

Formal Lab Reports

As a means of preparing you for writing an independent research paper, you will write formal lab reports on some of the class experiments we do this year. Formal lab reports will include the following sections:

Lab Jobs
Principal Investigator
Materials Manager
Maintenance Director
Safety Director/ Recorder

Title
Purpose
Hypothesis
Materials and Methods(include diagram of experiment)
Results (narrative; refer to tables and figures)
Discussion (narrative includes answers to any questions, accept or reject hypothesis,)
Tables and Figures
Appendix(photos, raw data, experimental setup, etc.)

These lab reports should provide adequate practice for research report writing.

Use the following as a guideline when writing your lab reports, then afterward as a checklist to make sure you have included everything before turning in your paper. **All boldfaced words should be titled as such in your paper.**

Title: This should include the relationship between the independent and dependent variables and include the scientific name and common name of any organism used.

Purpose: This should be at least one paragraph and includes the rationale for conducting the experiment emphasizing unresolved questions or issues, and states what you hope to learn.

Hypothesis: States what hypothesis is to be accepted or rejected as a result of the research. The hypothesis must correspond *SPECIFICALLY* to what is tested. Comparisons must be complete. For example, "...plants grown in sunlight will grow taller" or "soap X will work best" is insufficient. Taller than what? Better than what?

e.g. .. plants grown in sunlight will be taller after six weeks than plants grown in incandescent, fluorescent, or ultraviolet light for the same time period.

Soap X will inhibit the growth of *Staphylococcus aureus* better than soaps Y and Z.

Materials and Methods– Reports specifically, as concisely as possible, the procedures used to conduct the research. This section should be written so that the project could be replicated by someone not involved with the original research.

Write the procedure in PAST TENSE and PASSIVE VOICE.

Indicate in the text what materials were used, rather than in a separate list. For example, "Coleus were planted in 6 cm clay pots" or "measurements were made using a 10 cm ruler". Use SI units.

This section should NOT end with "Results were recorded." It should include what data were measured, how they were measured, and how they were analyzed to determine whether to accept or reject the research hypothesis.

Results– Includes the findings of the experiment reported in writing and supported by the inclusion of tables(charts) and figures (graphs and photographs) at the end of the report before the Appendix. This section includes observations, sample calculations and statistical analysis of the data. Raw data should not be presented here, but is placed in a table or an appendix (if it is a large amount) at the end of the report. This is an objective report. Do not interpret your data here, simply report it.

Tables and figures alone are not sufficient, these provide a visual overview of the findings, but the research results must be **PRESENTED IN WRITING**. Each table and figure should be referred to by number and summarized in the written report.

Discussion: This section is an interpretation of the findings of the research experiment and includes several components. It refers back to (and restates) the purpose, the prior research and/or the hypothesis. Conclusions are drawn based on the results (including data analysis) in determining whether to accept or reject the null hypothesis based on statistical analysis and whether to accept or reject the research hypothesis, or whether the hypothesis is supported or not. (Remember : **A HYPOTHESIS CANNOT BE PROVEN!!!!**)

Explanations for discrepancies in data are presented here, as well as limitations of the study. For example results may be questionable due to small sample size, or factors over which the researcher had no control which might have influenced the study.

The discussion also includes suggestions for procedural improvements and/or further research which could be undertaken to help better understand this area of inquiry.

Tables and Figures– (see the following books for specific info on making tables and graphs: Painless Science Projects by Faith Hickman Brynie, Ph.D Copyright 1998 ISBN 0-7641-0595-7 Science Experiments and Projects for Students by Julia Cothron, Ronald Giese, and Richard Rezba Copyright: 1996 ISBN 0-7872-1590-2

Writing Science Research Papers: 2nd Edition by David Williams Copyright 1999 ISBN 1-880319-14-4 (only available in Rm.317)) Tables and Figures follow the text of the paper in the Appendix

Table titles are printed above the tables and the word Table is always capitalized.

e.g. Table 1. Hourly soil temperatures in aquaria containing *Lumbricus terrestris*.

The titles of figures are printed under the figures and the word Figure is capitalized.

e.g. Figure 1. Hourly soil temperatures versus density of *Lumbricus terrestris*.

In the text of the paper, the tables and figures are referred to by number, and the word Table or Figure is capitalized.

Appendix - This section includes important information that is too lengthy for the main section of the paper, such as raw data, (photos, diagrams of special equipment or setups, etc.).