Honors Physics Laboratory Report Format
Spring 2nd Semester 2014

The following information is the expectations for all the lab reports you will turn in.
Keep this document somewhere secure as we will refer to it throughout the semester.

The Purpose of the Laboratory Report Format:

All colleges and research universities expect scientists and students of science to write their laboratory reports in a standardized format. This format is key to communicating the knowledge gained through experiments in an explicit manner that flows logically. Experiments are only valid when they can be replicated/repeated for the same results as the report states. Therefore, the person writing the report must make all the details of the experiment, it's purpose and the results clear to others. Below are each aspect the lab report should include in order that they should be written in. Each aspect is explained in detail with a corresponding example.

The standardized laboratory report includes the following:

- Title
- Abstract
- Introduction
- Procedure
- Analysis
- Conclusion

Title

The title should clearly communicate what the experiment is in a short sentence. Under your title should include names, the date, and the class period.
For example:

The Effects of Mass on Space & Time.
A. Student, B.A. Scientist, & Thinks Critically
January 1st, 2014
Period 0

Abstract

The abstract is a short paragraph that gives a quick summary of your entire experiment. This quick summary should include the concept or question being investigated, how you tested this concept or question, and the conclusion from your experiment including evidence that supports your conclusion. The purpose for the abstract in research/scientific reports are for when others are looking through reports for evidence, they will read the abstract quickly and know whether to invest their time reading the entire report. See the example for the abstract on the next page.

For example:
Abstract: Current research indicates that there are nearby planets that are habitable. We investigated this claim through use of our Large Telescope Apparatus in the region of XD34 to find evidence. The evidence we were search for included a significant amount of gravitational force on nearby star and stardust, due to the present of a large mass such as a planet, and light diffraction of planets orbiting the Helios star in the region of XD34. We discovered there was a change in the gravitational field around Helios of 0.32 X 10^2 Newtons/m +/- 0.01 X 10^2 Newtons/m and the surrounding matter, as well as presents of light diffraction. This confirmed the presence of a possible planet but not if the planet is habitable. Further experiments must be created to confirm habitability of the planet near Helios.

Introduction

The introduction allows the reader to understand the background knowledge needed to comprehend the reason for your experiment. This should include the theory or question behind the purpose for your experiment, the reason(s) you are perform this experiment, and what you hope to find out.

For example:

Introduction:

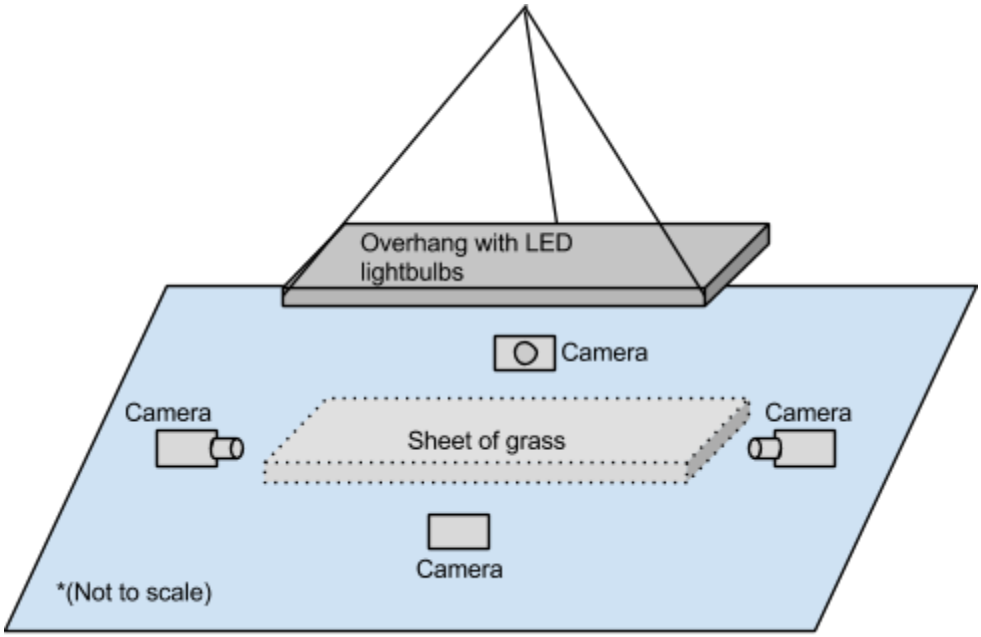
The law of ice cream headaches states that for every 1 scoop of ice cream you consume, you should expect an ice cream headache for total duration of 7 mins/scoop. We wanted to confirm this law of ice cream heachache through several taste tests at local ice cream shops. By eating ice cream at different ice cream shops, we could test for variations in ice creams from store to store and if they confirm the law of ice cream headaches for all shops. We hope to find out if the law of ice cream heachaches is true for the amount of scoops of ice creams to be directly proportional to the duration of the ice cream headache.

