Wave Superposition

Name:_____ Date: _____

Instructor: _____

Teammates

1.- _____ 2.- _____

3.- _____ 4.- _____

Instructions: Follow the steps on this worksheet, using your lab manual as a guide, unless directed to do otherwise by your lab instructor. Show at least one sample calculation for each step. Box final mathematical results. Do not forget the units.

1 Data

1. Measure and record the mass and length of the sample string provided by your instructor.

2. Without disassembling your setup, measure and record the length of the string in your setup.

3. For the tension corresponding to the 150 g mass, find and record the frequencies, f, that give well-defined envelopes for $n = 2, 3, 4$, and 5. Calculate and record the wavelength, λ, and period, T, associated with each value of n. Calculate and record the velocity, v, associated with each value of n. The velocity is given by $v = f\lambda$. Tabulate **all** of your data neatly.

4. Repeat the process in Problem 3 for the tension corresponding to the 300 g mass.

2 Analysis

1. Find the mass per unit length, μ, in kg/m of the sample string provided by your instructor.

2. Calculate the tension force (F), in N, for suspended masses of 150 g and 300 g.

3. Calculate the wave velocity (v_p), using Newton's Second Law in m/s, for suspended masses of 150 g and 300 g. Include the mass of the hanger in the masses.

4. Make a plot of wavelength versus period and use it to determine the velocity associated with each mass. Compare the velocities to those you calculated in Problem 3.

5. Find v_{300g}/v_{150g} for your data. What should it be theoretically?