How To Write A Lab Report

Overview

This document describes a general format for lab reports that you will be required to submit after the completion of lab exercises. Lab reports are the most frequent kind of document written in science class. The goal of lab reports is to document your findings and communicate their significance.

A good lab report does more than present data; it demonstrates the writer's comprehension of the concepts behind the data. Simply recording the expected and observed results is not sufficient; you should also identify how and why differences occurred; explain how they affected your experiment and show your understanding of the principles the experiment was designed to examine. Even though following a format is helpful, it cannot replace clear thinking; organized writing and proper English usage. Each of the following components are to be written on separate page -- front only -- regardless of how short the writing for that particular section. Hence, each individual lab report is a ***minimum*** of five (5) pages in length.

Components of a Lab Report

The Title Page needs to contain the name of the experiment; the names of lab partners and the date the lab was completed. The title of the lab should be straightforward and informative. For example: Not "Lab # 7" but "Lab # 7: Reconstruction of the Cottrell Electrostatic Precipitator" (if you are interested, Google it – yes, it is real and yes we are related.) The title page also consists of an ***abstract***. The abstract summarizes four (4) essential aspects of the report: the purpose of the experiment; key findings; significance and major conclusions. The abstract also includes a brief reference to theory or methodology. The abstract should be one paragraph of 25 – 100 words.

Quick Abstract Reference

Must have:
1. **Purpose**
2. **Key result(s)**
3. **Most significant point of discussion**
4. **Major conclusion**

Restrictions:
100 words MAXIMUM

Sample Abstract

We tested the validity of Newton's First and Second Laws of Motion. The acceleration of a glider on an inclined air track by the earth's gravity was measured as a function of glider mass. We observed that the acceleration was at an estimated 9.8 ± 0.05 m/s^2, independent of object mass and consistent with the currently accepted value for gravitational acceleration at sea level. We studied the relationship between force, mass and acceleration by allowing a gravitationally accelerated object to exert a force on the glider. Our results show a linear relationship between force, mass and acceleration and are consistent with Newton's Second Law of Motion.

Note on Verb Tense

Abstracts often create difficulties for students who struggle with keeping verb tenses straight. These two points should help you navigate the abstract:

- The experiment is already finished. Use the past tense when talking about the experiment:
  - The objective of the experiment was...
  - I placed the microscope...
  - The slides were prepared...
- The report, theory and permanent equipment still exist. Therefore, these get the present tense:
  - The purpose of this report is...
  - Newton's theory states...
  - The scanning electron microscope produces images of...

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Materials or Equipment Page can usually be a simple list, but make sure it is accurate and complete.

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Experimental Procedure Page describes the experimental process in chronological order. Using clear paragraph structure, explain all steps in the order they actually happened, not as they were supposed to happen. Be sure you document occasions when you did not follow procedures exactly (for example: "At step 4 we performed four repetitions instead of three and ignored the data from the second repetition. We did this because our second repetition reading was so far off from our first reading, we assumed that we had made a mistake.")

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Data & Results Page is usually dominated by calculations, tables and figures. Graphics need to be clear, easily read and well labeled. An important strategy for making your results effective is to draw the reader's attention to them with a sentence or two so the reader has a focus when reading the graph. Tables and figures must be labeled and numbered in order to help the reader refer to the proper table or figure as they read through the lab report.

In addition, this is the section where you answer any questions that are part of the lab experiment. Both the question and the answer must be written (no re-statement.) Answers should be concise, but written following standard English usage.

Quick Results Reference

1. Number and title tables and graphs
2. Draw attention to key points in tables or graphs
3. Provide sample calculation only
4. State key result in sentence form

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Conclusion Page is where you show that you understand the experiment beyond the simple level of completing the task. In this section you are to explain; analyze and interpret your results. This part of the lab focuses on questioning your understanding of the significance or meaning of your results. In addition, you should discuss problems that arose when conducting the lab (equipment failures; etc.). Finally, a one paragraph discussion on your likes and/or dislikes about the lab. It is ***not*** sufficient to state simply "I found the lab boring." You must elaborate on your feelings and give specific examples.

Focus your discussion with strategies like these:

- *Compare expected results with those obtained*.
  If there were differences, how do you account for them? Saying "human error" implies you are incompetent. Be specific in your statements. For example: the instruments did not measure precisely due to mechanical failure; the sample was not pure or was contaminated; calculated values did not take account of friction.
- *Analyze experimental error*.
  Was it avoidable? Was it a result of equipment? If an experiment was within the tolerance limit, you can still account for the difference from the ideal. If the flaws result from the experimental design, explain how the design might be improved.
- *Relate results to your experimental objective(s)*.
  If you set out to identify an unknown star based on its attributes, you'd better know the H-R Diagram. In other words, before making any sort of

conclusion and/or assumption, be sure you have enough background information to make an ***intelligent*** and ***informed*** decision.

- *Compare your results to similar investigations*.
  In some cases, it is legitimate to compare outcomes with classmates; not to change your answer, but to look for any anomalies between the groups and discuss those. In most cases, your results will/should be slightly different due to procedure; methodology; equipment and experience.
- *Analyze the strengths and limitations of your experimental design*.
  This is particularly useful if you designed the thing you're testing (e.g. a circuit; or some experiment to test your hypothesis).

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Finally, attach the original lab handout to the back of the lab report.

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Helpful Hints for Higher Grades

- Remember that the lab report is at a ***minimum*** of five (5) pages in length. The length of the lab report will be determined by the total number of data pages (graphs; tables; questions; etc.)
- The report should be typed on plain white-stock paper, or neatly printed - no script. If handwritten, it must be written in blue/black ink on plain white-stock paper. Different color ink/paper will result in the lab report receiving a grade of "F"**;** being ***returned*** for re-submission with the correct format; and loss of two (2) complete grades upon resubmission. You ***may not*** simply print out the lab, write your answers on the bottom of the page, staple them together and submit. This will result in the lab report receiving a grade of "F" and being returned for re-submission with the correct format and loss of two (2) grades upon resubmission. **Note**: there are several labs during the year that will ***not require a complete lab report write-up***. These will be announced when this occurs.
- Be sure to follow the above page-listed format.
- Your report should be clearly written with a logical flow. The writing component is graded on clarity; organization; grammar; spelling and completeness. Standard English usage is paramount.
- The technical component is graded on how the experiment was performed and the correctness of the results. Remember that you are reporting on what has already been done - so be sure to use past tense in your writings.
- Most importantly, have lab reports handed in on-time. Lab reports handed in late automatically receive a grade of "B."