Waves and Sound Computer Activity Name______Block _____ Physical Science A Answers don't need to be long, but they need to be in complete sentences!

Waves – PhET website

To get to the PhET physics simulations, the best method is to go to Google, search for "phet", and click on the first link. Click on the Simulations button on the home page. Then, scroll through the left menu until you find the topic you want – in this case, Sound and Waves.

1) Open the "Wave on a String" simulation. With your mouse, wiggle the first bead to send waves down the string. Note how they reflect back. Adjust Tension to see how High and Low tension affect the speed of the waves.

2) Set the Tension to High. Select Oscillate to make a machine create the waves. Leave these buttons at those settings until directed to change them!

3) Select No End to let the waves travel out the door (meaning they never reflect back).

4) Increase and decrease the Damping slider.

A) How do the waves change as damping is increased?

5) <u>Set the damping to zero</u> and the amplitude to 100%. This "amplitude" is not actually a distance, it is just the maximum the computer will make. Set the amplitude to 0, 40, 60, and 100. (You can also just type the number into the box instead of using the slider, but do not use the backspace key!)

B) As the amplitude is increased, what happens to the wave?

6) Adjust the frequency slider.

C) As frequency is increased what happens to the rate at which waves are made?

D) What does increasing the frequency do to the wavelength?

7) Keeping the amplitude constant at 50, adjust the frequency slider to 25, 50, and 70. Using the <u>onscreen</u> timer, measure the amount of time it takes to complete <u>15 full cycles</u> at each frequency setting.

E) f= "25": 15 waves, _____s f= "50": 15 waves, _____s f= "70": 15 waves, _____s

8) At each setting, calculate the <u>period</u> of the wave. This is the amount of time it takes to make each wave, or the seconds per wave.

F) "25": $T = _$ sec "50": $T = _$ sec "70": $T = _$ sec

G) As frequency is increased, what happens to the time between each wave?

9) The "frequency" slider does not match the actual frequency in Hertz. Calculate the <u>actual frequency in Hertz</u>. Frequency is the number of <u>waves per second</u>. One wave per second equals 1 Hertz (1.0 Hz).

H) "25": f = ____ Hz "50": f = ____ Hz "70": f = ____ Hz

10) At the same frequencies from the previous problem, measure the <u>wavelength</u> using the <u>onscreen</u> ruler. You can measure from crest to crest, trough to trough, or any part to the next matching part. You will need to run the animation for a few seconds at each new frequency, and pause the animation to measure the wavelength.

I) "25": λ	=	cm	"50": λ =	_ cm	"70": λ =	_ cm
	=	m	=	m	=	m

11) Calculate the velocity of the waves, for each <u>ACTUAL</u> frequency. (v = λf) VELOCITY = WAVELENGTH x FREQUENCY m/s = <u>meters</u> x <u>waves</u> wave second J) f= "25": v= ____ m/s f= "50": v = ____ m/s f= "70": v = ____ m/s

NOTE: Since the waves are traveling through the same medium (high tension string), they should all have the same speed. Do your answers match up? Check your math!

** Extra Credit ** : Reduce the tension from "High" to "8 Tenths" and repeat steps 7 through 11. Record your data on a separate sheet. In one or two sentences, explain what happens to frequency, wavelength, and velocity as tension is increased.