Laboratory Write-Ups*

Each team should jointly write **one** report on the experiment that was performed. The entire report should be typed up and any relevant equations, tables, and graphs should be included. All reports should include the following elements:

Title Page

A title page containing a descriptive project title, your name, your partners' first and last names (**only those in attendance during the lab**), and the date the experiment was done.

Abstract

An abstract is a **short** (one or two paragraph) summary of the entire report. The abstract must summarize the theory, the procedure, data analysis, conclusions, and the measured results. Since an abstract is a summary, it should *not* include formulas, detailed information, or data tables, but it must include the most important values that you obtained as your **final results** along with their **uncertainties**. Also, being a summary, you should not begin writing the abstract until you have finished the remainder of the report and know what to summarize. It must be no longer than one double-spaced page (one half page if single-spaced). Don't use personal pronouns like 'I', 'us', 'we', 'our', etc.

The abstract is the most important part of the report! Think of it as an Executive Summary – Something that will be read by busy, influential people (company presidents, big clients, venture capitalists, physics professors, etc.) who need to have the most important information spelled out clearly but succinctly. Neatness, grammar, sentence construction and spelling matter. The abstract must be self-contained and may not refer to other parts of the report or to the instruction sheets. This is often difficult to do, cutting everything down to just the bare basics, but it's a necessary part of technical writing as there are so many journals out there that people only have time to skim through lists of abstracts to decide what paper they need to read in detail.

Theoretical Background

The theory section should include an explanation or derivation of each formula you used. For example, you might explain how Newton's Second Law is applied to a falling mass and include a diagram illustrating any sign conventions you chose.

Experimental Procedure

The experimental procedure section should explain anything you did that was different from the instructions. Students often come up with better ways to do things and this is your chance to explain it. Since the measurements have already made, it should be written in past tense.

* Adapted from Material by Greg Trayling (see http://people.rit.edu/gjtsps/) – Winter 2008.

Data Tables

Individual numbers, as always, must include the proper units. The first row of each column in a data table or spreadsheet should show the name and units of the numbers in that column, and the rows below it should contain only the numbers without additional unit names.

Data Analysis and Graphs

Show each step for **one** sample calculation of each type. (Note: If you use a spreadsheet, the equations used to calculate each column in the spreadsheet must be presented, preferably in spreadsheet format). Since your discussion will include an analysis of the experimental uncertainties, these should be estimated and carried through your calculations. Explain any details that were not explained in the theory or procedure sections.

Any graphs must have a descriptive title, and the axes must be labeled with quantities and units. When using LoggerPro you should include one good printout of the LoggerPro graph for each of the unique experimental runs done.

Conclusion

Describe the results you obtained. Write a sentence or two for each of the objects explaining whether or not the experimental and theoretical values agree. Don't ever talk about an experiment being a 'success' or 'failure', just state your results. If they don't agree, suggest reasons why this might have happened. Don't ever use the phrase 'human error' or say things like 'it's probably my lab partner's fault' as these are technically meaningless and you won't find them in any scientific publication. If you can't see any reason at all for a discrepancy, then simply state that (This is actually done in scientific journals, and it's an invitation for others to look at the problem). The uncertainty analysis should be carried out correctly for both the experimental and theoretical parts. This component is just as important as the actual numbers, because without uncertainties you can't determine whether the numbers are in agreement or not.

Grading

The lab write-ups will be graded on a ten point basis as follows:

Abstract:	2 marks (major)
Theory:	1 mark
Data tables:	1 mark (record uncertainties and units)
Uncertainties:	2 marks (for experimental & theoretical values)
Sample calculations:	1 mark (show one example)
Graphs/LoggerPro plots:	1 mark (labels and units)
Discussion of results:	1 mark
Neatness and Clarity:	1 mark
Total	10 marks