ACTIVITY #6 USING A WAVE SIMULATION TO DETERMINE A RELATIONSHIP

Problem:

What is the relationship among speed, frequency and wavelength of a wave?

Materials:

Computer able to run the simulation found at

http://phet-web.colorado.edu/simulations/stringwave/stringWave.swf

Procedure:

- 1. Set up the simulation with "Pulse" and amplitude near 72, a pulse width near 32, damping near 14, and a tension medium high. (Note its position.)
- 2. Turn on the ruler and timer functions by clicking on their icons. They should be checked when they are on.
- 3. Select pulse from the choices on the bottom left.
- 4. Select and observe the effect of clicking on the green pulse icon.
- 5. Reset.
- 6. Use the timer function to time the seconds required for the pulse to travel a distance of 50cm, (0.50m). Press "Pulse" and let the wave start. You can then press start and stop on the timer to measure the time. By using the reset button, you can make several measurement and then average.
- 7. Record the time in the data section provided below.
- 8. Calculate the pulse's speed as you record your equation and answer in the calculation space provided below. Be careful to include the correct unit in your answer.
- 9. Change the selection from pulse to oscillate. Set frequency to about 15.
- 10. Once a standing wave is established, use the timer to measure the time required for 10.0 complete oscillations to occur.
- 11. Record the time in the data section provided below.
- 12. Use the pause/play arrow in the center of the screen to stop the oscillations at a convenient position.
- 13. Use the ruler to measure 3.0 complete wavelengths.
- 14. Record the distance in the data section provided below.
- 15. Calculate the frequency of the oscillations as you record your equation and answer in the calculation space provided below. Be careful to include the correct unit in your answer.
- 16. Calculate the wavelength of the oscillations as you record your equation and answer in the calculation space provided below. Be careful to include the correct unit in your answer.
- 17. Multiple the values of the frequency and wavelength as you record your equation and answer in the calculation space provided below. Be careful to include the correct unit in your answer.
- 18. In the conclusion section of this report, compare and discuss the answers to questions #8 and #17.
- 19. Change the tension to some other value. (Note its position.)
- 20. Repeat from step #5 to step #18 using the new tension.
- 21. In the conclusion section of this report speculate as to the relationship between tension and speed of this oscillation.

Data Table

Trial # 1 Original Tension			Trial # 2 New Tension		
Time for the	Time for 10	Distance of	Time for the	Time for 10	Distance of
pulse to	oscillations to	three	pulse to	oscillations to	three
travel 50 cm	occur	wavelengths	travel 50 cm	occur	wavelengths

Calculations:

(Circle your answers.)

Trial # 1 Original Tension

Trial # 2 New Tension

- 1. Speed of pulse
- 2. Frequency of oscillation
- 3. Wavelength of oscillation
- 4. Product of frequency, f, and wavelength, λ .

Conclusion(s):