Modern Physics Lab
Physics 252

This document gives you guidelines about writing your lab reports.

First, we have to emphasize that you must hand in your own individual lab report, written by you with no outside help. You will have a lab partner, or two, and you will have the same data. However, each student must evaluate the data independently, and write an original lab report.

Lab Write Up Guidelines

Please follow these specified guidelines. It is a good practice to separate and label each section and to keep the subject matter of each section distinct to streamline writing and prevent redundancy. The entire report, including equations and tables should be typed and plots should be done digitally. If you will have trouble with this please contact your TA ASAP.

If what you write is not clear and we do not understand what you are saying, we cannot give you credit. Please proof read your work before you submit it. Additionally, less is more. Writing long, dragged out reports with superfluous information and repetition will not get your more points and will more likely a negative effect on your grade. Be as concise as possible while ensuring you write the necessary information.

An outline for a model lab report is as follows:

A. Introduction and Theory (20 points): In this section you must have statements concerning the overall purpose of the lab (measuring the physical law/concept we are looking to confirm). You must also explain briefly the theory behind this physical concept in words and introduce the relevant equations that define the physical system under study (derivations are not necessary). Historical background is not required. It should be obvious to an external reader we are investigating some physics that has something measurable or observable of interest and that reader should have a basic understanding (an introduction) of what physics they will see in the upcoming sections. They should not know what results you found in the experiment after this section.

B. Procedure (10 points): Describe how the physics law you will be testing is measured. Be sure to comprehensively describe all elements of the experiment so that it can be repeated exactly by a qualified reader. Write this section such that a competent scientist can reproduce your experiment. This means too much detail is a bad thing in this section (i.e brand names and model types of equipment, obvious bits of information like "I will turn on the battery by pressing the on button"). You should make note of important equations for the lab, explain, in detail, the physics in your own words and, using the lab manual, explain the procedure and equipment you will use to test/verify this law.

C. Results and Analysis (50 points): This is highly important; note that this section is worth more than the other sections for a reason. Here you should report your finalized results, which in most cases is results tables and graphs.

Some general rules for reporting your results:

1. Present the results of your experiment, showing the data important enough to quantify your result.
2. If a data table is more than half the page then consider only presenting a representative portion of it in the report, say for a single sample out of a multi-sample experiment (anything more than 10 data points in too much). Another good way to reduce the size of tables in this situation is to process the data (use the equations to get results) and plot them. Again, this depends on the nature of the experiment. However, you should make sure it is clear what equations you use to get processed data, for example a trigonometric relation to turn measured distances into a measured angle.
3. Please make sure that the relevant data is presented in tabular form. Label each column and do not forget to mention the units. Lack of units will be deducted. Additionally, it is extremely important that your results are rounded correctly. Incorrect rounding will also result in a deduction.

The bulk of your report will be analysis. You not only need to analyze your results but also you will need to tie your results to the concept you set out to measure (what you spoke about in the intro). It is unnecessary to

display the mathematical computation of error, but you should use this section to consider what your result (and error) means physically and how it compares to what you expect from theory (and the official results) from reputable (cited) sources. Below are important characteristics of a high quality analysis section.

1. Present your final results with their proper error and discuss their quality in terms of accuracy and precision (A result may be very precise, but far off the mark from where it should be, or it may be right on the mark, but very imprecise. Understanding the quality of your result is the most important part of performing an experiment along with being able to accurately relate that result back to the physics you set out to study).
2. Comparison of the expected results with the experimental results.
3. Discuss the possible sources of error that contributed to your uncertainties and explanation of discrepancies if applicable.
4. Discuss possible approaches to reduce uncertainties or performing the experiment differently that could give a more precise or more accurate result for future attempts.
5. Comment on the significance of your results and why such measurements may be valuable outside of the context of our lab.

D. Conclusion (20 points): This is where you summarize your results. You should restate the purpose of the experiment (the physics concept you wanted to measure), restate your final result or results with the uncertainty and comment again if your result compares to the expected result and reiterate the point that this result infers/confirms some physical law. A good rule of thumb is a reader should be able to understand your report by reading this section (what you wanted to measure by doing this experiment, what you found as a result in your experiment and if what you measured agrees with what you expected to measure).

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