Formal Lab Report:

 A lab report is a concise review of what you did, why you did it and what it means. Writing a good lab report will require practice. A lab report, like any formal document you submit, is a reflection of you and your capabilities. They require your best effort. Proofread your paper and use spell check. Your report should be neat, legible and well organized. If you are unable to create this electronically, then write in ink on one side only. Science reports should be written using APA style. Always refer to the lab report rubric to make sure you have all the appropriate information included in your lab report. If you would like me to proof read your lab report before you submit it, give it to me at least 24 hours before it is due. If you would like help with your report, make an appointment with me and be prepared to ask specific questions.

Report Format

• Use the passive voice (past tense, third person). This style of writing is used to convey that the researcher was impartial and objective when performing the experiment and collecting the data

Example 1: “I added 5 ml of buffer to a 250 ml flask” uses an active voice whereas “Five ml of buffer were added to a 250 ml flask” uses a passive voice.

Example 2: 10 mls of the NaOH solution were pipetted into the test tube and shaken until a precipitate formed.

• Your report should have 1 inch margins on both sides and top and bottom.

• You should double space and use a size 12 font (Times New Roman, Georgia, Palatino linotype, or Bookman Old Style)

• Keep your language simple, yet professional. Do not use words like “things” or “stuff”- think of alternative words. Do not use a creative writing style. A lab report is meant to distill facts. Try to use short, common words and simple phrases. Avoid fancy words and fuzzy phrases. Here are some examples of fancy words/phrases and simple alternatives:

 FANCY SIMPLE: ascertain = find out; endeavor = try; utilize = use; due to the fact that = because; in order that so = to

Lab Report Sections

Your formal lab report should include your experimental design document as it was approved (without the Experimental Design Check List) as well as the following sections:

PROCEDURE: Write a detailed and precise procedure that includes both the correct sequence of steps and the materials/equipment that you actually used. You may have adjusted your procedure while experimenting. This procedure should reflect what you actually did to collect the data reported.

The procedure should be detailed enough so that another experimenter could duplicate the experiment without having to ask you ANY questions! Write for one level of the independent variable and add repetitions for repeated trials. Most steps should include a number of some kind: size of pot in mL, amount of soil in grams.

Example:

1. Arrange twelve 4” clay pots on each of 3 24” x 6” plastic gardening trays

2. Add 100 g of MiracleGro gardening soil to each pot

3. Add 1 radish seed (all from the same seed packet) to each pot at a depth of ¼”

4. Add 25 ml of water to each pot

5. Arrange each tray on a shelf of the classroom AV cart.

6. Attach a grow light to the top of the bottom 2 shelves.

7. Make sure the distance from the plant to the light is the same on both shelves

8. Cover the top tray with black cloth to simulate darkness. The cloth should cover all sides but not be secured down (so that air movement is still possible)

9. Set up a timer on tray 2 set for 12 hr cycles of dark and light

10. Turn on grow lights

11. Water all plants with 25 ml of water each every day, wearing insulated gloves when working near the shelves with grow lights.

12. Measure plant height (soil to tip) at the end of 5 days and record in data table

A flowchart could be used as a procedure (this includes pictures and brief descriptive words to explain the pictures)

CHECKLIST FOR EVALUATING YOUR PROCEDURE:

1. All important steps included.

2. All materials and equipment included.

3. Procedure is written for one level of the independent variable.

4. You have included repetitions for repeated trials.

5. You have included repetitions for levels of the independent variable.

6. You have used short numbered steps

7. You have included all important numbers/brand names of materials and equipment required for the experiment.

8. Spelling and grammar are correct.

RESULTS:

There are usually 3 parts in this section, a data table, qualitative observations and a graph.

a) DATA TABLE: Although there are no universal rules for constructing data tables, generally accepted guidelines and conventions do exist. For example, the independent variable is almost always recorded in the left column and the dependent variable in the right. When repeated trials are conducted, they are recorded in subdivisions of the dependent variable column. If derived quantities, such as the average height are calculated, there are recorded in an additional column to the right. When recording data in a table, the values of the I.V. are ordered from smallest to largest. The title of the data table should communicate the purpose of the experiment and mention both the I.V. & D.V. The data table may also include calculated values, with a note for how calculations were completed.

Data should represent the appropriate number of significant figures for the measurement device you are using. When using a device with gradations (lines) you should report to the smallest line you can read and estimate to 1/10th the value between the 2 lines. Never drop significant 0’s.

b) OBSERVATIONS: You should state all observations (made with any of your 5 senses), particularly those that indicate a chemical reaction occurred or anything unexpected

Example: The leaves of 9 of 12 of the plants with no sunlight had brown spots on them at the end of the experiment while none of the other plants did.

c) GRAPH: (when appropriate): The type of graph (Line or Bar) depends on the type of data collected. In chemistry a LINE GRAPH is most commonly called for and is used when the I.V. is a continuous range of measurements.

CHECKLIST FOR EVALUATING BAR GRAPHS:

1. X axis correctly labeled including units

2. Y axis correctly labeled including units

3. X axis correctly subdivided - discrete values

4. Y axis correctly divided into scale

5. Vertical bars for data pairs correctly drawn

CONCLUSION: There are several parts to your conclusion; each part should be a paragraph.

a) YOUR ARGUMENT: You should clearly state your claim, and a rationale for how the evidence supports your claim. You must tie your claim to what the scientific community accepts as scientific model, theory or law or what has been published in the scientific community. You should indicate if the hypothesis was supported.

Example: The amount of sunlight did not affect the growth in height of the plant. Our evidence indicated no difference in mean plant height regardless of the amount of sunlight the plants were exposed to (2.11cm vs 2.10cm vs 2.13cm for 0 hrs, 12 hrs and 24 hrs of sunlight per 24 hr period respectively). The hypothesis that the more sunlight a plant is exposed to, the higher it would grow was not supported. This was unexpected since plants need sunlight to undergo photosynthesis, a process critical for plant growth.

b) ERROR ANALYSIS: If you are testing for a result in which there is an accepted value, your conclusion should include an error analysis. This could be a comparison to your data to the rest of the class’ data. This should include % error or % yield along with a narrative of sources of error. Be sure that the sources of error you list are consistent with the MAGNITUDE and DIRECTION of your actual error. Do NOT use the term “human error”. If you made a blunder (ex. weighing the wrong sample, spilling your product) state it as such and if time allows, re-do the experiment. If there is no accepted value that you can compare your result to, you should describe anything that happened that you did not expect and attempt to explain it.

c) RECOMMENDATIONS FOR IMPROVING EXPERIMENT:

Example: Since we did not see the difference in growth we expected in this study, we suggest a couple modifications. First we think it is very important to not plant the seed until we can begin the control of lighting conditions. It is possible that in our study, the plant could have begun to undergo photosynthesis in our lit lab conditions before we started the study since we did not control how long we waited to plant the seed. We would also suggest running the study for a longer duration to see if changes in height require more time to show.

d) RECOMMENDATIONS FOR FURTHER STUDY:

Example: We recommend conducting a study to determine the effect of different types of light on plant growth. When we began this study we realized that there were many different types of artificial lights that could be used. We decided to use the type that was available in our lab but we are curious to know if plants would grow better in different types of light.