
A longer guide to writing laboratory reports

I. Title

- ▶ Use Aperture Laboratory investigation titles for inspiration
- ▶ Include the names of the organism or target chemical(s)
- ▶ Do not include the words “Lab”, “Report”, or “Project” in your title

II. Introduction

- ▶ Start from the most broad background details, and move toward the most specific
 - ▶ What are you testing? Use scientific names of organisms and define major themes of the research (i.e. homeostasis, cell respiration)
 - ▶ Why is this investigation of interest or relevant to scientists/humanity?
 - ▶ What have previous investigations found? Briefly summarize similar or related experiments
 - ▶ What other factors (besides the one you are testing) may affect this experiment?
 - a) Be sure you are still overall focusing on the factors that are in your experiment

III. Experimental Design

- ▶ First sentence: “The purpose of this (experiment/investigation) was to...”
- ▶ Identify independent, dependent, and controlled variables
- ▶ Describe how you will *measure* your results (i.e. gas production as an indicator of cell respiration)
- ▶ Clearly identify experimental and control groups
 - ▶ Controlled *groups* are complete sets of the experimental procedure
 - ▶ Controlled *variables* are factors that are kept constant in your experimental design/procedure
- ▶ What is your hypothesis? What results are expected? What other results are likely?

IV. Materials and Methods

- ▶ Materials should be included in a list
- ▶ Step-by-step overview of procedure, ideally given in complete sentences in a narrative form
- ▶ Should include all units and specific names (no abbreviations)
- ▶ Should be in past-tense
- ▶ Give precision of measurements and how many trials were conducted
- ▶ Include a photograph of your experimental design (if applicable)

V. Results

- ▶ Organize your data - you may always add headings within your results section. Do so in italics.
 - ▶ Include uncertainties with measurements (i.e. rounding, precision, etc.)
 - ▶ Include sample calculations for any results that are given as a mathematical result
 - a) Averages computed by spreadsheet should be described (i.e. “computed using Google Sheets®)
- ▶ Should include all graphs, tables, and figures
 - ▶ You should not include a table of your raw data. If this is relevant, put it in an appendix (see below)
- ▶ Should include qualitative data, and the qualitative data should be organized *with* the quantitative data of that trial or experiment
- ▶ Should be statements of *fact only*

- ▶ Should discuss important data points for the reader (maximum, minimum, average where applicable)
 - ▶ Do not simply spell out each data point. Focus on trends and important features. If I need every data point I will check your appendix.
- ▶ Should describe the data, but *not* explain the data, should *not* make claims, should *not* address errors

VI. Conclusions

- ▶ Directly state whether your hypothesis was *supported* or *rejected* (or if the hypothesis could not be supported or rejected based on the data)
 - ▶ Remember that rejecting a hypothesis is not a bad thing
- ▶ Make a conclusive statement (overall takeaway of the results) of your findings
 - ▶ Support your conclusion with a statement of your results
- ▶ Explain the data, make claims, inferences and extrapolations
- ▶ Discuss whether your findings are consistent with other published results or studies
- ▶ Describe sources of error, including addressing outliers
 - ▶ Sources of error are not always human error! Other errors may include:
 - a) Precision of measurements
 - b) Accuracy of measurements
 - c) How well controlled the experiment was
 - d) Whether enough samples in the experimental group were measured
 - e) Whether the levels or intensity of independent variable was sufficient to determine a trend
 - ▶ Always predict the *effects* of the error on your results/outcome (higher/lower/faster/slower)
- ▶ Suggest ways for improving the lab procedure
 - ▶ How could the errors addressed above be avoided in the future?
- ▶ Address whether your experiment is a valid test of what you were attempting to measure
 - ▶ Consider 3 a-e above. Given all of these things, did your experiment provide reliable data on the phenomenon you wish to explain or understand? If not, discuss why.

VII. References

- ▶ APA Jr. citations should be created and exported using NoodleTools
- ▶ Direct quotations should be rarely used, if ever

VIII. Appendix

- ▶ If you wish to include all raw data, insert a new page after your references section and insert tables there.

IX. Style and Writing

- ▶ Check your grammar and spelling!
 - ▶ All verbs and nouns should agree (the beaker *was* vs. the beakers *were*)
- ▶ Make sure your tone is formal writing. Think of how your textbook writes sentences. Do not use abbreviations or “slang”.
- ▶ Each section (introduction, experimental design, materials and methods, etc.) should have a heading
- ▶ Sentences should flow and be easily interpretable by the reader
- ▶ Long paragraphs should be broken up by similar concept
- ▶ Graphs should be on the same page as their figure caption, and should be large and readable