Physics 6

Lab Manual

LACC Physics Faculty

Lab Report Guidelines for Physics 6

There will be approximately eight laboratory experiments performed during the semester for Physics 6. *For each experiment a lab report is due approximately one week after the lab is completed*, (the instructor will indicate the exact due date). The basic information to include in the reports is a description of the experiment, a complete set of data obtained during the experiment, analysis and interpretation of the data, and a conclusion section. By including the following sections, in the order given, you will be writing a complete report*.

1. Cover Page. The cover page should include your name, the name of the experiment, as well as the date you performed the experiment. Also include the names of your lab partners.

2. Lab Manual. Including the actual lab manual in your report provides an accurate description of the experiment.

3. Original Data Sheets. Include any original sheets of paper where data was recorded, plus all graphs and tables printed from the computer.

4. Principle's Section. The principle's section should provide a description of the underlying Physics principles, laws and facts that are being tested by the experiment. This section should also include the derivation of any specific formulas that are to be used in the analysis section. Usually the lab manual will suggest which formulas need to be derived in the principle's section.

5. Calculations and Analysis. The calculations and analysis section should contain all the calculations and error analysis suggested in the lab manual. Carefully answering all the questions and performing all the calculations suggested in the C and A section of the lab manual will complete this section.

6. Tabular Summary. The tabular summary should summarize your calculations by listing the experimental and theoretical values together with the percentage errors of all the important quantities calculated in the analysis section.

7. Conclusion. The conclusion section of the report should include two parts. A brief summary of the purpose of the experiment, including your observations of the physical results, and a statement concerning the factors which may have caused a discrepancy between the experimental and theoretical results, in other words, a statement about the sources of error in the experiment. Try to include at least three well thought out possible occurrences where errors may have crept into the results of your experiment.

Although it is not required, you are encouraged to write your reports on a computer using word processing software and perhaps a mathematical program (like Excel or Mathematica) to help do calculations and graphical analysis. *If you choose to write your report by hand, please write in ink and not pencil! A neat and organized report is definitely a factor in the lab report grade.*

You may discuss your lab reports, and check your calculations with your lab partners and other members of the class, but *it is essential to write the report yourself.* When writing the principle's section and the conclusion section, *be sure to put your ideas in your own words*, and **do not simply copy the principles or purpose sections from the lab manual**. Try to express yourself clearly and correctly, even though grammatical and spelling errors will not be counted against you.

***Note**: Alternate lab report formats (such as a 'technical journal format') are acceptable as long as a discussion of principle's, calculations, results, and a conclusion are included. If you are interested to write your lab report in a different format than the one presented here, please see instructor to discuss the alternate formats.

Velocity of Sound

(Physics 6, Experiment # 7)

Purpose:

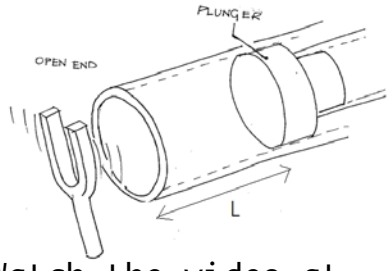
To determine the velocity of sound in air by measuring the wavelength of standing waves of a known frequency.

Apparatus and Materials Needed:

Telescoping resonance tube
Support for tube
Three tuning forks of different frequency
Rubber striking mallet
Thermometer
Meter stick

Procedure:

Select tuning forks with different frequencies. When striking the forks, only use the rubber mallet as hitting them against a hard object will cause them to go out of tune and they will vibrate with an unknown frequency. Starting with the plunger in the resonance tube as far out as possible, slowly move it inwards while listening to the sound that is created when a vibrating tuning fork is placed in front of the open end. You may have strike the fork again during this period. You will notice that for a particular position of the plunger, the sound emanating from the open end seems louder than at other positions. Measure the distance between the front of the plunger and the end of the tube and call this distance L_1 in your lab notes. Now, again with a vibrating tuning fork held at the open end of the tube, continue to move the plunger inwards from this first point of resonance and listen for the second point of resonance that is closest to the first one detected. Measure the distance between the front of the plunger and the open end of the tube and call this distance L_2 in your notes. Record the frequency of vibration of the tuning fork, L1, and L2 in your lab notes. Repeat the measurement twice more using a different tuning fork each time. Record the air temperature in the room. Make a careful sketch of your apparatus in your notes and record all details that you think are important.



Watch the video at
https://www.youtube.com/watch?v=CM5IFM0N1bE
Virtual LAB found at the 9:55min mark of the video.

Questions and Analysis

1. Present your experimental data in the form of a table. Clearly indicate the units and give each column an appropriate heading. Give the table a meaningful title.

2. Sketch a diagram of the pressure waves in the tube for consecutive points of resonance. Is it possible to determine which harmonic has been excited?

3. Use your data to determine the speed of sound in the tube for each set of measurements. Clearly show your working and determine the average value

4. The speed of sound in air is empirically related to the air temperature according to the following formula: $V_T = 331 + 0.61T$. Where V_T is the speed of sound in air in m/s and T is the the air temperature in °C. Compare your result with that predicted by the empirical equation and calculate the % error.

5. In your conclusion, in addition to discussing your results, discus what other factors might affect the speed of sound in the tube and the frequency of resonance of a tube closed at one end.

Include your original lab notes in your write up.

Name of Student: _____

Date Performed: _____

Instructor's Initial: _____