SC-1, S-2: Standing Waves and Sound **Name**_____
Lab Worksheet **Group member names**_____

This sheet is the lab document your TA will use to score your lab. It is to be turned in at the end of lab. To receive full credit you must use complete sentences and explain your reasoning clearly.

SC-1 Transverse Standing Waves on Strings:

In this lab you will do Procedures I and II about vibrating strings, but not Procedure III about a vibrating drum head. Your TA has a computer animation to help you visualize how standing waves are generated by the superposition two traveling waves.

Procedure I:

The lab manual has all the instructions for setting up the experiment. Below are places for you to record your data, show your calculations, and discuss your results.

1) The experiment is easier to do if L is greater than 1 meter. Your TA will provide you with enough string. It is also suggested to keep the length of sting between the pulley and the hanging mass as short as is practical. Record L.

   L = _____

2) Weigh your string and compute μ in g/m before you tie knots in the string. Show your calculations.

   μ = _____

Perform the experiment in part 4.

3) Calculate and record your predicted tension for the mode you choose, which mode you choose, and the actual tension required to make that mode have the largest amplitude. Show your calculations and sketch the shape of the mode.

   Predicted tension, F_T = _____ Mode _____ Required tension, F_T = _____

4) How do the two tensions compare?

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Perform the experiment in parts 5-8.

5) Record the total hanging mass and calculate the tension in the string. Show your calculation.

Mass = _____ F_T = _____

6) Following the instructions in your lab manual, adjusting the driving frequency to get the greatest amplitude in the 2nd mode (two humps). Record f_2 in the table below. Continue increasing the driving frequency and find the largest amplitudes for as many higher modes as you can, perhaps 4 more. Record those frequencies in the table below.

f_2	f_3	f_4	f_5	f_6

Analysis

7) Do the calculations in part 1 and enter the values below. Show all your calculations.

n	2	3	4	5	6
f_1					

f_1 ave. = _____

8) Now calculate the velocity of waves in the string. Show your calculation.

v = _____

9) Now calculate the mass per meter, μ, of the string. Show your calculation and comment on how this value compares with the measured value from part 4.

μ = _____

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Procedure II:

1) Collect and record data for this part in the table below. It is suggested that you use Excel to generate the plots. Using complete sentences answer the questions, both 1 and 2.

mass						
frequency						

Tape or staple copies of your plots below and answer the questions.

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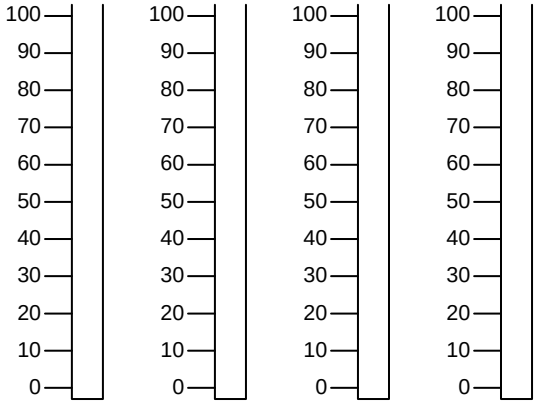
S-2 Velocity of sound in Air:

In this lab you will only do Suggestion 1.

1) Follow the directions in the lab manual and record the water levels for maximum resonance on the tube diagrams below. You will likely find only three, depending on the frequency of the tuning fork. Mark the water level and draw the waveform in the tubes below. Calculate the wavelength for each *n* and record below.



n = _____ _____ _____ _____

h = _____ _____ _____ _____

λ = _____ _____ _____ _____

2) Record the tuning fork frequency and calculate the velocity of sound in air. Show all your calculations and comment on how close it is to 343m/s.

f = _____