

## Instructions for Experiments

1. Read each experiment thoroughly before coming to lab; come prepared to ask questions.
2. Review the pertinent material in the web links in the modules before each lab period.
3. Work in groups of 2 or 3 whenever possible. Participate fully.
4. Discuss the procedures and analysis carefully with your group.
5. Think before doing. Consider ways you can reduce errors and uncertainties. If your percent difference comes out large go back and re-examine your measurements and calculations. The three R's about uncertainty that distinguish physics experts from physics novices are:
  - Recognize. Experts recognize that all measurements have uncertainty.
  - Reduce. Experts employ clever but learnable methods to reduce their uncertainty.
  - Report. Experts report their uncertainties honestly and carefully.
6. Take precautions for safety. Also handle equipment carefully to prevent breakage.

## Instructions for Lab Write-ups

1. Use pencil. Neatness counts. Clarity of communication is very important.
2. Always report units with your measurements.
3. Indicate the quantity and units on each axis of your graphs. Spread graphs out to cover as much of the page as is reasonable. In physics we always say “ $y$  vs.  $x$ ” or “‘vertical’ vs. ‘horizontal’.”
4. Make your drawings and explanations so clear that a layman could understand them (and so you can still understand them in three years). Sketches should show the important aspects of the operation of the apparatus.
5. Show all calculations, including calculations of slopes of lines and calculations of percent differences.

$$\% \text{ difference} = \frac{\text{measured} - \text{accepted}}{\text{accepted}} \times 100\%$$

Note that the % difference can be negative.

6. Report uncertainties and percent errors honestly and carefully. Don't report 0% difference. Percent difference is meant to indicate the accuracy of your measurements and there is *always* some error or uncertainty, so don't record 0% as your difference; instead, if it first seems to be 0%, use some other method to estimate the error (ask your instructor for suggestions).
7. Write a conclusion section for each lab summarizing what you learned. In your conclusions indicate which special steps you took in the procedure to minimize errors.
8. Please staple multipage write-ups.