Name:

Final Lab Book

Criteria	Proficient	Satisfactory	Insufficient
Documents Preparation ☐		☐	☐
Student has come to the lab well-prepared and pre-lab questions are complete; identifies goals for each lab period or analysis session; sketches the proposed procedure	*Pre-lab questions are complete and correct; initial calculations or simulations show that the student has thought about what to expect; the goals for each lab period or analysis session are specific and stated clearly at the beginning of each lab or analysis session; the description of proposed procedure is clearly stated and is informative*	*Pre-lab questions have been attempted; preparation is adequate; specific goals are included, basic procedure is proposed*	*Pre-lab work is minimal or non-existent*
Documents Lab Happenings ☐		☐	☐
Documents day-to-day activities and happenings on a regular basis; states the details of the experimental procedure clearly, comprehensively and efficiently on a regular basis *Evidence of inter-lab period work* Yes ☐ No ☐	*Day to day happenings are well-documented on a regular basis throughout the lab period and between lab periods; the experimental procedure is clear, complete and efficient; it takes no effort to comprehend - a new student not familiar with the experiment could follow what has been done; it reveals that the experiment is well-designed and quickly converges to the results; independent, dependent and control variables are defined; it includes debugging, relevant settings on equipment, equipment tests; it includes quick-checks (or pre-experiment tests) where parameter space and the phenomena to be studied are explored before lots of data is taken*	*Documentation largely complete; the experimental procedure takes some effort to comprehend and some details are vague; experiment design is adequate to achieve the goals of the experiment*	*Documentation is minimal or non-existent; partners names and roles missing; date and time missing; filenames missing; names of analysis programs missing; the experimental procedure is present or even missing; if present, important details are missing; it takes a lot of effort to comprehend; it is not clear how equipment was used, or what tests were made to make sure the equipment was behaving as expected*
Data Management ☐		☐	☐
Data is recorded and presented in a meaningful way (see Hughes and Hase Ch 5 on Data Visualization and Reduction, and PHYS 332 Guidelines on Data Management)	*All important data are present, organized, and recorded clearly; tables are labeled and placed in logical order; files and locations of data are clear; figures showing raw data are included at the time when the data is taken and show a steady improvement in experimental technique and understanding; figures showing final data and fits are present; figures include error bars, legends and are labeled appropriately; the final graphs are a good representation of how the results address the goals of the experiment*	*All important data are present, but recorded in a way that requires some effort to comprehend; the tables are labeled but labels are confusing; figures are adequate; graphs are present and largely correct with minor issues, e.g. axes do not correspond to the independent and dependent variable; scale is not accurate; error bars are incorrect; presentation does not clearly interpret the results*	*Some important data are absent or incomprehensible; they are not organized in tables or the tables are not labeled properly; Graphs are present but major problems exist, e.g. the axes are not labeled; there is no scale on the axes; data points are connected; there is no fit; there is no legend; there are no residuals; representation does not interpret the results*

Comments:

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Identifies and Evaluates Uncertainties *Identifies sources of experimental uncertainty and steps taken to minimize uncertaintie; evaluates specifically how identified experimental uncertainties may affect the data and the final results; includes parameter uncertainties*	☐ *All uncertainties are correctly identified; there is a distinction between random and systematic uncertainty; the biggest source of uncertainty is identified; the design of the experiment has been optimized to minimize uncertainties; all uncertainties are correctly evaluated; the impact of the uncertainties on the data and results are discussed; the uncertainty in all intermediate and final results are correctly calculated*	☐ *Most experimental uncertainties are correctly identified but there are some weaknesses; there is no distinction between random and systematic uncertainty; little or no effor has been made to minimize uncertainties; too much emphasis is placed on uncertainties of little consequence; results take the identified uncertainties into account and evaluation is largely correct*	☐ *Little or no effort is made to identify and minimize experimental uncertainties, but most are missing, described vaguely, or incorrectly; little or no effort is made to evaluate experimental uncertainties, but most are missing, described vaguely, or incorrectly*
Demonstrates Physical Understanding *Identifies and explains the basic physical principles and the associated mathematical models required to support the experiment and analysis*	☐ *Basic physics ideas and equations are included; the mathematical representation contains no errors and it is easy to see the progression from first to last step in solving the equations*	☐ *Principles are identified but explanation is incomplete or unclear or steps are not complete; not all variables are defined*	☐ *Some or few principles are identified and partially used to explain the system but the description is generic or vague or applies the wrong concepts*
Analysis of the Results *Includes goodness of fit tests and hypothesis testing (e.g. Hughes and Hase, Ch 5-8)*	☐ *Detailed analysis that is more complete than usually seen; careful comparison of results to the model is made using parameter uncertainties and statistical tests*	☐ *Adequate analysis; most analysis is present and largely correct*	☐ *Some analysis is present but generally insufficient*
Quality of the Results	☐ *Results are excellent; results are complete and more accurate, precise and/or clearer than usually seen*	☐ *Results are of good quality - results are complete, and a sufficient amount and quality of data was taken and reported; steps were taken to minimize uncertainties*	☐ *Results are of minimal quality; results are present but not complete; efforts were not made to minimize uncertainties or data has larger uncertainty than typically seen*
Summarizes Accomplishments *Accomplishments of each lab activity or analysis session are summarized; final results are communicated (see Hughes and Hase 2.9 on rules for reporting experimental results)*	☐ *Summary of each lab activity or analysis session is complete and includes reflection on future actions; final summary is complete; findings are discussed clearly, results are compared quantitatively to known values; there is deep reflection on the quality and importance of the findings and how they were impacted by experimental design and the limitations of the model*	☐ *Summary of each lab activity or analysis session is accurate but little reflection on the impact on experimental design or future action*	*Summary may or may not be present but not useful*

Comments: