

## How to Present Scientific Data and Information

**Background Information:** During the course of your studies in all science classes at WLHS, it will be necessary for you to be able to present scientific data and results in a clear and concise manner. Most often this will take the form of graphs and data tables included in a lab report. This skill of writing lab reports will be used many times throughout this year, and in future science classes.

**Lab Reports:** Lab reports will be completed for all labs done during science classes. These reports are designed to present information, data, and results in a neat, orderly manner and will be similar to report forms used in future science classes as well. Many labs will have preprinted report forms containing blank data tables and analysis and conclusion questions. All your answers to questions must be in complete sentences. Some labs will require a full student-written report. The following will serve as a template for completing the student-written reports. All sections are required and MUST be in this order.

**Title:** Write a brief, concise, yet descriptive title

**Problem:** What question(s) are you trying to answer? What is the purpose for doing the lab? Include preliminary observations or background information about the subject.

**Hypothesis:** Make an educated guess of the solution to the question(s) of the problem. It must be written as a complete sentence and should give an idea as to why the answer is correct. It must be done *before* the start of experiments and is not necessarily expected to be the actual correct answer. It must be testable.

**List of Materials:** Make a list of ALL materials used during the lab

**Drawing:** Provide a photograph, picture, or make a neat sketch illustrating some main aspect about the experiment, labeling all parts as necessary. *Necessary for some, but not all labs.*

**Data:** Include data tables, observations, graphs, or additional notes made during the lab. Tables and graphs done on separate sheets must be inserted and shown in order; do not attach these at the end of the lab.

**Data Table(s):** See specific information presented below.

**Graph(s):** As needed, see specific information presented below.

### Analysis:

- Explain your results by summarizing the data and illustrating averages, high or low points, trends, patterns, etc. that will help the reader understand your results. Include calculations and equations you used.
- Accept or reject your hypothesis.
- Explain why you accept or reject your hypothesis using the data you collected from your lab.
- Discuss possible experimental errors that could have occurred in the data collection and how these could have been prevented or lessened.

### Conclusion:

- List one or more things you learned and describe how they apply to real life situations.
- Write a short concluding summary of the lab referring back to the problem, your hypothesis, and your final results.

**Rubric:** Labs count for 20% of the final grade. Most preprinted reports are each worth 50 points. Each section is generally worth 5 points. Missing items or incomplete items will result in deductions of 1-5 points. Incorrect answers to analysis and conclusion questions will also usually result in 1-3 point deductions per question. Non-scientific answers will result in 3 point deductions per question. Some reports, (student written reports) will be worth 100 points. For these reports, point values are essentially doubled.

	10 pts (excellent)	8 pts	6 pts	2 to 4 pts
Introductory Material, Procedures – Methods	1. Relevant title 2. Includes question to be answered by lab 3. Hypothesis is reasonable 4. Hypothesis is testable 5. Provides a description or step-by-step list of how the experiment was performed	One of the “excellent” conditions is not met	Two of the “excellent” conditions are not met	Three of the “excellent” conditions are not met; Description is unclear, steps were missing
Data: Tables/Graphs	Data are clearly recorded, organized, trends are readily seen, tables/graphs are complete and labeled appropriately	Results are clear and labeled, trends not obvious	Results unclear, missing labels, trends not obvious at all	Results are present, but too disorganized or poorly recorded to make sense
Analysis	1. Data and observations analyzed accurately, trends noted, enough data for conclusions 2. Hypothesis is accepted or rejected based on data 3. Sources of error and their prevention are identified	Analysis is somewhat lacking in insight, enough data, but additional would be more powerful	Analysis lacking in insight, not enough data was collected, OR analysis does not follow data	Not enough data, analysis poor or inaccurate; errors not identified
Conclusion	1. Summarizes the essential data used for conclusions 2. Discusses applications of experiment (“real world connection”) 3. Conclusions follow data (not wild guesses or leaps of logic)	One of the “excellent” conditions is not met	Two of the “excellent” conditions are not met	Three of the “excellent” conditions are not met
Format and Writing	Neat, organized, all headings and labels, few grammar/spelling errors			Lacking organization, multiple grammar / spelling errors, not neat

## Data Tables

### Criteria for all data tables:

1. Each column or row is clearly labeled
2. The appropriate SI Units are shown as an abbreviation in parentheses
3. Columns and rows are straight vertically and horizontally
4. Labels and units are printed or typed; spreadsheets or word processing is welcome; no cross outs
5. The use of significant figures is consistent
6. A title indicates what is included in the table

Example: **Timeframe for Reaction ‘A’** *Title*

	Time (min)	Mass of Reactant (g)	
	0	9.8	<i>Headings with labels / SI units</i>
<i>Independent Variable</i>	1	4.9	
	2	2.5	
	3	1.2	
	4	1.2	
	4	0.6	

*Data* *Dependent Variable*

**Rubric:** Points will be deducted for missing or incorrect items. Generally, each item is worth one point. Items include title, headings, SI units in ( ), neatness, and correct sig figs.