Procedure

The procedure describes how to performed your experiment. This should include all the steps of your experiment and how you collected your data. There should be enough details that anyone could replicate your experiment AND confirm the results you report within the margin of error. Include the equipment you used, a diagram or photograph of how your equipment was set up, and the purpose of the equipment. The diagram or photograph show include labels of the equipment. See next page for example.

For example:

The main goal of this experiment was to collect data on how fast grass grows under LED lights. Our equipment included a 10'"x10" sheet of grass, 10 LED lightbulbs, an overhang attachment for the LED lightbulbs, and 4 cameras. The LED lightbulbs were attached to the overhang and supplied with electricity from a nearby wall outlet. The sheet of grass was placed under the overhang. The four cameras were placed on the table, each recording one of the four side views of the sheet of grass. The LED lightbulbs provided light for four days continuously. The cameras recorded all four days. We measured the growth of each side at time intervals of growth per every 2 hours, growth per every 12 hours, and growth per every 24 hours. Below is a diagram of the laboratory set up. Note that is not to scale.



Analysis

The analysis is where you report your data, how you analyzed it, and what your results were, including error. This is also where you explain how you calculated your data if there were any calculations. You must include the equation(s) you used and why you used that mathematical method. The best way to explain your mathematical method is to review what theory or concept you were testing. After explaining your mathematical method, include your finalized data/results. Be clear how you organized your data, whether it is in tables or in graphs, with labels. State at the end what your results showed including errors. There will be a separate lecture and a handout for calculating error. See next page for example.

For example:
Analysis:

The data we collected compared how many hours of studying improved a student's grade on a standardized test. We collected scores for the test for 0 hours of studying, 1 hour of studying, 2-3 hours of studying and 3-4 hours of studying among a sample size of 100 students. For each duration of time studied, there were exactly 20 students for each category. To calculate the average test score for each duration of studying, we performed the following averaging method:

$$\Sigma(Test\ Scores\ for\ the\ students\ who\ studied\ X\ hours) \div (Number\ of\ Students) = Average\ Score\ for\ X\ hours\ of\ studying$$

Below is the table of our average scores for each duration of study time.

Hours Studied

	0 Hours	*1 Hour*	*2-3 Hours*	*3-4 Hours*
Average Test Score (%)	*50% +/- 2%*	*70% +/- 2%*	*79% +/- 2%*	*92% +/- 2%*

The results show a direct correlation between greater amount of time students leads to higher scores of the test.

Conclusion

The conclusion is where you summarized your experiment's purpose and what you discovered from your analysis. This is where you relate your purpose of experiment to your results and how they agree or disagree with what you were hoping to find out. You should also include what caused error in your experiment, whether it was systematic (the equipment caused some error) or random (caused by an outside source from the equipment itself).

For example:
Conclusion:

The purpose of this experiment was to confirm the existence of coal particle in high quality diamonds. By applying gamma rays to diamonds until they melted into liquid form. We placed the diamond liquid in a centrifuge and sorted for coal particles according to density. We discovered high quality diamonds contained 0.0004 % +/- 0.0001% of coal particles compared to their total mass. The error is some the systematic error that using a centrifuge. For this final data analysis, we can conclude that high quality diamonds are very unlikely to contain a significant amount of coal particles.