Laboratory Report Format

Physics 250 - 260 - 270

Laboratory reports in this course consist of the following elements. (A sample lab report can be found on my web site, and I suggest you print it out and refer to it when you write your own reports.)

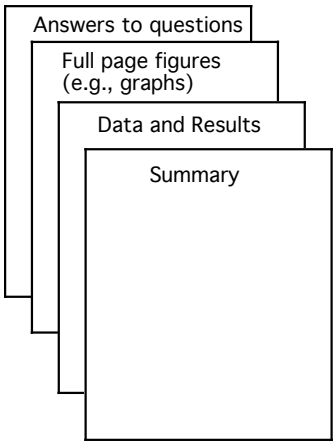

Fig. 1: Order for lab report

Summary: A written description, in your own words and based on your own understanding, of the experiment and of your results. It should include:

- A brief and precise description (one or two sentences) of the purpose of the experiment in your own words. Do not plagiarize the lab handout or the report of another student.

- A brief description (two or three sentences) of the experimental methods — i.e., what was done and *why* it was done in terms of the relevant practical and theoretical considerations. A common mistake is describing the procedure in terms that make it sound like you were just following a cookbook recipe — e.g., "We measured this and that and then plugged them into equation 2…" Another common error is going into far too much detail; generally I do not need to know specifically how you measured things or what instruments you used, but I do want to understand what you measured and why it is relevant to the purpose of the experiment. References to good figures can be very helpful here.

- A guide to the experimental data and results — i.e., what you *found*. Sometimes this will be no more than a few references to the table or tables in which the data and results are clearly indicated, but it is often helpful to comment on certain aspects of the data such as what may have limited the range of any parameters under your control, any important trends that were observed in the measured values, or any unusual problems you may have encountered and how they were overcome.

- Most importantly, your analysis of the results — i.e., what they *mean*. At a minimum you must make clear what your results are, whether they are reasonable, and what specific conclusions you draw from them. Do not include equations in your summary; they should be in the “Data and Analysis” section. However, you can refer to relevant equations by number.

- The summary should be word-processed with double-spaced lines. All other parts of the report can be *neatly* hand-written.

Use first person in your summary. Although not standard in scientific writing, I feel it is clearer to use phrases like, "We measured the height…", than to engage in passive voice constructions like, "The height was measured…". I encourage you to discuss your results with your partners and other students, but your summary must by your own. Keep your summary as brief as possible subject to the need to be clear, precise, and complete. Do not pad it with written repetitions of the data or "feel good conclusions" — e.g., expressions of how much you liked (or disliked) the experiment. Very adequate summaries can easily be written in less than a page. Exceptional summaries may well be longer, but this will be a result of their more detailed and substantial analysis of the results. In every case, however, my evaluation of your summary will be improved if you say whatever you have to say clearly and in as concise a manner as possible.

Data and Results: A concise formal presentation of the data and results on *one page,* unless that is impossible to do. Be sure to note the following:

- All variables should be defined either in words or via reference to simple sketches of experimental apparatus.

- Any important theoretical equation that is used in the analysis should be presented along with a clear indication of how it is to be used. Equations should be consecutively numbered and referred to by number whenever necessary.

- If you word-process this section you should use an equation processor for formulas. For example, I want to see $\frac{1}{2}at^2$ and not (1/2)at^2 or (1/2)at**2. If your word processor cannot format algebraic formulas then write them in neatly by hand. Also use proper scientific notation: 1.23×10^3 and not 1.23E3.

- All measured data and all calculated results should be clearly indicated with **units** in tables. It is not simply "a good idea" to include units on physical quantities; it is absolutely essential. A failure to indicate the units on a physical quantity is a complete failure to provide the value of that quantity. Few mistakes are easier to avoid and none will be more destructive to the score you receive on a lab report.

- Tables should be numbered consecutively and referred to by number whenever necessary.

- Do not clutter up your report with "sample calculations," however, it must be completely unambiguous how every calculated value was obtained.

- I encourage you to work with your lab partners as you analyze your data and produce your tables and graphs, but you must always do your own calculations. The reports of lab partners will not, therefore, suffer from the same calculation errors.

Full Page Figures: These are figures that support your data analysis.

- Usually these will be graphs, but some experiments require other kinds of figures like vector diagrams, drawings of fields, optical rays, etc.

- Each graph should be on its own sheet of quality graph paper with the axes scaled so that the data fills at least half the page. You may use computer-produced graphs only if they include all of the elements that are expected on a hand drawn graph. (Your first laboratory activity will be an exercise in graphical analysis and good graph formatting.)

- Figures should be numbered consecutively and referred to by number whenever necessary.

Answers to Questions: Most labs will have a series of questions that ask you to delve more deeply into certain aspects of the laboratory. Some of the questions deal with more qualitative and conceptual aspects of the experiment, while others my ask you to derive a particular equation used in the analysis. Your answer to a question must be a clear exposition and not merely a conglomeration of equations.

NOTE CAREFULLY: any report submitted with an incomplete data analysis will be returned ungraded.