

Formal Lab Reports *(MUST be word processed!)*

Abstract: The abstract is a concise, one-paragraph (100-200 words) summary of the purpose, methods, and significant results of the experiment. It is a "lab report in miniature." It should be complete enough to stand alone for any reader.

Introduction/Purpose/Background: The introduction or purpose section introduces the question to be answered by the experiment. It also gives any necessary theoretical background.

Equipment and Materials: This section lists all equipment and materials used in the experiment. It also includes a diagram of any experimental setups, and notes on setting up the equipment, if appropriate.

Experimental Procedure: (When a procedure is not supplied in the lab handouts themselves) This section needs to be descriptive and precise, giving all of the experimental steps you actually performed (in the order in which you actually performed them).

Data: Report all of the data you actually obtained in an organized data table that you create or in any data tables supplied in the lab handout. You should indicate and justify ALL uncertainty estimates.

Some notes on data tables:

1. Always put large (or even reasonably-sized) amounts of data in a data table.
2. Each column should be labeled with the quantity, symbol, and units of the data it contains. (Ex: "Time (t) in seconds")
3. Write neatly!
4. Avoid clutter as much as possible. Put units in the column heading if all of the data have the same units.

Results: The results section needs to contain a sample of each calculation that you perform on your data (your math can be hand written into your formal lab write up), including error propagation. The results of the experiment need to be neatly and clearly presented in tabular or graphical form (or more often, both).

Some notes on graphs:

1. Use graph paper.
2. All graphs have a descriptive title.
3. Choose the largest convenient scale for the graph. A graph should fill a page, as nearly as possible.
4. Each axis must be labeled with the quantity, symbol, and units plotted on it. (Example: "Time (t) in seconds")
5. Number the scales neatly and clearly.
6. Use an "x", ".", or "+" to indicate data points - not a big blob.
7. Draw error bars on your data points when and where appropriate. (Ask if you don't understand)
8. Remember that a bunch of points is not a graph. Draw the "best smooth curve" - often a straight line - through your data points that best represents their trend.

Conclusions: Here is where you answer the question that the experiment was designed to answer, to the extent that you are able. You also analyze the factors that influenced your results. This is the "meat" of the lab, and it is the section that your instructor will spend the most time reading. Here are some things to avoid - things that will definitely "cost you" in terms of your grade:

1. You will lose points if your conclusions do not follow logically from your results. Do not say something just because that is what the textbook says.
2. You will lose points if you do not remark about remarkable results, and attempt to analyze their cause. For instance, if your lab record says "We measured the free-fall acceleration, g, in the classroom to be 468 m/s²." without any further comment, you can expect to have to rewrite this section of your lab.
3. There is no absolute truth in science. Your results may "support" or "not support," some hypothesis, theory, or law, but you did not "prove" it. The words "verify" and "confirm" seem a little strong, but they are OK.
4. You will lose points if you merely speculate about sources of experimental error. Statements like "Friction may have caused a discrepancy in the results" need to be supported with data, or at least some plausible theoretical mechanism.
5. You will SERIOUSLY lose points if you use the words "human error." Your instructor will read this phrase as "I don't care enough about this experiment to actually think about what is going on in it, so please butcher my lab grade."
6. You will SERIOUSLY lose points if you say something like "there may have been a calculation error." Your instructor will read this phrase as "I really don't care enough about this experiment to go back and check my work, so please butcher my lab grade."