

Results

At some point you will draw a conclusion about whether the data you have obtained are consistent with the expected relationship between your variables. If you predicted a straight line in your theory section and your experimental results support your prediction, you should say so. You should, however avoid comments like, “our results prove that the theory is correct.” You can never *prove* a theory; to do so, you would have to perform all possible experimental tests of that theory, and you don’t have time for that in a three-hour lab period (or in a lifetime, for that matter). On the other hand, it is possible to disprove a theory with a single contradictory measurement (provided that the experiment has been done correctly, which may be a matter of debate!). The accepted phrase in both cases is less rashly assertive, “our results are *consistent* (or *inconsistent*) with the theory.

Often your discussion of the implications of your results will be straightforward. Systematic errors or other problems (including faulty theories) will sometimes cloud the issue, though. Your discussion of the implications of unexpected results will show your strength as a physicist most clearly. You should be creative, but careful. Don’t allow yourself to indulge in empty speculation about an unexpected result; test your speculations. If you come up with an explanation, try to show that it could indeed have caused an effect of the same magnitude and in the same direction as the effect you observed.

CHECKLIST FOR THE ANALYSIS SECTION:

- Brief description of data.
- Graphs of data and comparisons with theory.
- Discussion of consistency or lack thereof with any theoretical predictions.
- Discussion of uncertainties.
- Discussion of results and their implications.

PUTTING IT ALL TOGETHER

In principle, if you write the various sections of your report using the guidelines above, you should be done. Before you turn in this masterpiece of scientific prose though, you need to make sure that it all hangs together. That is, do the links between sections that you imply in one section actually appear in another? For example, did you test in your analysis section the equation that you derived in your theory section? If you make assumptions in your theory section, did you include tests of those assumptions in your procedure section? Did the measurements that you describe in the procedure appear as graphs in your analysis? Do your