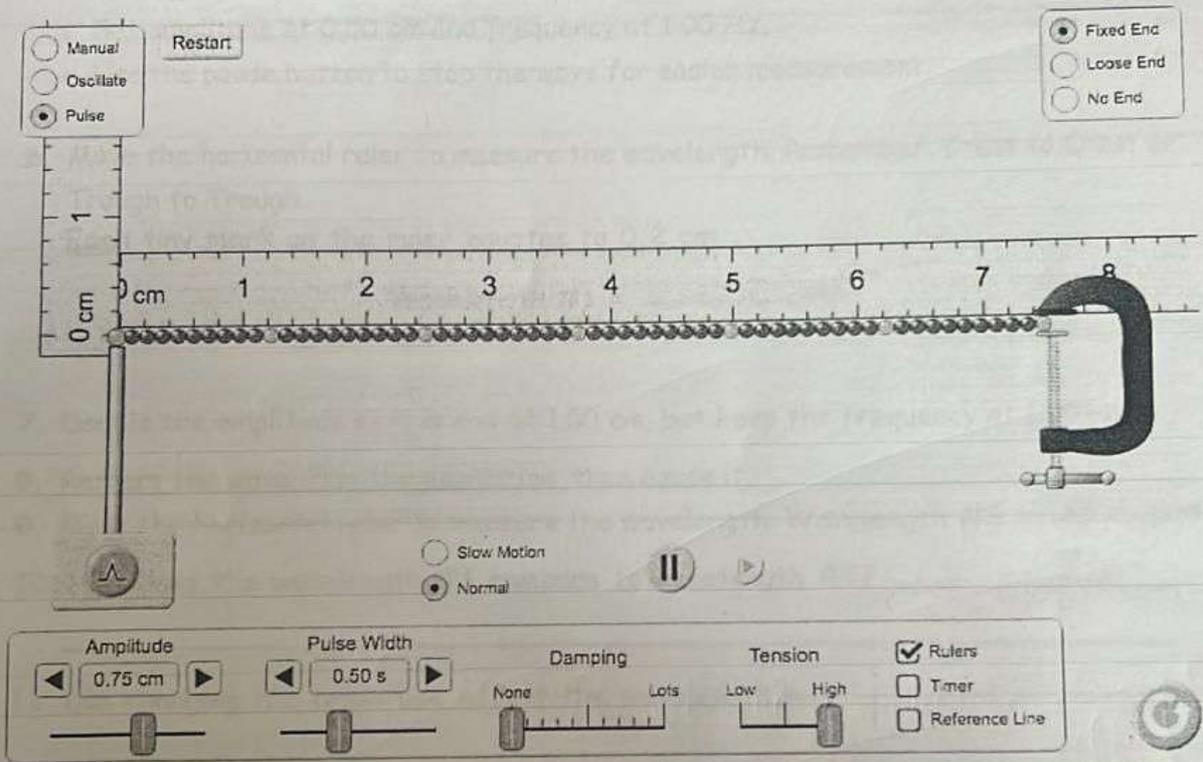
Set Up
Click on the Wave On A String Link.
1. Set the top controls to **Pulse** and **Fixed End**.
2. On the bottom menu:
   - Move the **Damping** slider to None
   - Keep the **Tension** at High
   - Check mark **Rulers**, and move the rulers to look like the image below.

Wave on a String   PhET ≡

The green button will send a single pulse:

First Activity: Amplitude

1. Hit the green button once to generate a pulse. What happens to the pulse
   Bounce
   when it reaches the fixed end?
2. To stop the wave but keep all settings the same, click Restart. ❘ Restart

3. Which slider will adjust the starting height of the wave? _Damping_
   $0.75 \times 2 = 1.5$ cm
4. What is the maximum height possible?_____

5. Which slider makes the height of the wave decrease as it travels? _Damping_

Second Activity: Wavelength and Amplitude

- Set your controls to | ⦿ Oscillate | and | ⦿ No End | .

- Select Slow Motion   ⦿ Slow Motion
- Set amplitude at 0.50 cm and frequency at 1.00 Hz.
- Use the pause button to stop the wave for easier measurement.

6. Move the horizontal ruler to measure the wavelength. Remember: Crest to Crest or
   Trough to Trough.
   Each tiny mark on the ruler equates to 0.2 cm

   Wavelength #1 = ___6.2___ cm

7. Double the amplitude so it is now at 1.00 cm, but keep the frequency at 1.00 Hz.

8. Restart the wave. Play the oscillation, then pause it.
9. Move the horizontal ruler to measure the wavelength. Wavelength #2 = _6.2_ cm

10. How does the wavelength #1 compare to wavelength #2? _not change_

_____

11. Did changing the amplitude affect the wavelength? _no_____

Third Activity: Wavelength and Frequency

- Set your controls to ⊙ Oscillate and ⊙ No End and ⊙ Slow Motion
- Keep amplitude at 1.00 cm and change the frequency to 1.50 Hz.
- Use the pause button to stop the wave for easier measurement.

12. Move the horizontal ruler to measure the wavelength. Wavelength 4.2 cm
   #3 =

13. Set the frequency so it is now at 2.00 Hz, but keep the amplitude at 1.00 cm.

14. Restart the wave. Play the oscillation, then pause it.

15. Move the horizontal ruler to measure the wavelength. Wavelength 3 cm
   #4 =

16. Set the frequency so it is now at 3.00 Hz. Keep the amplitude at
   1.00 cm.   2.1 cm

17. Restart the wave. Play the oscillation, then pause it.

18. Move the horizontal ruler to measure the wavelength. Wavelength
   #5 =

19. Summarize your data in the chart below.

Data #	FREQUENCY (Hz)	WAVELENGTH (cm)
#1	1.00 Hz	6.2
#2	1.00 Hz	6.2
#3	1.50 Hz	4.2
#4	2.00 Hz	3
#5	3.00 Hz	2.1

20. Why did the summary chart not include any information about the amplitude?
   Because it's fixed. Amplitude doesn't affect the wavelength.

21. Did changing the frequency affect the wavelength? yes

22. As the frequency increased, what happened to the wavelength? decreased

23. What happens to the wavelength of a wave if the frequency is doubled?
   $\lambda_2 = \frac{1}{2}\lambda_1$

24. What happens to the wavelength of a wave if the frequency is tripled?
   $\lambda_2 = \frac{1}{3}\lambda_1$