
Physics Laboratory Guidelines

Spring 11

Everyone should have the lab notebook with quadrille (graph) pages available from the bookstore. This will be used to keep a record of each experiment that you do in the physics lab. (Other **required** materials include a 15 cm clear plastic ruler and protractor, scientific calculator, and a glue stick or tape.) A description of each experiment to be performed will be available on the physics website and should be printed out by the student before coming to lab each week. Take the time to study this before coming to lab. Things will go smoother for you (and you will learn more!) if you have some idea of what is expected of you when you arrive at the lab.

A brief written lab report will be due from each person at the end of the lab period for each experiment performed. The report should include the following:

Heading: Date and title of the experiment. Include a list of the lab group members and their responsibilities.

Purpose: One or two sentences describing what you are trying to accomplish with the experiment.

Procedure: Before any data or results are displayed, an explanation should be given as to how that data was obtained and what equipment was used to do the measurements. Include sketches or diagrams that help to explain how you carried out the experiment. If you like, you may cut out and paste into your notebook the written procedure from your lab writeup (you will need to provide your own tape or glue for this purpose). However, **you must make your own sketches and diagrams.**

Data: Data taken during the experiment and data later calculated should be displayed in neat tables (**an excel spreadsheet**) and graphs (see an examples on following pages). Please do not confuse the data with the calculations part of the lab. Your calculations will be explained in the next section of your report.

Calculations and Questions: Explain any calculations you use in obtaining final results by showing a sample calculation for each different formula used. Each sample calculation should contain three lines. Shown below is an example of a sample calculation:

$$\begin{aligned}A &= 4 \pi r^2 && \text{(formula used)} \\A &= 4 \pi (6.32 \text{ cm})^2 && \text{(substitute data from your experiment)} \\A &= 502 \text{ cm}^2 && \text{(final result of calculation)}\end{aligned}$$

Be sure to include units in your calculation and include only the proper number of significant figures in your results. Also, **please answer all the questions asked in your lab handout in this section.**

Conclusions:

Give a short discussion of what your results show. The following ideas should always be included:

- Did you accomplish the goals stated in the purpose (No. 2 above)?
- Discuss sources of error in your experiment (not human error!). It is assumed that there is some error associated with taking measurements. You will be expected to **indicate at least one valid source of error and estimate how it affected your results.**
- Find the percent difference between your experimental results and the accepted values for those same quantities. To find the percent difference use the following equation:

$$\text{percent difference} = \frac{\chi_{exp} - \chi_{acc}}{\chi_{acc}} \times 100\%$$

where χ_{exp} = the experimental result

where χ_{acc} = the accepted value

Make-up Labs:

There will be no make-up lab unless the student has given notice at least one day beforehand. The only exception to this is if you are sick on the day of the lab. Please email or call your lab instructor immediately to discuss arrangements for making up the missed lab.

Late Labs:

If a lab is not finished/graded the day of the lab, **it is due on or before the next lab day**. A lab turned in later than the following lab day will be considered late. **Only two late labs will be accepted during the semester.**

Grading Policy:

The grade for each lab report will be S+(9 pts.), S(7 pts.), or S-(5 pts.). After finishing an experiment, your lab report will be reviewed and graded before you leave the laboratory (in most cases). Your lab instructor will discuss with you the particular criteria that determine the grade you receive on your lab reports. However, here are some general points to consider:

- Have you satisfactorily completed the items listed on the previous page?
- Neatness and general readability. **(If the lab report is not legible, you will be required to rewrite and/or type the written portions of your report.)**
- An indication that you really understand what you did.

For point (b) and (c) you should aim to write your reports so that another student at your level (not necessarily taking this course) could read your report and understand what you did and why.

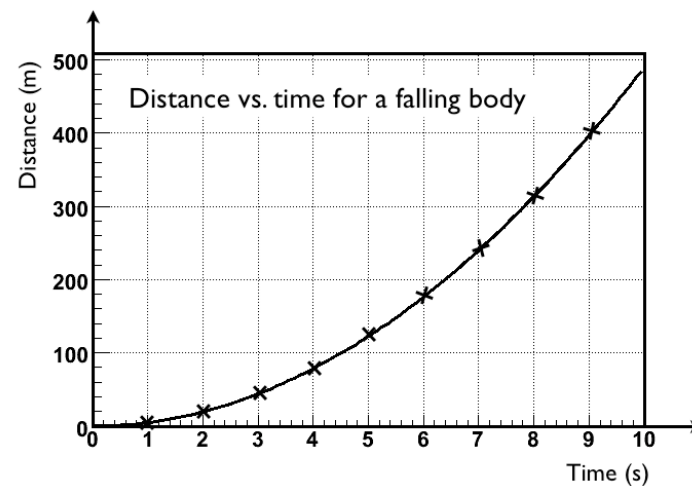
You are expected to bring your lab notebook to class each week. **A forgotten lab notebook is an automatic S-**.

Important: No one will be given a passing grade in the course unless at least $\frac{3}{4}$ of the required lab reports are satisfactorily completed by the end of the semester.

Below is shown a typical graph that might appear in your lab report

NOTE:

- The graph has a title.
- Both axes are labeled and include units.
- Data points are shown clearly marked
- A smooth curve is drawn which best represents all of the data points.



Below is shown a typical data table that might appear in your lab report

NOTE:

1. The table has a title.
2. Each column of data is labeled and the units used are clearly shown.
3. Attention is paid to significant figures.

- Data for Freefall Experiment -

Trial	Distance (m)	Time (s)	Time ² (s ²)	Measured Acceleration (m/s ²)	Accepted Value - Acceleration (m/s ²)	Percent Difference (%)
1	4.92	1.02	1.04	9.46	9.80	-3.49
2	19.8	1.96	3.84	10.3	9.80	5.19
3	43.8	2.92	8.53	10.3	9.80	5.19
4	79.6	4.11	16.9	9.42	9.80	-3.83
5	124	5.03	25.3	9.80	9.80	0