Physics Laboratory
Foothill College

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Required Materials:

1. Scientific Calculator
2. Ruled paper

Grading: Generally, you will be doing an experiment or exercise each week. You will be expected to turn in a group report (one report for every two people) after each experiment.

Format (3 points):
Hand written or typed on ruled loose leaf paper.
Tape in graphs or include them as a separate sheet.
Two people per group - One report per group (one report for every two people).
Five sections: title, purpose, procedure, data & results, conclusion
Have the first 3 done when you come to lab.
Make sure your tables, calculations, graphs, etc. have the correct units and labels.
Make sure to include your lab partner's name and the date.

Pertinent Information (1 point):
Take out some ruled paper and use it to record all information during lab. All information should be recorded, in ink, on this paper. If you make a mistake, draw a single line through the entry and make a note explaining the mistake. You never know, your original calculation may have been correct. Your data should be recorded in the order taken. You may wish to record run numbers (generated by the computer when collecting data), so you know which data in the computer corresponds with which run conditions from your experiment.
Start the lab by recording the date and the names of your lab partners.

Analysis (4 point):
Show sample calculations. One calculation of each type is sufficient. Calculate percent difference from expected values:

$$\%difference = \frac{(value_{experimental}) - (value_{accepted})}{(value_{accepted})} \times 100\%$$

Include a summary chart. Arrange your results into a logical order in the summary chart in able to help you to spot trends in the data.

Include error analysis. All results should include errors and units (50±2 kg, not 50 kg).

Conclusion (4 points):
Did your result agree with the accepted value? Was it higher or lower and does that make sense given your sources of error?

Look for trends. If you change something, did it affect your results; did your results get better or worst? Think in terms of systematic vs random error.

> **Random errors** are statistical fluctuations (in either direction) in the measured data due to the precision limitations of the measurement device. Random errors usually result from the experimenter's inability to take the same measurement in exactly the same way to get exact the same number.
>
> **Systematic errors**, by contrast, are reproducible inaccuracies that are consistently in the same direction. Systematic errors are often due to a problem which persists throughout the entire experiment. Example: your scale isn't set up properly and reads 0.5 g too high for all of the measurements throughout your experiment.

List sources of errors in your experiment. Think about the experimental design (can some aspect of the experiment be improved to make the data more accurate?), random errors, and systematic errors. Do not use the "shotgun" approach of just listing every possible source of tiny error. Try to think of the one or two main sources of error. Does your data support your reasoning?

> Note that systematic and random errors refer to problems associated with making measurements. ***Mistakes*** made in the calculations or in reading the instrument ***are not considered in error analysis***. It is assumed that the experimenters are careful and competent! Your report should ***never*** say, "human error."

Instructor Discretion (3 point):
This is my opportunity to reward (or deduct) points for:
- Work habits and effort
- General comprehension and understanding of the experiment
- Accuracy of results

Make-up Policy: Due to the nature of setting up equipment for the laboratories, there are no make-ups. A missed lab results in a zero for that lab.

Important Notes:
1) You must pass the laboratory to pass the class.
2) You must be in lab to collect your own data (even if you already had this lab in a previous class).