**The Steps of Scientific Inquiry**

**Question / Curiosity:**

Usually written in “Will…if” format. The question should be testable, specific and detailed. The **will** part is your prediction about how the dependent variable will be affected. The **if** part talks about what you, the scientist, will do to your independent variable.

**Abstract / Background Research:**

**Background Knowledge:** In this section, you talk about what you already know, or have found out, about the question. It is a good place to define any science terms.

**What do I expect to happen and why?:**

Explain your prediction or what you expect to happen in the experiment. It is important to explain your reasoning here. WHY are you making the prediction you are making? Remember…you are not just making a guess and you need to explain your thinking here.

**Hypothesis:**

An **“IF…THEN”** statement that is specific, testable, and measureable. This statement is a **prediction.** The **IF** part talks about what you are doing / changing in the experiment (the independent / manipulating variable) and the **THEN** part talks about what you think will happen (the dependent / responding variable).

**Constants:**

These are the things you have to keep the same for all the trials so that you know for certain only your independent variable made the changes you observe. Remember, you need to have a **controlled experiement** in which you only have **one** variable (the independent variable you identified in your hypothesis).

**Procedure:**

This is where you will list all the materials you need and explain what you will do to test your hypothesis. The materials section should be a neatly organized list (columns or bullets usually work well). The experimental procedure should be written in numbered steps. It is important you are specific and detailed in your procedure…think in terms of writing a recipe. For example:

1.)…

2.)…

**Data & Analysis**

Data is usually organized into a table to keep it neat, organized and easy to understand. Usually you perform 3 or more trials and find an average. Sometimes we collect class data to gather even larger amounts of data. Always LABEL your data.

**Qualitative Data:** words / descriptions (ie. color, shape, texture)

**Quantitative Data:** numbers /measurements (ie. speed, time, mass)

**Analysis:** Look for patterns and trends in your data. If possible, you may want to graph your data to help you see trends. Overall, was your hypothesis supported by your data? If it was proven true by your data you need to **accept** it. If your data does not support your hypothesis, you need to **reject** it.

**Conclusion:**

The conclusion should be written in complete sentences in paragraph form. Many times, it is the only piece of a lab report that other scientists read, so it must summarize the entire scientific inquiry.

1. Restate the purpose of the lab. What were you trying to do?
2. Restate your hypothesis **word for word** exactly as you have it written above and state whether you accept or reject it. (ie. I (accept or reject) my hypothesis which is, if…then…)
3. **Evidence:** Explain your data. You should include actual data here (quantitative or qualitative) that **provides evidence for your choice of accepting or rejecting your hypothesis.** This is where you back up your decision, so make sure you are specific, detailed and provide enough data to do so. You should also explain whether the difference between the experimental trials and control trials is significant or not.
4. **Errors and Uncertainties:** Discuss any possible sources or error or uncertainty that may have caused you to get inaccurate data.

**Reflection:**

1. How valid do you think your data are from this lab based on your experimental design and possible sources of error? Explain.
2. What would you do differently next time to improve your experimental design?
3. Based on the results of this scientific inquiry, what additional question or curiosity do you have that you could pursue?