

Lab Format

1. Title of Lab, Name, Partner's Name, Date!

2. Purpose

- brief statement about physical phenomena studied in lab
 - What physical quantities is the experiment meant to determine?
 - What hypotheses about theoretical relationships will be tested?

3. Apparatus

- point form list of apparatus

4. Theory

- discuss theory involved in the experiment
- include all formulas that are used in calculations

5. Procedure

- discussion of what:
 - measurements made, how they were made, and how they were used
- diagrams are useful
- do **not** recopy lab manual
- do **not** spend lots of time discussing detailed instructions related to software settings
 - just give a brief description of the setup

6. Results (Data)

- *most* data should be given in tables
 - include units(!) and errors(!)
 - errors and values **must** be rounded appropriately
 - include both raw data and calculated data
- data values are should be listed before or after data table

7. Analysis

- show sample calc'n *and* sample error calc'n for *each* formula used
 - clearly indicate what is being calculated (title)
 - give formula, show substitution of values and give result
 - include units at all steps in calc'n
 - show calc'n of value and calc'n of error in value seperately
- include eq'n of best fit line to data in analysis section or on graph
 - include errors in slope and intercept
 - include units in slope and intercept
 - round error and value appropriately

8. Graphs

- done using a plotting program
- each graph should be a full page
- graphs can be included at the end of lab
- informatively titled and clearly labelled
 - label axes and give units for quantities on axes
- if data expected to exhibit linear relationship
 - include best fit line on graph
 - include eq'n of best fit on graph on in analysis

9. Discussion:

- Any extra questions in the lab, give your answers in paragraph form in this section. Don't repeat the questions. Give the answer in a way that explains the question and the answer.
- Any brief calc'ns involved can be included as well. Alternatively, you could include them in the analysis section.
- *Hint:* Some of these questions may imply sources of error that you can include in the latter part of the conclusion.

10. Conclusion

- The conclusion(s) of scientific experiment are of two types:
 - (a) Determination of the value of a physical quantity
 - give numerical results with errors(!)
 - state if result agrees with accepted or theoretical value within error
 - (b) Verification of hypothesized relationship between physical quantities
 - discuss what theoretical relationships were verified
 - discuss how experimental results relationship was verified by data
- In laboratory period of a science course, other (secondary) conclusions may be asked for
 - for example: conclusions about equipment or methods used
 - secondary conclusions should only be discussed after main results of experiment
- Brief discussion of possible sources of error (can be a separate section)

11. Sources of Error

- assumptions and/or simplifications that were not taking into account in the expt'l design
- try to describe how they would affect experimental results (ie. increase, decrease or random?)
- "human error" is **not** acceptable source of error
 - if you realize, after the fact, that a mistake was made during the lab, it is useful to mention this, but this is not really what is meant by *Sources of Error*.

General Comments

- The order of these sections is strict, except that graphs may be included at the end
- If labs have multiple parts, could divide lab into different, clearly indicated, sections
 - Exception: only one conclusion
- Report should not be overly long!

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- Give reader clear idea of what was done and the results
 - CLEAR and CONCISE
 - * point form OK, but don't overdo it
 - Do not assume that reader knows what the lab was about!
 - * should be able to understand basically what was done without reading lab manual
- In presentation of all data and results, give the value and error in the value with the same exponent in scientific notation
- **Neatness is absolutely critical**
 - Word processor required
 - You must turn in a legible and comprehensible lab writeup!