

Lab Reports

“The unity of all science consists alone in its method, not its materials” - Karl Pearson, *The Grammar of Science*

A lab report is a formal record of your research process, results, and conclusions. A well-written lab report will allow your reader to easily understand your data and evaluate your methods. Below are some of the most widely-accepted guidelines for writing a lab report. (Of course, the principles and guidelines outlined on the “Science Writing” handout apply to lab reports as well).

WHO IS MY AUDIENCE AND WHAT DO THEY WANT?

Like all forms of writing, the structure, style, and purpose of a lab report is determined by the report’s audience. In general, readers of lab reports want two things: to understand the information gained during your experiment and to be able to evaluate the legitimacy of that information. This means that you have two goals when writing your lab report: clearly communicating your results (as well as your interpretation of them) and providing all the information necessary to allow someone to verify them by repeating your experiment.

The definition of audience in the paragraph above is fairly abstract. Who, for example, is this “someone” who would be repeating your experiment? In practical terms, of course, your lab report will mostly likely be read and evaluated by your professor. However, this is not the audience you should address in the report itself. Like a professional scientist writing for a journal, you should address your lab report to your peers. That is, imagine a typical student in your field (though not necessarily in your class). How much detail and information would they need to repeat your experiment? Which technical terms might they need explained to them? Addressing your lab report to this imaginary student will allow you to demonstrate your own mastery of the material to your professor.

THE STRUCTURE OF A LAB REPORT

The structure of a lab report follows its purpose: lab reports are made up of multiple clearly-labeled sections, each of which contains different information. This makes it easy for the reader to locate the information they are looking for. The order and names of these sections varies by discipline and instructor, so be sure to follow your instructor’s requirements. What follows is a brief summary of the most common sections of a lab report.

Title: the title should be specific enough to reflect the emphasis and contents of your report. It should be no more than two lines long.

Abstract: the abstract should give your reader all the information they need to decide if your experiment is relevant to them. It should clearly and concisely summarize the purpose, scope, methods, results, and conclusions of your report. Abstracts are written in the present tense.

Introduction: the introduction puts your experiment in context of your field of study. It should discuss the rationale behind the experiment, the reasons the experiment was performed, and your hypothesis. It should also describe the relevant scientific principles and research on which the experiment builds. The introduction is particularly important in college lab reports, because it is where you demonstrate your understanding of your instructor’s rationale for assigning the lab.

Methods and Materials (or Materials and Methods or Experimental): the name of this section depends on your instructor and discipline, but the content will be the same. The methods and materials section describes the process of performing the experiment. It should be detailed enough to allow someone else to duplicate the experiment, but it should not be written as a set of steps (or in “recipe” style). Instead, this section should recount the experiment as it was performed, using the past tense. Be sure to quantify everything you can – time elapsed, temperature, volume, mass, etc. – and to explain the rationale behind your actions.

This handout is adapted from resources originally created by Frederick Coye Heard of the University Writing Center at the University of Texas at Austin (mwc.utexas.edu), M. C. Nagan and J. M. McCormick at Truman State University (chemlab.truman.edu), and The Writing Center at UNC-Chapel Hill (writingcenter.unc.edu).

Results: The results section presents (but does not interpret!) the data that you gathered during your experiment. Depending on the amount and type of data you gathered, this section might include tables and figures. As in the materials and methods section, you should refer to your results in the past tense.

Discussion: in the discussion section, you interpret your results in relation to your hypothesis. The discussion is typically the longest section of a lab report. In a college lab report, it is also (often) the most important; it is here that you demonstrate your understanding of the connections between the lab and the course material.

All the conclusions you present in your discussion section should be clearly supported by the data available in your lab. You will need to lay out your logic clearly and carefully for your reader. Remember that a single experiment is rarely enough to “prove” or “disprove” anything, so choose your words accordingly; “suggests,” “indicates,” or “implies” are all more reasonable options. The discussion section is also your opportunity to place your results in the context of other research in your field and to explain any part of your methods that you feel might invalidate your results.

Conclusion: the conclusion is a one-paragraph summary of your report. You should indicate whether or not you achieved the goals outlined in your introduction and briefly describe the implications of your results. (Not all scientific disciplines require a conclusion).

References: the reference page should contain the full bibliographic citations for any sources referenced in your report (most likely these would be in your introduction and discussion sections). Be sure to check with your instructor on what citations style to use (APA, CSE, ASC, etc.).

LAB REPORT DOS AND DON'TS

DON'T start by writing your abstract or introduction. Even though the sections of your final lab report will be arranged in a specific order, you will likely run into trouble if you try to write them in that order. The abstract and introduction address the report as a whole and therefore should be written near the end. Most guides recommend beginning by writing the “Methods and Materials” and “Results” sections, as these are made up of information that is readily available in your lab notes.

DO take detailed and specific notes in the lab. Another reason for starting with the “Methods and Materials” section is that the information from your experiment will be fresh in your mind. However, memory is no substitute for careful note-taking, especially when quantifying things like time, mass, volume, etc. Remember: nothing you do afterwards can make up for faulty lab notes.

DON'T procrastinate. Writing a lab report (like any type of writing) takes time and revision. Even though the experiment and its results may seem very obvious to you, it will likely take multiple drafts for you to figure out how to best communicate this information to your reader.

DO include headings and labels for the sections of your report. Lab reports follow a strict format for a reason; headings make the purpose of each section clear to your reader.

DON'T abandon good paragraph structure. Section headings are no substitute for strong topic sentences and good paragraph organization, particularly in longer sections like your discussion.

DO follow the principles and guidelines outlined on the “Science Writing” handout. All of these general rules apply to lab reports. The handout also contains further details on the use of tense and passive voice in science writing.

DO spell out abbreviations (apart from common measurements) the first time you use them.

DON'T (ha) use contractions.

DO place a space between a number and a unit (5 cm).

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