

# How To Write A Formal Lab Report

## 1. Title Page

*Use one full page*

- an informative report title
- your full name(s)
- class name
- date report turned in
- instructor name

## 2. Abstract

*4-6 sentences arranged in one paragraph as follows:*

- the scientific context of your experiment (What you were trying to do)
- what you did (use active past tense)
  - Example: Sam **repaired** the car.
  - Non-Example: The car **was repaired** by Sam
- how you did it (brief mention of the methods used)
- what you found (state your results in qualitative, non-numbered terms)
- what it means (what was learned or established)

## 3. Introduction

*Varies in length, one full paragraph minimum*

- Background information so that a reader will understand the purpose of your experiments.
- Discuss and cite specific experiments done by others if possible. (reference last year's experiment where we built the machines and used them to determine the mass of an unknown counterweight.)
- What are the questions you are asking, and why are they worth asking?
- Explain the purpose of your experiments
- Give a brief description of modifications used and what was measured.

## 4. Hypothesis

*Usually a single statement sentence*

- Please state in a If/ Then format; stating what you did and what you expected to happen.
- The statement after "if" is the independent variable.
- The statement after "then" is the dependent variable, because what happens will depend on what you did in the first place.
- Generally, the dependent variable will be the problem you mentioned in the purpose.

## 5. Materials

*A bulleted list*

- Create a comprehensive list of all the materials needed for this experiment.

## 6. Procedure

*A single paragraph followed by a numbered list*

- Summarize the procedure that you performed in your own words using active past tense. This is especially important for deviations from the lab protocol.
- Details like concentrations (in absolute units like mM, not 1x), temperatures, and sample size are important.
- Tables or diagrams are often useful here to describe the modifications. Insert pictures here if you have them.

## 7. Results

*A paragraph that describes your result, as well as tables and graphs*

- Describe your results (do not list actual numbers, but point out trends or important features). "Data" is the plural form of the noun "datum" (use "data are", not "data is").
- Refer to all figures and tables by number as well as any other relevant information. "See Figures." is not sufficient.
- Always report the direction of any significant difference or relationship. Did your dependent variable increase as your independent variable increased? Or did it regress?
- Results are typically not discussed much more in this section unless brief discussion aids clarity or guides the reader through a series of results.
- If you experienced technical difficulties, you must describe your expectations rather than your actual data or get raw data (not completed figures) from a classmate or the laboratory instructor (remember to cite their source).
- Graphs should be created in Microsoft Excel or a similar program and imported into your document.
- Do not simply list your raw data.
- Graphs, diagrams, and photos are numbered consecutively as Figure 1 to Figure X.
- Tables are numbered separately from the Figures as Table 1 to Table X.
- The Table convention is to use columns for categories of information (i.e. size, shape, etc.) and rows for the different entries (i.e. species of bacteria).
- Label the axes or columns and define all variables including units (do not repeat units within the Table). Labels such as "variables 1,2,3, and 4" are not sufficient.
- See report that follows for an example of Figure legends and Table captions and footnotes.

## 8. Conclusion

*A final concluding paragraph*

- First state if the hypothesis supported your hypothesis or did not support it.
- Explicitly state which data supported or did not support your hypothesis. If the data you gathered was numerical I should see numbers used here.
- Try to explain why you got the results that you did. Try to use the principles and rules you learned in class (i.e. Newtown's Second Law). This is a chance to truly demonstrate your mastery of concepts.
- Critique the experimental design. Does it adequately address the hypotheses being tested? Were there faulty assumptions in the design that confound your interpretation of the data?
- What new questions are prompted by the results?
- If your particular experiment failed, what would you do next time to make it work?
- Include in your text answers to specific questions if listed in the laboratory handout. It is usually a good idea to reflect on these questions as you are obtaining your data.

## 9. References

- Avoid the use of direct quotes. Paraphrase and cite the source instead.
- Prepare a complete alphabetized (by first author's last name) list of references that you cited within your report.
- Do not list at the end if not cited within the text of your report.
- Do not cite in your report if not listed at the end.