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| ­­­ | Physical Science  **Simulation – Waves on a String**  *ATAR Physics Year* *11* |
| Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |

This lab uses the Waves on a String simulation from PhET Interactive Simulation:

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

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| **Objectve** |
| 1. Discuss wave properties using common vocabulary. 2. Predict the behavior of waves through varying mediums and at reflective endpoints. 3. Use scientific vocabulary for wave properties and behavior. |

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| **Develop your understanding**: |
| Open the Waves on a String simulation, then investigate wave behavior – as you explore, think about how you would describe waves and some reasons the waves might act the way they do. Especially, look at **Oscillate** with **No End** setting. Play with **Amplitude**, **Frequency**, and **Tension**. What is the effect of **Damping**? |
| Tips: Later during this lab, you will relate your own descriptions to scientific ones. It is important that you have your own words to begin your learning, so don’t do any research yet. Also, learning is best when you make your own drawings. |

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| **Explain your understanding** |
| 1. Write a list of characteristics to describe the waves. Describe each characteristic in your own words so that any person could understand waves. Use images to help with the descriptions. |
| **Wave Characteristics:** |

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| **Experiment: Relationship between tension, wavelength and frequency** |
| Set to “Oscillate” and “No End” – Keep the ruler and timer on  Set the frequency to 1 and tension to low  Make your measurements and fill the table below:   * **Measure the time** *(how?)* it takes for a wave to travel the length of the string **(e.g. 6 cm)** * **Measure the length** *(how?)* of a single wave length. * Do the same measurements at **Frequency** = **2** and **3** * Repeat the experiment at moderate and high **tension** |
| *Results*:   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Tension** | **Frequency** | **Time to travel the length of the string** | **Wavelength** | **v = s/t** | **f** x **l** | |  | *(Hz)* | *(s)* | *(m)* | *(m/s)* | *(units?)* | | Low | 1 | 4.86 | 1.25 | 1.24 | 1.25 | | Low | 2 | 4.80 | 0.62 | 1.25 | 1.24 | | Low | 3 | 4.87 | 0.42 | 1.23 | 1.26 | | Moderate | 1 | 1.62 | 3.75 | 3.70 | 3.75 | | Moderate | 2 | 1.59 | 1.85 | 3.77 | 3.70 | | Moderate | 3 | 1.59 | 1.24 | 3.77 | 3.72 | | High | 1 | 0.99 | 6.22 | 6.06 | 6.22 | | High | 2 | 0.97 | 3.15 | 6.18 | 6.30 | | High | 3 | 0.98 | 2.10 | 6.12 | 6.30 | |
| ­­­ Conclusion:  1. If the tension remains constant and the frequency increases, what happens to the wavelength?  Wavelength reduces  2. Is there any pattern in the last two columns of the table (speed and Frequency X wavelength)?  They are all only affected by tension.  3. Based on the data, determine the relationship between frequency, wavelength and speed of a wave.  Speed = wavelength \* frequency |