

## Lab Reporting Process

Each lab report included in your course notebook will be organized in a similar manner. The reports will be divided into labeled sections with each section intended to accomplish a specific purpose. The sections described below will almost always be included. Study each description, tape into the front of your course notebook and refer to it often as you progress through the course. Specific guidelines for each lab are provided on a unit-by-unit basis.

### Title

The title marks the beginning of a lab. It should be clearly written at the beginning of the lab. Use the title provided by the teacher. Labs do NOT need to begin at the top of the page. They can begin a few lines after the previous lab ends.

### Purpose

Labs ALWAYS center around a question which is being investigated. The question is written as a purpose statement and included in the Purpose section. The Purpose section should be clearly labeled as Purpose and include the purpose statement provided by the teacher.

### Data

The Data section includes a clear and organized documentation of the observations and measurements that were made during the lab. The Data section may include a table of measurements organized in rows and columns with the column headings indicating the quantities being measured. Data sections may include diagrams of an experimental set-up with observations recorded on the diagram. The use of sentences and lengthy paragraphs is not necessary. Elaborate discussions are discouraged. But clearly labeled and documented findings are essential. These findings become the evidence that allow you to draw a conclusion related to the question described by the Purpose.

The Data section will often include calculated data. Work should be shown for each type of calculation that is performed. If the same type of calculation is repeatedly performed, the work only needs to be shown once. This work should be clear and labeled.

The Data section often includes a graph. The axes of the graph should be clearly labeled. When the graph is a representation of collected data, you will often be asked to determine the slope, y-intercept, regression constant and equation. The equation is often written in slope-intercept form. The equation should include symbols for the variables being plotted – not the traditional y and x often used in math class.

The Data section will often include Class Data in addition to individual lab group data. Class Data should be clearly labeled to distinguish it from data collected by your lab group.

### Conclusion

If labs are thought of as centering around the investigation of a question, then the conclusion includes the answer to that question. The Conclusion statement(s) (the answer to the lab) ALWAYS relates to the Purpose statement (the question of the lab). A Conclusion is long enough to completely answer the question(s) that is (are) introduced in the Purpose section. Conclusions should always include complete thoughts written in complete sentences.

On occasion, you will be asked to write a Conclusion/Discussion. A Conclusion/Discussion may be slightly lengthier and includes more explaining or describing. When asked to write a Conclusion/Discussion, you will be provided clear directions about what to write about.

## Discussion of Results

Many labs will include a Discussion of Results section. The Discussion of Results section includes an explanation of how the collected data provides logical and reasonable support for the statement found in the Conclusion. The Discussion of Results should be clear, specific, and reasonable. It is often a lengthy section of several sentences and even paragraphs. It is an opportunity for a student to express their understanding of the clear and logical line connecting the evidence (Data section) to the verdict (Conclusion section). In the Discussion of Results section, the student writes, explains, elaborates, supports and cites evidence from the Data section. The Discussion should not be a verbal re-iteration of the data, but rather an explanation of how the data support the conclusion. The student describes how the observations and collected data support the conclusion, citing specific examples as evidence. The student may describe what would have been observed if a contrary conclusion were to be drawn and show how those observations were not made. When appropriate, the student may identify data that seem inconsistent with the conclusion and explain why such data are not swaying the Conclusion in a different direction.

A Discussion of Results section sometimes includes an **error analysis**. In an error analysis, the student evaluates the reliability of the data. An error analysis is a response to the question “How well did I do?” Expectations or theories (found in textbooks) may be introduced and the consistency between the experimental findings and the theory is discussed. If there is an accepted answer to the question that involves a determined quantity, a percent error calculation is often performed (see bottom of page). If two values are being compared (perhaps a class average of a determined quantity and an individual lab group’s value), a percent difference calculation is often performed (see bottom of page). An error analysis will often identify specific data trials which are in error, describe the manner in which they err from the expected results and attempt to explain the cause of such errors.

## Additional Information

Lab reports should only occupy the right-side of your two-faced course notebook (i.e., the *front* side of each page). The left side of the pages (the *back* side of each page) is for class notes, notes from post-lab discussions, responses to required Discussion Questions, solutions to sample problems done in class and book notes. A lab report does not need to begin on its own page; it may begin following the ending of the previous lab. While a lab report is by no means an art project, thought should be given to how you will lay it out on a page so as to efficiently use the provided space without sacrificing readability. Think about where you will fit the Data table, any required graphs, the Conclusion and the Discussion of Results.

Every lab in every unit will come with a paragraph identifying the title and the purpose and describing the requirements for a complete lab report. For some labs, diagrams, graphs, data tables and other additions will be provided. These must be taped into the course notebook. If the taped in addition is too big to fit the allotted space, then tape in one half of it and fold over the other half so that it fits. However you do your lab reports, learn to have fun with it and to personalize it in your own way. But most of all, use it as a method of documenting and communicating your work in the lab. Your lab grade will only be as good as the care, attention and effort that you devote to lab reporting.

## Equations for calculating percent error and percent difference:

$$\% \text{ error} = \left| \text{theoretical value} - \text{experimental value} \right| / \text{theoretical value} * 100\%$$

$$\% \text{ difference} = \left| \text{class value} - \text{individual value} \right| / \text{ave. of class and individual value} * 100\%$$

$$\text{OR} \quad \% \text{ difference} = \left| \text{value 1} - \text{value 2} \right| / \text{ave. of values 1 and 2} * 100\%$$