Name:

Date: _____ Period: ____

Wave on a String Lab

PART A: MANUAL

- 1. Go to the PhET simulation <u>Wave on a String</u>. This is linked on my website(mrwadnizak.weebly.com).
- 2. Turn on the <u>ruler</u> and the <u>reference line</u> by clicking the box in the bottom right of the screen (A). Move the reference line so it is lined up red and green dots.



- 3. Change the End to **<u>No End</u>** (B).
- 4. SET: **Damping** = None **<u>Tension</u>** = low.
- 5. Move the wrench up and down to create waves.
- 6. Practice using the wrench to make a wave shape.
- 7. Pause the simulation to see your waves. Is it possible to measure them? Adjust the rulers if necessary.
- Create a consistent wave with an <u>amplitude of about 1.0 cm.</u> Use the slow motion function if you need to. Practice until you get a good one.
- Pause the simulation. <u>Draw and label</u> your wave below with all of the <u>actual</u> measurements. These
 may need to be an average of the waves you can see on the screen.

- 10. Keep the **amplitude** the same and try to increase the **frequency** of your wave.
- 11. Change the Damping slider to "Lots" as you make waves. <u>Describe</u> what happens to the wave. Play with the in between values, too. Change it back to <u>None</u> when you are done.

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12. Change the Tension slider to high as you make waves. Describe what happens to the wave. Change it back to low when you are done.

- 13. In the upper right hand corner of your screen, change the end of the string to loose or fixed (B).
- 14. Make a wave like the one you did in steps #7-8. Pay attention to what happens when it bounces off of the end.
- 15. Describe/diagram what you see for 2 types of endings. Pay close attention to how the amplitude changes.

Fixed End	Loose End	

PART B: OSCILLATE

- 16. Change from "Manual" to "Oscillate" in the upper left corner of the screen (C).
- 17. Make sure it's on **No End** in the upper right corner of the screen (B). **Damping = none; Tension = low**

18. DO NOT CHANGE ANYTHING ABOUT THE WAVE YET!

- 19. Measure the period of the default wave for 10 waves. Use the timer under the ruler checkbox (A)
 - a. You can slow the wave down by changing from Normal to Slow Motion (D)
 - b. You can also click on the Pause button (E) to stop the wave.

20.

- a. Time for 10 waves = _____
- b. Time for 1 wave or Period (T) = _____
- c. $Frequency = \frac{1}{Period(T)} =$

21. Measure the wavelength of the wave. Wavelength = _____ cm

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22. Change **ONLY** the amplitude.

Amplitude (cm)	Wavelength (cm)	Wave Drawing
0.25		
0.75		
1.25		

23. What effect did the change in amplitude have on the wavelength?

- 24. Change the amplitude back to 0.75 cm.
- 25. Change **ONLY** the frequency to:

Frequency (cm)	Wavelength (cm)	Wave Drawing
0.25		
1.50		
3.00		

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26. Based on this activity, what is the relationship between wavelength and frequency? Use detail and actual data from the lab.

Waves: Use visual and mathematical representations to model the properties of waves.

4 Highly Proficient	3 Proficient	2 Close to Proficient	1 Developing
 Lab is complete and includes detail. Advanced knowledge of waves is shown. <u>Actual data</u> is used as evidence to explain the relationship between wavelength and frequency. 	 I can show strong understanding of the different properties of waves. The lab is complete and answers are <u>mostly</u> correct. My work is neat. 	 I can show <u>some</u> understanding of the properties of waves. Some of my information is <u>incorrect</u>. My work needs more detail. My work is <u>incomplete</u>. My work is rough draft quality. 	 I show <u>little to no</u> understanding of the properties of waves. Not attempted or mostly incomplete.