

AP BIOLOGY LAB MANUAL

Projected Lab Activities:

1. Animal Behavior*
2. Microquantity Measurement
3. Electrophoretic Separation of Proteins*
4. Diffusion/Osmosis*
5. Using a Spectrophotometer
6. Enzyme Action*
7. Chromatography Techniques
8. Photosynthesis—The Light Reactions*
9. Meiosis—Tetrad Analysis*
10. Probability and the Chi-Square Analysis
11. *Drosophila* Genetics*
12. Restriction Enzyme Simulation
13. Engineering a Plasmid
14. Bacterial Transformation
15. DNA Restriction Analysis
16. Natural Selection Simulation
17. Population Genetics
18. Evolution and Phylogenetics
19. Transpiration*
20. Respiration*
21. Physiology of the Circulatory System
22. Dissolved Oxygen Content*

*requires a formal lab report

How to Write a Lab Report for AP BIOLOGY:

I will be honest with you. I cannot speak for Chemistry or Physics, but the 'labs' that we did in Regents Biology were really just pen and paper exercises. The infamous "Clothespin Lab" and my "Plant Growth Project" were more of an actual lab. For AP Biology, your participation in lab is an integral part of your class experience as well as your grade (40%).

Throughout this experience, you will be working with a variety of measuring devices as well as modern equipment currently in use in research labs worldwide. Be attentive to safety precautions prior to each lab activity. Your instructor will emphasize these precautions prior to each lab. Specific precautions will also be listed in the pre-lab readings. Some precautions are universal to all science labs and are listed below:

- NO SUBSTANCE, FOOD, OR DRINK IS TO BE BROUGHT INTO OR INGESTED WITHIN THE LABORATORY
- SAFETY GLASSES ARE TO BE WORN DURING EXPERIMENTS WHERE CHEMICALS OR HEATING DEVICES (BUNSEN BURNERS, HOT PLATES, HOT WATER BATHS) ARE IN USE
- LOOSE FITTING CLOTHING AND LONG HAIR IS TO BE TIED BACK AND SECURED WHEN USING HEATING DEVICES.
- REPORT ALL CHEMICAL SPILLS/BROKEN MATERIALS TO THE INSTRUCTOR
- WASH YOUR HANDS WITH SOAP AND WATER FOLLOWING EACH LAB ACTIVITY
- WHEN ALIQUOTING CHEMICALS FOR PERSONAL LAB GROUP USE, BE SURE TO LABEL ALIQUOTS WITH THEIR IDENTITY.

You are expected to read through the lab activity prior to each lab and familiarize yourself with the procedures. All lab activities have a time constraint. To complete the activity on time requires prior planning. Preparing your Pre-Lab write up is mandatory for all formal reports. Be prepared to complete labs that go beyond the normal class period, after school if necessary. Labs will be conducted in groups, yet understand that each student must turn in their own, unique work. A first instance or even suspicion of plagiarism (a.k.a. **CHEATING**) will be dealt with strictly—a **0%** will be applied to the lab report score...no appeals will be taken. Second offense is an **'F'** for the quarter. A third and final offense will be removal from the class. These are non-negotiable terms.

You will follow a general format used for research reports published in scientific journals. (*See the paper [The Value of Animations in Biology Teaching: A Study of Long-Term Memory Retention for an example.](#)*) Although different journals require different formats, all papers have a roughly similar outline. They reflect the basic scientific method of asking a question, formulating hypotheses, conducting experiments to test hypotheses, and interpreting results. Even though not all journals require authors to divide their papers into clearly labeled sections, this practice will help you develop good habits in reporting your findings. Therefore, you are asked to label each section in your paper except for the title.

You will have 5 school days from the day of lab completion to prepare a lab report for submission. Every day late is a 10 point deduction. After 2 weeks late, the maximum score for a lab is 50%.

LAB GRADING:

You will have the grading scheme used for each lab before you start. Point values will be slightly different for each section depending on the lab. Remember, the overall lab grade is worth 40% of your quarter average!

