

AP BIOLOGY FORMAL LAB REPORT GUIDELINES

General Information

Each student must submit a typed, double-spaced formal lab report based on the data collected by the group. Lab reports are written in passive voice. Reports written in first or third person will have points deducted accordingly. Ex: I added a drop of solution to the test strip. This should be written as follows: 1 drop of solution was added to the test strip. **All headings and subheadings must appear and be underlined in your lab report.**

- I. **Title:** Be as specific as possible and briefly denote primary topic dealt with during the experimentation.

- II. **Introduction:** The "Introduction" of the report should explain why the work was done. What were the objectives of the research? How does the research help to fill a hole in our knowledge? The Introduction should include a clear statement of the problem or question to be addressed in the experiment. It is always helpful to put this question into some context by stating why this question needs to be answered or why you found this question to be particularly interesting. Any background material that is particularly relevant to the question should be included in this section.
 - a. **Problem/Question:** State specific question(s) the problem you are investigating in the lab.
 - b. **Background Information:** Include any information that will help the reader understand the experiment that you have conducted. Important terms should be defined in this section. You should have several sources cited in this section of your report.
 - c. **Hypothesis:** Write a single statement telling the exact thing you are trying to test in your experiment. (if...then...statements, but are not required- NEVER in first person)

- III. **Materials and Methods:** The "Materials and Methods" section tells how the work was done. It should NOT be a simple list of the materials used. What procedures were followed? What research materials were used: the organism, special chemicals, instruments? In some of the experiments you will be doing, many of the procedures are given in great detail in the handouts. It is not necessary to retype these verbatim, but rather summarize them and cite the laboratory manual in your references. Provide details only about changes from the handout and about your individual project. The most important feature of this section should be to include enough detail in your description of how your experiment was set up and run so that anyone reading the Materials and Methods could repeat your experiment. In describing your procedure, you need to make sure you explain all variables (dependent and independent variables, constants, and controls, if there are any.)

- IV. **Results:** The "Results" section explains in words what you found, the data that you generated, explained succinctly in the body of the report and presented in detail as tables or graphs. The results section should be written so that any college student could read the text to learn what you have done. For example, you might use a paragraph to explain what is seen on a particular graph; "When the enzyme was soaked in sulfuric acid, no change in absorbance was observed (Table 1)" Do not make the common mistake of writing, "We performed the experiment, see figures 1-4." That is too brief and does not convey to a novice what you have done. When stating your results in the body of the text, refer to your graphs and tables. Do not attempt to discuss the interpretation of your data - explanations should be included in the "Discussion" section. Each table and figure should be numbered sequentially for easy reference in the text, and all figures must have a brief description called a legend, which provides the reader enough information to know what you did to produce the data.
 - a. **Data Tables**
 - i. Neatly drawn with a straight edge, or are computer generated.
 - ii. Includes a descriptive title and a table number.
 - iii. Headings must include units in parentheses. Do not include units in the table beside the numbers.

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b. **Graph**

- i. Always use graph paper, or use Excel to generate your graph.
- ii. Includes a descriptive title and a figure number before the title.
- iii. All units must be in axes titles in parentheses. Do not forget axes labels.
- iv. Avoid using color. Use different line patterns for separate plots on the same graph.
- v. Error bars must be present for all data

****Data may be qualitative (observational without numbers) or quantitative (with numbers) or both. Often qualitative data may be used to support or explain discrepancies in qualitative data in your conclusion.**

- V. **Discussion:** The "Discussion" section typically includes your appraisal of what your research means, including its success in meeting the objectives stated in the introduction, and its significance in advancing your knowledge of the subject. This section also is the place to explain discrepancies or difficulties with experiments, as well as suggestions for future work. For example, if you had known initially what you know now, how might you have changed your experiments? Most importantly, the Discussion provides an opportunity to compare your results with those of others. What previous information exists that is relevant to your research? Do your results support or supplement that information? Once again, when providing your interpretation of the data, direct the reader to specific tables and graphs to prove your point.
- a. **Concluding** – Analysis of data. What does your data mean? Include comparisons of graphs, describe trends. How do your data compare to data in the literature (show a reference). Conclusions should be clearly related to the problem or question, and connected directly to the results. Relate the results to concepts learned in class. Discuss the biological meaning of the results.
 - b. **Evaluating Procedure(s)** – Comment on the design and method of the investigation and upon the quality of the data. List the weaknesses and indicate how important those weaknesses are to the study. Comment on any errors and the precision and accuracy of the measurements. Comment on your experimental process, use of equipment, and time management.
 - c. **Improving the Investigation** – Suggestions for improvements should be based on the weaknesses and limitations identified above. How would you change the experimental method and data range collected? Be realistic and clearly specific.
- VI. **Literature Citation** – Given that some of the information included in your lab write up will have been taken from a published lab activity, you must include a citation of the source. The source(s) used should be cited within your lab write-up, especially in the introduction section.

The following citation format will be appropriate for lab reports if the laboratory investigation came from the College Board Lab Manual

AP Biology Investigative Labs: An Inquiry-Based Approach. New York: College Board, 2012: Page(s).Print.

Use MLA or APA to cite any additional information used in your report. method for each type of media listed below: