

PHYSICS 120 – PRINCIPLES OF PHYSICS I

THE LAB REPORT

Part I. Content and Format

The lab report is your personal record of the experiment you performed during the lab period. Serious effort should be made to write a careful and complete report according to the format described below. But realize that the lab report needn't be a 30-page thesis; usually, four or five pages of text (not counting tables and figures) are sufficient to summarize purpose and procedure, report and interpret the data, and discuss the results of the experiment. The emphasis here is on effective communication: write clearly and be concise without omitting valuable information. The ultimate test of a good lab report is whether, a year from now, you or someone else can flip through its pages and understand the goals, methods, and outcome of the experiment.

Lab reports are to be typed using a standard 12-point font (Times New Roman is preferred). Double-space the text and use 1.0-inch margins. Figures and tables should be placed in the text where appropriate and not all clustered at the end of the report. The pages of the report should be stapled together.

Organization of the Lab Report

Your lab report should include the following sections. Each of these sections is described more fully below.

1. Title Page
2. Introduction
3. Procedure
4. Data and Data Analysis
5. Results and Discussion
6. Conclusions

Title Page: Here, you should include the title of the experiment, your name (underline it), your lab partners' names, the date you conducted the experiment and the date you submitted the report.

Introduction: If you look at just about any scientific paper, the first few lines are an attempt to put the investigation into context. In particular, the authors indicate the motivation for the experiment (what question was the experiment trying to answer?) and explain why the experiment was important to do. Likewise, you should use the introduction to lay out, in a couple of sentences, the purpose of the experiment in a way that will capture the interest of the audience (remember who the audience is) without giving excessive information. Define all physics terms.

A couple of stylistic notes: First, the lab report should be written, for the most part, in past tense, since you are reporting on activities (measurements, analyses, etc.) that have already happened.

Second, use active voice rather than passive voice. (Example: “We measured the length of the string using a meter stick” versus “The length of the string was measured with a meter stick.”)

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Procedure: In this section, you should describe how you carried out your investigation. Highlight the main steps of the procedure (without going into excessive detail) and let the reader know what measuring instruments were used to obtain the data. Include a sketch of the apparatus if you think it is appropriate (diagrams can be hand drawn, though we prefer computer-generated drawings). If you made a series of measurements over a range of adjustable experimental parameters, or if you needed to take elaborate precautions to get good data, you should explain this. DO NOT list the steps followed like a cook book!! Discuss the procedure in prose form.

Data and Data Analysis: Your experimental findings should be recorded neatly in the form of tables, graphs, or charts. Tables of data should be typed. Insert tables using your word processing software; do not insert sheets from a spreadsheet like Excel.

Data must be accompanied by explanatory text. Imagine you are making a presentation at a conference and you are projecting the graphs and tables onto a screen. Surely you would not display this information without comment! As a rule, then, every data table and graph in your report should have a few words of associated text telling the reader about the information contained in the figure. Also, if certain quantities in your data tables are derived from other data, explain how this is done and give a sample calculation. (Note: sample calculations are not needed for trivial cases; for example, you may assume the reader knows how the average of a set of numbers is determined.) You must include uncertainties with all data.

When presenting data in tables, each column of numbers must be identified with a heading which tells what the numbers mean and in what units they have been measured (example: "v = glider speed in m/s"). Put units only in the column heading. All tables and graphs should have a label (e.g., "Figure 2") and a title (e.g., "Position versus time for a falling ball").

Results and Discussion: This is the most important part of the lab report. Report your main results and discuss their significance. Link your experimental findings to the objectives described in your introduction. Did your investigation accomplish its purpose? Was the final outcome of your experiment consistent with your expectations? Have new questions been raised by your experiment? What were possible sources of error, or false assumptions, which may have skewed your results? Be sure to report what your data and analysis reveal, even if those results don't seem "right". There are real reasons - since we live in a world where laboratory equipment and experimental conditions are not ideal - why experimentally determined numbers and relations may come out "a little off", or even a lot off!

Conclusions: In a short paragraph or two, summarize the main things you learned from your experiment and, where appropriate, make suggestions for improving the experimental procedure or for undertaking new lines of investigation. Did you verify the theory that you investigated? (Please note that at this level you did not 'prove' a theory. That may happen next year, though!)

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Part II. Grading

Each lab report will be graded on the following:

Mechanics - use of proper sentence structures, punctuation, and spelling

Organization - report follows suggested format; paragraphs coherent and focused on theme of each section; tables and graphs are properly labeled and formatted

Content - report clearly identifies the purpose and results of the experiment; thoughtful analysis and evaluation of data; adequate treatment of methods; all of the important data is included.

Summary of Important Points:

- Underline your name on title page
- Include lab partners' names and date on title page
- Do NOT write procedure in cookbook form
- All tables and figures must have a label and caption (plots are figures and should be labeled as such)
- If a table is split between 2 pages, include the column headings on the second page.
- Include sample non-trivial calculations (conversion of degrees to radians, calculation of averages are trivial)
- Include all equations used in analysis with a label (Eq. 1, Eq. 2)
- Make sure all sections are labeled (Introduction, Procedure, Data and Analysis etc.)
- Make sure data in plots are NOT hidden by the information boxes with the fit results
- Make sure there are no data points on the axes
- Units!!! Don't forget units!!
- Do NOT forget errors!!!
- Make sure all figures have a label and a caption
- Do not cut and paste figures from the lab handout – make your own
- Make sure ALL variables are defined – assume the reader is intelligent but has no idea what you're doing (*i.e.*, needs to be told s is the distance between the object and lens).