APES Lab Notebook Protocol

For Your Information

A lab notebook is considered a legal document in industry. The company owns the notebook and the work you document in it. Any discoveries you make or ideas that are patented become the company's ideas and patents. That is what they pay you to do. So the lab notebook plays an important role between a scientist and the company for which they work.

The lab notebook is frequently the main record that is kept in research. It is supposed to contain enough information so that anyone could read the notebook and reproduce the experiment or test, exactly!

Grading

For each lab or experiment completed you will be required to complete a laboratory report in your lab notebook. This will be collected at unspecified times during the trimester, therefore your lab notebook must always be up to date. Every lab will be graded according to the grading rubric provided. Lab reports are due the day following each lab unless otherwise stated. There is a 10% per day penalty for late work. Plagiarism will result in a zero!

General Lab Notebook Rules:

1. There are several documentation rules that you will be asked to follow this year in lab. They are simple, but very important. You will be graded on the accuracy and neatness of your record keeping in addition to the quality of your analysis.

2. You are expected to have your lab notebook with you in class every day. I will be collecting notebooks during the trimester and having an up to date, accurate, and complete record of your lab work is a big portion of your grade.

3. Documentation is essential to science. Documentation skills are simple and will always be used. They will help to demonstrate the integrity of your documentation. Be sure to include the following:
    a. Page number on each page
    b. Experiment (or assignment) title across the top of the initial page. If the lab is on more than one page, each time you turn a page, write the experiment name and "continued".
    c. Your signature (or initials) and the date at the end of each data section, and at the end of the lab (after the conclusion).

4. Only dark pen (blue or black) should be used. Never use pencil. Never use correction fluid.

5. Errors are corrected by drawing a single line through the word or words, then right next to that, write your initials and the date. For example, ~~this part of a sentence is a misteak.~~ KJ 8/27/13 If the error involves an entire paragraph or data table, draw the line diagonally through the work, then put your initials and date.

6. Do **not** copy any information from the notebooks of former or current students. The only exception is when working in a group and only one member of the group recorded the data during the experiment. In this case, you must indicate in your notebook that the results were copied from the other person's notebook. Write the recorder's name and the page number from which the data were copied next to the copied data.

7. If the page has a large number of unused lines after you are done documenting, draw a diagonal line through the unused lines, write "VOID" in the middle and initial and date. If you skip a page, you need to write on the page "This page was intentionally left blank."

8. Never remove pages from your lab notebook.

9. Occasionally we might paste or tape a piece of paper into the lab notebook. After it is in place, along the edge of the paper, write the page #, your initials and the date. This way if the paper ever falls out, you can tell that something used to be there.

10. Data tables should be completed in blue or black pen or electronically created. They should be neat, clearly titled and labeled. Graphs, Diagrams, and Drawings should be completed in pen or electronically created. They should be neat, clearly titled and labeled.

Setting up your lab notebook:

- On the front cover put the following in blue or black ink: (You may use a printed label)
    1) Your name (First and Last)
    2) APES LAB BOOK
    3) Instructor's name
- Open the notebook and label the pages, **using pen only**, starting with 1. Put the "1" on the upper right hand corner of the page. Turn the page, and on the upper left hand corner write a "2". Continue this pattern on each page with 3, 4, 5 … until 50.
- Go back to page 3 and write "Table of Contents" across the top of the page. Each time you add a lab to your journal, add an entry to the table of contents.
- Underneath the top line, write the following column titles:

Date	Title of Lab	Page #

- Leave page 4 blank in case the table of contents needs more than one page.
- Begin recording Demos and Labs on page 5.

Lab Format

Each lab should be neat and legible, proofread, and in the proper format. In your notebook, each lab should be set up as follows. Use the rubric that follows to better understand the grading system which includes format AND content.

Part 1: Pre Lab (Normally, this will be completed before coming to class)

Title Each new lab should be started on a fresh page. The title should be underline and at the top of a new page. You should include the date and the names (first and last) of group members.