## Graphs

### **Criteria for all graphs:** (See examples on next page)

1. Scale accurately represents data; shows trends or changes, or can extrapolate data; use up graph paper
2. The horizontal x-axis represents the independent variable – this is the first column in a data table
3. The vertical y-axis represents the dependent variable – this is the last column in a data table
4. Identify each axis with a label and units (in parentheses); please leave adequate room for all labels by using a minimum 1-inch margin.
5. Scale numbers are clear, easy to read, not crowded, and neatly written
6. The graph is titled appropriately to describe the data and show the relationship between variables
7. If there is more than one line, each line must be identified, preferably with a key
8. Data points are circled
9. Axes extend only as far as the scale numbers
10. Full name and period number are present at the top of the sheet
11. Neatness, grammar, spelling, straight edge lines, and axes with appropriate labels all count; the paper is free of any other extraneous marks, cross outs, notes, and calculations

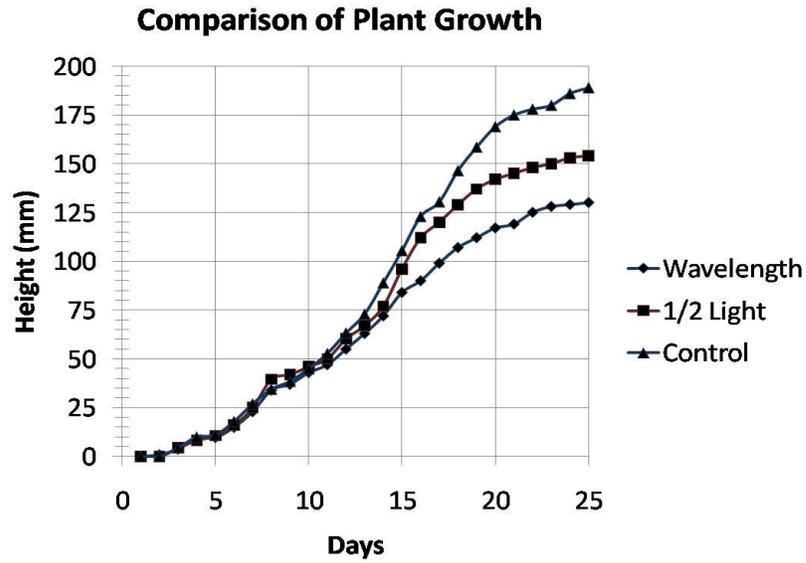
### **Directions for making graphs**

1. Decide if the graph would be more appropriate vertically or horizontally
2. Calculate the number of squares (or lines) that are available vertically or horizontally
3. Decide on the range needed for both axes
4. Decide if the origin should start with zero or if another number is more appropriate
5. Plot the data points
6. Decide if the data shows a straight line or a curved relationship. The textbook has examples.
7. Draw a line that best represents the data (either connect the dots or a best-fit line not necessarily hitting each data point)
8. Identify each axis, write an appropriate title describing what is being graphed, and provide a key for multiple lines, bars, or pie slices

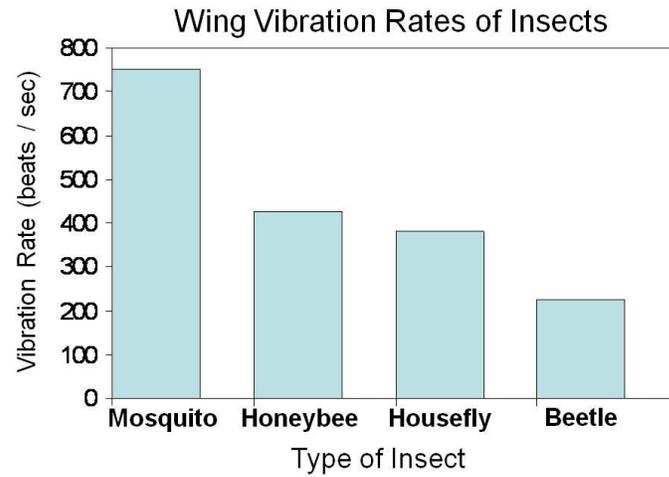
### **Rubric:**

Points will be deducted for missing or incorrect items. Generally, each item of a graph is worth one point. Items include title, labels, SI units in ( ), size/scale of graph, neatness, correct variable with appropriate axis, key, correct data representation lines, data points, done on graph paper.

Line Graph:



Bar Graph:



Pie Chart (graph):

