

A typical formal lab report contains the following parts:

1. Title

The title of a report should indicate exactly what you have studied:
e.g., *The Effects of Light and Temperature on the Growth of the Bacterium, Escherichia coli.*

This title explains the environmental factors manipulated (light and temperature), the parameter measured (growth), and the specific organism used (*E. coli*). If a large number of variables or organisms were used, the title could say "Several Factors..." or "Various Chemicals...." It is unnecessary to include words such as

"**Observations on the Effects of...**" or "**A Report on the Effects of...**" or "**A Study on the Effects of....**"

Other examples could include the following:

- Morphological studies on the effect of methyl mercury on Black Duck liver (*science*)
- Relationships between perceptual mechanisms for color and pattern in human vision (*psychology*)
- The influence of religion on the career plans and occupational values of May 1992 college graduates (*sociology*)
- Relationship between mineralogy and trace element chemistry in sediments from two fresh water deltas and one marine delta within the Fraser River Basin (*geology*)

2. Introduction

WHY DID YOU STUDY THIS PROBLEM?

The introduction should identify the problem or issue and give background information (historical and/or theoretical) about that

problem. The introduction contains a brief literature review which should describe previous research conducted on the problem, and explain how the current experiment will help to clarify or expand the knowledge. This information should justify why you conducted the experiment. All references to previous studies should be properly documented. The introduction should end with a purpose statement (sometimes in the form of a hypothesis or null hypothesis): one sentence which specifically states the question your experiment was designed to answer.

e.g., *The purpose of this investigation was to determine the effects of environmentally realistic exposures of acid precipitation on productivity of field-grown and chamber-grown peanuts*

3. Question and Hypothesis

WHAT DO YOU WANT TO FIND OUT?

Be specific. Make sure the question can be answered experimentally. Make sure the question can be answered by measurement.

How will exposures to acid precipitation at the same pH as local rainfall in Hogan County, Nebraska affect the growth rate of field-grown and chamber-grown peanuts?

WHAT DO YOU BELIEVE THE ANSWER WILL BE?

Using your prior knowledge, answer the question. Again, be specific: state measurements, numbers, names, etc.

Exposures to acid precipitation at the same pH as local rainfall in Hogan County, Nebraska will not change the growth rate of field-grown and chamber-grown peanuts by more than 5%

4. Materials and Methods

WHAT DID YOU DO? HOW DID YOU DO IT?

In the materials and methods section of a formal lab report, you will describe how and when you did your work, including experimental design, experimental apparatus, methods of gathering and analyzing data, and types of control. This section must include details and be written clearly enough to allow readers to duplicate the experiment if they so wish. This section is written in past tense because you have already done the experiment. It should **not** be written in the form of instructions or as a list of materials as in a laboratory manual. Instead, it is written as a narrative describing, in passive voice, what you did.

Do not use "I" or "we".

Six petri plates were filled with agar.

Methods adapted from other sources should be referenced.

Photographs, maps and diagrams may be used to help describe the experimental setup

5. Results

WHAT DID YOU FIND?

In the results, you present your observations and data with no interpretations or conclusions about what they mean. Tables and graphs should be used to supplement the text and to present the data in a more understandable form (see Tables and Figures in this Fastfacts). Raw data will probably be most effective in table format, with the highlights summarized in graph form. The written text of the results section may be as short as one sentence summarizing the highlights and directing the reader to specific Tables and Figures. Use past tense to describe your results. Sample calculations for a lab report in a course may be included in a separate section titled

"Calculations" or in an Appendix at the end of the report. Check with your course instructors for specific requirements in a particular course.

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6. Discussion

WHAT DOES IT MEAN? HOW DOES IT RELATE TO PREVIOUS WORK IN THE FIELD?

Explain what you think your data mean. Describe patterns and relationships that emerged. Compare these results to trends described in the literature and to theoretical behavior. Explain how any changes to or problems with the experimental procedure may have affected the results, or offer other suggestions as to why your results may have been different from or similar to related experiments described in the literature. Interpretations should be supported whenever possible by references to the lab manual, the text, and/or other studies from the literature, properly documented. Remind the reader of your own results, when relevant, **without** repeating endless information from Results. If your lab manual includes questions to be answered in the Discussion, integrate your responses into a logical discussion, rather than answering them one by one. And don't include **only** the answers to the questions--use them as a guideline for supplementing your discussion, not limiting it. Address each Hypothesis individually, and after discussing results, say whether you reject it or do not reject it.

7. Literature Cited

Also called "References" or "References Cited," this is a list only of papers actually mentioned (cited) within the report. (A "Bibliography," on the other hand, refers to a list of all materials used to get background knowledge on a subject; you will not usually be required to include one in a scientific lab report.) Remember that **ALL**

information within the report that is not your original work or ideas should be referenced (not necessarily quoted, but paraphrased or summarized--quotations are **rare** in scientific writing.)

8. Tables and Figures

Tables and figures are often used in a report to present complicated data. Use the following guidelines to incorporate them effectively.

- Each table or figure MUST be introduced within the text, and the comment should point out the highlights:
e.g., The temperature increased on the third day (Figure 1).
- All tables and figures must be numbered and have self-explanatory titles so that the reader can understand their content without the text:
e.g., Table 1. Percent of soybean plants exhibiting visible injury after exposure to acid precipitation.
- Tables and figures are assigned numbers in the order they are mentioned in the text.
- Tables and figures are numbered independently of each other (i.e., Table 1 and 2, and then Figure 1 and 2 as well).
- Tables are referred to as tables, and all other items (graphs, photographs, drawings, diagrams, maps, etc.) are referred to as figures.
- Tables are labelled at the top and figures at the bottom.
- Tables and figures may be placed at the end of the paper, or within the text as soon as possible after they are mentioned without interrupting the text (i.e., at the end of a paragraph or section). Check with your professors for their preference.