**Lab Participation Guidelines**

\**Keep these guidelines in your binder at all times. Make sure all of your work is* ***in your own words.***

For each lab, you will receive a laboratory worksheet. The laboratory worksheet will possess specific prompts where and how to record data. The laboratory worksheet will provide the key information for completing your laboratory report. Therefore, you must ensure all prompts are completed in neat, legible handwriting. Additionally, in a group setting you may write down information reached via consensus; however, make sure you understand what the information is representing so that you can clearly discuss that information in your laboratory report

The worksheet will be designed to represent data and information in chronological order. Please use a pencil so that information may be corrected during the lab. The more you document, and the more detail you provide, the easier it is to transition that information into a logical, articulate laboratory report.

**What should you do BEFORE lab day?**

1. Read any handouts or procedures before the day of lab.
   1. Become familiar with the chemicals and/or products you will be handling
2. Remember all safety protocols and procedures
   1. Appropriate clothing, shoes, hair pulled back, etc.
3. Complete a Pre-Lab according to the attached template.

**What should you do DURING class on lab day?**

1. Remain vigilant, remain a scientist
2. Keep your laboratory worksheet safely away from all chemicals or lab products
3. Complete the worksheet with prudence – thoroughly completing all sections in neat, legible writing
4. Again, the more you document concerning the procedure, methods, observations, results, interpretation, the easier and more complete your laboratory report will be

Please use the following format for your procedures and observations recorded while performing the lab/experiment:

|  |  |
| --- | --- |
| **Procedures** | **Observations** |
| 1. Researchers gathered materials. |  |
| 1. Researchers filled the pots with planting soil. | The soil was dark brown with flecks of white in it. |

1. Write down any data or information you collected during the lab (**Data and Calculations)** Make a table and/or graph to organize this information. \**Remember*: Create a title for your table. Label your axes on graphs and include a graph title! Complete any necessary calculations and show an example of each type of calculation.

**What should you do AFTER a lab?**

1. Complete any assigned “Post-Lab” activity and/or complete any assigned formal lab report.
2. Follow your safety guidelines – cleaning the experimental area and washing your hands

Template for Pre-Lab (does not need to be double spaced)

Pre-Lab: Short, descriptive title phrase

**Purpose:**

Explain why you are doing the experiment.

**Question:**

What question are you trying to answer? \*Include IV and DV in the question if it is a controlled experiment, i.e. How does the type of nutrition supplied to a plant effect plant growth?

**Background Information:**

In a short paragraph, write background information pertaining to the topic of the lab that will help the reader understand the topic of the experiment.

**Hypothesis:**

Write a possible explanation or answer to the experimental question. Why do you think the observed change will happen? (i.e. Certain nutrients like nitrogen as well as organic matter and moisture help plants grow.)

**Prediction:**

Write what you predict will occur. (i.e. The more nutrients in the soil, the taller the plant will grow.)

**Measurement and Variables:**

Identify the independent, dependent, and control variables and explain how they will be measured or controlled. \*Required only if it is a controlled experiment.

**Pre-Lab Questions:**

Answer any pre-lab questions here.

**Materials and safety:**

Include a bulleted list of materials that will be used to complete the lab. What safety materials and precautions will be used during the lab?

**Procedures:**

In your own words, write a BRIEF summary of steps regarding how you will conduct the experiment – may be a numbered list.

In Progress (To do during the lab)

In Progress

**Procedures and Observations:**

This section must be in **PAST TENSE.** Use the following table format to list your detailed procedures and observations conducted and made during the lab.

|  |  |
| --- | --- |
| **Procedures** | **Observations** |
| 1. Researchers gathered materials. |  |
| 1. Researchers filled the pots with planting soil. | The soil was dark brown with flecks of white in it |

**Data and Calculations:**

Write down any data or information you collected during the lab (**Data and Calculations)** Make a table and/or graph to organize this information. \**Remember*: Create a title for your table. Label your axes on graphs and include a graph title! Complete any necessary calculations and show an example of each type of calculation.

**Formal Lab Report Structure & Writing Requirements**

**Lab reports MUST BE typed**. No handwritten reports will be accepted. Minimum writing requirements from syllabus must also be followed. **Do not forget to properly cite any outside sources used.** If you are required to write a FULL lab report for a lab, the following sections should be included:

**\*\*Make sure that minimum writing requirement from syllabus are met. Be sure to include a Works Cited for any sources you use outside of class notes.** (5 points)

**Title:** (5 points)

A short, descriptive phrase to explain what the experiment is about. (Include IV and DV if it is a controlled experiment.)

**Introduction:** (20 points)

*First paragraph*: What is the topic of the lab? Describe general background information that will help the reader understand the lab. Define important terms. Recall Hayes et al. article on atrazine and gonadal development.

*Second paragraph:* What is the purpose of the lab? Why do we care about this topic? What question are you trying to answer by performing the lab? What is/are your hypothesis/es and prediction(s)? \*If you performed a controlled experiment, include a description of your independent, dependent and control variables.

**Materials & Safety:** (10 points)

Include a bulleted list of materials that will be used to complete the lab, followed by a short description (in complete sentences) about what safety materials and precautions were implemented during the lab.

**Methods**: (15 points)

Include the detailed steps you followed to complete the lab in paragraph form – CANNOT be a numbered list. This section must be in **PAST TENSE.**

i.e. We/I first gathered materials and filled eight pots with planting soil. We/I then placed one bean seed atop the soil in the center of each pot…

**Results**: (15 points)

In paragraph form, discuss your results and any important data you gathered during your experiment. In this section, you may also include trends in your data. **DO NOT include interpretation of your results in this section, interpretation should be reserved for your discussion.** After your written results paragraph, you should include any tables or graphs that you used to organize your results. Include labels below all graphs and tables i.e. *Figure 1.* Titles and axis labels must be included for graphs. All tables must have titles as well.

i.e. The piece of potato in the distilled water solution gained 3 grams of mass over the course of the experiment, thus its percent change in mass was positive as shown in *Figure 2*.

**Discussion:** (30 points)

Interpret your data/findings in complete sentences. What inferences can you make from your data? Was your hypothesis supported/not supported? Why or why not? What changes should be made in future studies? For instance, if your hypothesis was proven, should a study be conducted to elucidate the mechanism of action? Include at least three possible sources of error or limitations of your study design. For instance, if only one sample was analyzed, would that not represent a limitation because the sample size was far too small? Would a sample size of 20-30 be more appropriate? What could be improved about the procedures or the experiment in general? Describe one opportunity for future research regarding this topic. \*\*It is not enough to “just answer” these questions. You MUST provide **support** for your answers! After answering these questions, include one or two sentences in conclusion regarding how your conclusions are applicable to the real world.

When in doubt, read Hayes et al. study. Review the structure, word use, and content discussed in the introduction, methods, results, and discussion.