Purpose This section's purpose is to introduce the topic. It also provides them with the necessary information so that they will understand the purpose of the research. In this section state the problem, and list any experimental predictions you may have.

Hypothesis: The hypothesis should be presented, not as a prediction but as a general statement. What is the effect of the independent variable on the dependent variable?

Materials A bulleted list of materials you will use for the lab.

Procedure Describe the steps you took to conduct your experiment. The steps should be somewhat detailed and numbered so that you know the exact protocol that you are following and so someone could repeat your

experiment using your procedures as a guide as to how you performed each and every step. Drawings or diagrams will be required if applicable to explain your study site, materials, or methods. This information should not be copied word for word, but must be summarized and in your own words from the handout (if provided). Write in 3rd person (No "I" or "We" or "Suzie poured 3mL into the beaker" Just say, "Pour 3mL of liquid into the beaker".)

Safety Precautions A bulleted list of safety precautions (if any are applicable).

Part 2: During Lab

Data/Observations (Results) The best way to report quantitative data is using a table. (ALL TABLES MUST BE SET UP PROIR TO START OF LAB- They can be typed a pasted or taped in.) Be sure to clearly number and label the tables. ***Always use the proper units.*** Include a written description of your results within in your analysis (in Post Lab-to follow). Be sure and report any qualitative data as well. If applicable, you can try using drawings or diagrams to help explain your data. Any anomalies during the running of the experiment should also be recorded. Do not include any analysis or discussion of results in this section.

Part 3: Post Lab

Analysis The analysis will consist of the following three parts:

A. **Graphs** All graphs should include the following:
   - ½ page in size with title
   - X and Y axes should be labeled **with units; Numbers without a unit are meaningless!**
   - Clearly indicated data points
   - In color (color pencil only)
   - A complete and accurate key, when necessary

   Graphs can be completed in the notebook, or in excel and pasted or taped into your notebook (No staples).

B. **Calculations** All calculations should include the following:
   - Show ALL equations/formulas used
   - Show ALL work. You must include the set-up for each formula using data from the experiment. Any steps that are needed MUST be shown, not just the end product
   - The end product must be circled and include correct units.

C. **Questions/Discussion** Each question must be incorporated in the answer within a complete sentence. The answer must be specific. (Not "The lab went well. Our data proves it" but "The lab proved that… happened because the data -state again- corroborates these findings based on the following information…")

Error Analysis Explain how errors could have occurred during the experiment and what steps were taken to minimize their effect. When required, provide a statistical analysis of the accuracy of your data.

Conclusion Draw conclusions about your experiment based upon your hypothesis and include the experimental evidence or error analysis. Make sure in the conclusion that you show your understanding of the lab. Include a short summary of the significance of the results – How is this experiment useful?

Lab Report Notebook Grading Rubric– 25 POINTS

	Points Awarded
Proper Format (5 points)	
Title (1 point) - Reflects on purpose & meaning of lab	
Purpose (1 point) - Helpful background information given - Hypothesis and predictions in line with experiment	
Materials (1 point) - Complete list of all materials used in experiment	
Procedure (1 point) - Detailed, numbered steps that describe exact protocol used - Clear procedures that are able to repeated - Diagrams & study site included (if applicable)	
Safety Precautions (1 point) - All safety precautions necessary to lab included	
Data/Observations (5 points) - Tables are set up correctly - Proper units are used - Data accurately & clearly summarized - Descriptions are valid & logical - Diagrams and drawings are included if applicable - Anomalies are recorded	
Analysis with Calculations (5 points) - Graphs are labeled correctly and in correct format with correct information - All work in calculations is appropriate and is shown - All questions were answered in the correct format with logical sense	
Conclusion (5 points) - Accurate interpretation of results - Appropriate conclusions drawn - Summarizes evidence for each conclusion - Short summary of significance of results	

Total Points: _____