Scientific papers: introduction and procedure
Physics 220, spring 2009

Assignment:
An introduction section and procedure section for one of the following experiments: Isotope shift, Photoelectric effect, or Superconductivity
Draft due by class time March 26. Final version due April 2. Draft counts 40% of the grade.

A lab report or paper should be persuasive as well as informative. By the information you choose to present, you convince the reader that you have performed the experiment appropriately, and show the reader where your conclusions come from and why they're valid.

The intended audience is people who have had physics at the level of this course, but haven't performed this particular experiment or read the lab writeup.

Introduction (and Background)
In a few introductory paragraphs, describe the goals of the experiment and give the necessary theoretical and experimental background. (If you need to present a lot of background material, consider making a separate Background section after the introduction.) Let the reader know what the paper is about, and what the purpose of the paper is. If the paper is very long, indicating how it's organized is also helpful.

Procedure (Experimental details)
Describe what was done in enough detail (including information about specific pieces of equipment used) so that the reader could repeat the experiment. This description should be written in the past tense ("we taped a meter stick to the ceiling", not "next you tape a meter stick to the ceiling.") Don't simply retype the procedure in the lab writeup; write what you actually did, adding details ("used a meter stick to measure the length from the floor to the flat side of the lens"). Comments about any difficulties encountered and what you did to ensure the validity of your results are also appropriate here.

Other hints for writing these sections:
In deciding whether or not to include something, ask yourself "Will it help the reader evaluate the correctness of the work, or perform the experiment him/herself?"

The procedure is not a chronological narrative of everything you did. Chronology isn't important unless if might affect the results (it's not important that you did the calculation of the correction factor while waiting for the apparatus to warm up, but it may be important when you read the barometric pressure of the room)

Equations should be where they will make most sense to the reader—probably at least not until the reader understands the main ideas behind the experiment. Similarly, remember that your reader hasn't seen the experimental setup or read the lab writeup, so make sure the reader knows what you're talking about if you refer to "the lens"—maybe you want to say "a +7-cm focal length lens."

Figures, graphs, and tables should have captions, not titles, explaining what they are and what they mean. For this assignment, they may be on separate sheets of paper, as an appendix to the text.

Equations and references to figures, graphs, and tables should be part of complete sentences. For example, when referring to a figure: "The apparatus was as shown in Fig. 1."

Any equations that aren't obvious (for example, equations that can't be found in TZD or in the lab handout) should be derived or a reference to the source should be given. In giving any equation, you should define the variables and constants used. If you use many equations, you may wish to number each equation so that you may refer to them by number later in the paper. MLA format for references is OK for now.