PRE-LAB:

For designated labs, you will first complete your pre-lab assignment in your Lab Composition Notebook. This will include the ABSTRACT, INTRODUCTION (only specified parts as instructed), and MATERIALS/PROCEDURE sections. You will also need to compose your DATA TABLES where you will collect and first record any data from your experiment. These will be due the days prior to the lab actually taking place. It will receive a score that will be factored into the overall lab grade (~20%). **However, if it is not completed before the lab, you will not be able to conduct the lab with your group.**

TITLE:

On the cover page, list the title of the lab activity taken (not just from the manual!). Names of group members, class period, instructor, and date submitted should be at the bottom right of this page. See examples provided in class.

ABSTRACT:

This section of your lab is a short paragraph below the title on the cover page that has a few sentences, which accurately describes the objectives and purpose of the lab. It is specific enough to capture the essence of the lab without elaborate details, **but is not just a rehashing of the objectives in the lab manual—those are the learning objectives, not necessarily the purpose of the actual experiment!**

INTRODUCTION:

This section of your lab report provides the conceptual basis and/or theoretical background of your experiment. Design this section of your lab report using three (3) 'sections':

1. **Identify and in detail, explain** the theory/principle/concept illustrated in this lab*. Use citations (properly formatted—see citation section of this lab manual) when quoting the textbook or various other resources.
2. **Describe** the basic design of the experiment, including all variables—dependent and independent, as well as listing all controlled conditions.
3. **Clearly identify your hypothesis and explain how this design will test it—that is, what you expect to find based on the experiment.**

This introduction section will take some research. Do not try to do this off the top of your head!

MATERIALS/PROCEDURE:

This section of your lab report will include a comprehensive account of the procedure used to conduct this investigation, incorporating all materials. **Do not just copy the steps from the manual!** This should be written in paragraph form, third person, past tense.

RESULTS:

In this section of your lab report you will present your data in a logical, concise order. Construct data tables, charts, and/or graphs to present the data collected. Any graphical displays of data must include titles and labels for all components. **State results here... do not add your interpretation of these results. That is for the next section.**

DISCUSSION:

In this section of your lab report, **you will give your interpretations of the data.** You must open with a statement that either shows that the data supported or refuted your hypothesis. **Either way, explain the significance of your data.** In this section, "dazzle us" with your knowledge of the concept and why the results were what they were. This is the goal of each experiment—to see if your hypothesis stands up to testing!

Regarding the questions for this section, you will not have to rewrite the questions, but they must be numbered and answered in complete sentences.

Finally, you will have to provide a possible (or actual) source of error that might have (or did) influence the results. This is more than just stating "We could have measured the sample wrong". To receive full credit for this, you must do the following three things:

1. List actual (or possible) source of errors.
2. Describe effect caused by each possible error.
3. Explain how you could correct the error.

CONCLUSION:

This section of your lab report wraps everything up. It is in paragraph or two that consists of declarative statements identifying:

1. Significant results of your experiment.
2. Valid generalizations that can be formed based on your results.

PRESENTATION:

Your lab report needs to be composed in a grammatically correct fashion. Spelling and grammar do count! Also, cut to the chase. **Except for in the discussion section, be brief and concise.** There is not a point value for word count!

CITATIONS:

Whenever you are using information from other sources, you need to cite your work. Also, when using these external sources, it is not a cut and paste and be done with it method. You must write out the findings in your own words and then properly cite it. If this does not occur, it is called plagiarism—and you will lose credit for the **entire** lab—or worse! Look here for more details on this... <http://library.duke.edu/research/citing/> How do you properly cite work? Look below at an example of using an on-line source:

When using online documents here is the minimal citation required is listed below. Oh, and **USING WIKIPEDIA IS NOT AN ACCEPTABLE SOURCE OF INFORMATION!**

Author's name (last name first). Document title. Date of Internet publication.
Date of access <URL>.

- ex:
- Landsburg, Steven E. "Who Shall Inherit the Earth?" *Slate* 1 May 1997. 1 Oct. 1999
<<http://www.slate.com/Economics/97-05-01/Economics.asp>>.
 - Mitchell, Jason P. "PMLA Letter." Homepage. 10 May 1997. 1 Nov. 1999
<<http://sunset.backbone.olemiss.edu/~jmitchel/pmla.htm>>.