

## Writing a Well-Formatted Lab Report

Labs are the basis for our understanding of the key concepts in Physics. It is important that the laboratory report be well written.

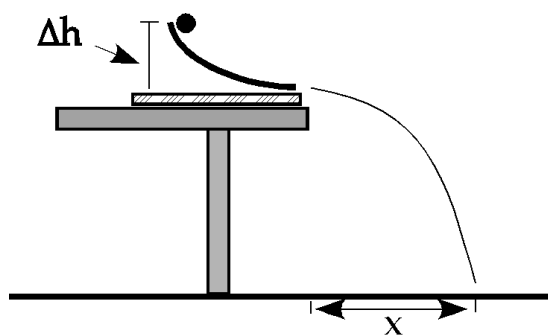
CLARITY is the first requirement of the lab report. The report should convey to your reader in a clear manner WHAT the purpose of the investigation was, HOW you conducted the study and collected the data, WHAT the results were, and HOW you interpreted your findings. The ideas in your report should be developed in a LOGICAL SEQUENCE.

### **ORGANIZATION OF THE REPORT**

Depending on the type of question, the lab report should be organized into several sections. Your reports will have the following distinct subdivisions.

PURPOSE: A clear and precise statement at the beginning of the report should identify the exact purpose of the investigation, what the lab will demonstrate or solve. Also, identify independent variable, dependent variable, and controlled variable. This purpose should be to address exactly what was asked for in the synthesis question and should not contain extraneous information.

MATERIALS and APPARATUS: Provide a complete list of supplies and materials that you used. Also, each apparatus used in the investigation, along with a detailed diagram to illustrate the configuration of the apparatus, should be included in this section. The variables to be measured should be clearly pictured. See example below.



PROCEDURE: This section should identify and name all experimental variables and briefly describe how the independent variables are controlled. Someone who was not present during the lab should be able to understand how the experiment was performed by reading your procedure. Let your reader know without a doubt WHAT was measured and HOW it was measured so that she or he will be in a position to judge the validity of your results and your interpretation. Do not include numbers while you describe the procedure.

Exception: In a few labs such as Speakers or DC Motors, a construction slideshow is provided for the students. In this cases, writing the procedure would take a tremendous time. Instead, a statement of referring to the slideshow would be acceptable.

RAW DATA: This section should consist of a presentation of the data you collected. It is important that the data be organized neatly and logically. There are certain ground rules that should be observed in presenting data:

- a. Data should be neatly recorded and effectively organized. Usually some type of table is needed.
- b. Each table should be numbered.
- c. Each table should have an appropriate title. The title allows the reader to identify the data without detailed inspection.
- d. The row and columns of a table must have headings to indicate what has been recorded. The reader should be able to tell without hesitation what the data in a given column or row of the table represents.
- e. All trials for different values of the independent variable should be recorded.
- f. The units for physical measurements (kg, m, s, etc.) in a data table should be specified in column headings only.
- g. Record data in decimal fractions only. Instead of the number  $1\frac{1}{2}$  write 1.50 if three significant figures are justified.
- h. Rules regarding significant figures must be properly observed. This rule applies not only to the recording of measured data, but to the results of any calculations made with them.
- i. A zero should always be placed before a decimal point when no other figure occupies that position. Seven tenths should be written "0.7" not ".7".
- j. Use metric system of measurements exclusively.
- k. The uncertainty should be recorded in the heading (if it is the same for all measurements) or in a separate column (such as standard deviation.)

DATA ANALYSIS: This section should include all graphs, mathematical expressions of the graphs, analysis of graphs (shape, relationship depicted, slope, y-intercept, linearization needed, error bars, etc.), and post-laboratory calculations. All graphs should be numbered and have descriptive titles. "X vs. Y" is not a good enough indicator of what the graph is presenting; instead try something more like "X vs. Y of the ... in the ..." State each formula on its own line (not inline with the text) and, if the formula was not provided in the lab manual, identify all the symbols used in the formula. If repetitive calculations are to be performed, substitute *only one set of data* into each formula and then construct a table for all additional calculated values. Be certain that your final calculated values are expressed to the correct number of significant figures, and have accurate units.

In addition, discuss the plausability of the results and possible errors (stating “human errors” is not acceptable.)

CONCLUSION: The conclusion should refer back to the purpose of the experiment. State your findings. The result should be quoted including the units and the uncertainty. This section should be fairly brief, as nearly all of the physical and mathematical interpretation of the data should already be stated in the Analysis section.

### **FORMAT OF THE REPORT**

The report should be neat, orderly, legible, and should be carefully entered into the lab report form.

The report should be typed (Times New Roman, 12, double spaced.)

Separate sections of the report should be labeled in such a way that the overall organization of the report is immediately apparent to the reader. If the response to the synthesis question should be written in a “letter to a person” style, the report does not have to follow the “sections” style. The apparatus, procedure, data, and analysis sections can be blended together. However, the report must have a purpose and a conclusion.

Below are a few HIGHLY RECOMMENDED tips for a well-formated report.

While your grade does not depend on these items, they will help you write more professional scientific reports:

#### *Writing Style:*

- Take care to use proper grammar and spelling, as this reduces ambiguity and confusion.
- There should be no unnecessary shift in verb tenses. It is preferable to use the past tense throughout the report.
- Avoid the use of the first person (“I” and “we”). It is preferable to use the third person entirely. You may use “this student”, “this writer”, “the investigator” and so on.

#### *Mechanics:*

- You should keep all data collected during the lab (maybe on a loose leaf paper.)
- Erasures should not be made in the data collections, because data that are erased and later needed are irretrievable. Everyone makes an occasional error. When corrections are in order, draw a single line through the material to be deleted and write the correction neatly above or beside the deleted material.