Name : ____ Date: ______________________

Investigation – Wave On A String

In this lab you will be taking measurements (wavelength and time period) from a wave simulated by a computer application. You will use these measurements to create a graph by hand. From your graph you will find the speed of the wave.

1. ***Setting up the math***. There are two equations that we will be working with: $v = \lambda f$ and $T = \frac{1}{f}$. In the space below, state what each of the letters in the formulas stand for.

____

____

____

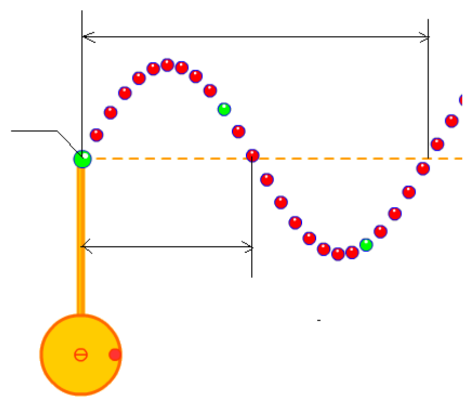
2. ***More math set up***. After you have collected you data, you will be creating a graph of λ vs. T (y vs. x). Using the equations given in step 1, show that the relationship between T and λ is given by the equation: $\lambda = v \times T$.

____

____

____

3. ***Terminology***. On the diagram below, label the following: *half-a-wavelength, wavelength, source of disturbance (SOD).*



4. ***Setting up the program***. Start the program as instructed by your teacher and make sure that the settings are as given below:
   a. Set the *Amplitude* to 60%.
   b. Set the *Frequency* to 15%.
   c. Set the *Damping* to 0%.
   d. Set the *Tension* to high.
   e. Check the boxes for *Rulers* and *Timer*.
   f. Set the radio buttons to *Oscillate* and *No end*.
   g. Press *Pause*.
   h. Drag the horizontal ruler until it is lined up with the horizontal dashed line, and its zero is at the left end of the string.

Name : ____ Date: ______________________

Investigation – Wave On A String

5. ***Using the step button***.
   a. With the program paused, you can use the step button to incrementally advance the motion of the wave. This will allow you to measure the wavelength. Step the program forward until the SOD is at an amplitude of zero (at equilibrium position). You should be able to use the ruler now to measure a full or half wavelength.
   b. With the program paused and the SOD at equilibrium, *reset* then *start* the timer. Step the program forward until the SOD has gone through one complete cycle. You can read the time period from the timer.
6. ***Taking your measurements***. You will be doing 10 trials by taking measurements of *wavelength* and *time period*. Start with *frequency* at 15% and then increase it by 5% for each trial. Record your data in the data table provided below. Make sure to write the units for you measurements in the spaces provided.

Wavelength (λ) /										
Time Period (T) /										

7. ***Making a graph.*** Use the data you collected to make a professional looking graph of λ vs. *T* (y vs. x). Draw a line of best fit through the points, and find the equation of this line of best fit. Do this work ***on the graph paper*** by labeling the two points you are using for your slope and showing all of the math on the graph paper. Be very neat. In the space provided below write the equation for your line of best fit and circle the value of the slope.

____

____

8. What are the units for the slope you calculated? *Hint: use the axes of your graph to help you*.

____

____

9. In step 2 you developed the equation: $\lambda = v \times T$. Explain why the slope of the line is *v* and then state the speed of the wave, *v*, in *cm/s*.

____

____

____

____