



ADVANCED PLACEMENT PHYSICS

LA0002A : Formal Lab Reports in the AP Physics World

rev. 2004 1007

OVERVIEW

Formal labs, in AP Physics, will be an extension of the “formal lab” system from Honors Physics. Reports will be modeled even more closely on the model of published scientific papers. In addition to being accurate and professional, you will be expected to contribute back to the community by “reviewing” the papers of your peers.

PAPERS

Each lab group will electronically submit one paper. This is expected to be thorough and complete. It should have the usual sections:

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| Abstract | <p>An abstract is a very brief summary of the experiment, usually no more than a paragraph long. It should be set off with extra space in the horizontal margins -- 2 inches (5 cm) instead of the usual 1 inch (2.5 cm) from both sides.</p> <p>Your abstract should answer, in one sentence apiece, the following questions:</p> <ul style="list-style-type: none">∞ What did you look for? What question did you set out to answer?∞ How did you look for it?∞ What did you see? <p>To the extent practicable, your abstract should have the numerical or symbolic results of the experiment.</p> |
| Theory | <p>What was the theoretical underpinning of your experiment? In other words, why did you expect your procedure to yield useful results? A full treatment is expected (although you can skip steps of elementary algebra or even calculus) -- the idea is to show the progress of your thought, not to prove you can do math. Where appropriate, you should <u>reference your ideas</u> -- be sure to give full credit for work borrowed from other sources. Otherwise it's plagiarism.</p> <p>NB: The Theory section should generally come first, before Equipment or Procedure, because the theory will inform your choices about equipment or process. It gives the reader context to understand the next two sections.</p> |
| Equipment | <p>List whatever you used. Diagrams, sketches, or pictures are particularly helpful here.</p> |
| Procedure | <p>Report on <u>what you did</u>. Write in first-person and be explicit. The idea is, another lab group should be reasonably confident of replicating your results by following your procedure. Use paragraph form and focus on crucial steps, not minutiae.</p> |
| Data and Analysis | <p>Here you present the data you collect, preferably in graphical form when practicable. (Of course, your theory section will have explained <u>why</u> these particular graphs are meaningful.) You also conduct whatever analysis is needed to reduce your data into information. Data is what you take during the experiment; analysis is what you do once the equipment is put away. Since the two have a lot of overlap, they can often be in the same section.</p> |
| Conclusion | <p>At the end, you should weave the disparate parts of your experiment into a single meaningful tapestry. You should explicitly answer the question of the lab, drawing upon your data and your analysis. You must investigate the limits of reliability of your conclusion (what is, in earlier years, called “error analysis”). Finally, you should suggest modifications or revisions to the experiment to improve it or to explore new questions that have arisen.</p> |

FORMAT ISSUES

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| Title | All scientific papers come with a title, so that they can be easily referenced later. Titles can be whimsical or eye-catching (“The Goldilocks Problem”) but should then include a descriptive subtitle (“The Goldilocks Problem: Why is Venus Too Hot, Mars Too Cold, and the Earth ‘Just Right?’”) You can also just have a descriptive title: “On the Dynamics of Rising Bubbles”. Since experiments are designed to answer specific questions, a well-formulated version of the question can serve as the title. |
| Figures | Indexed as “Fig. 1”, etc.; and captioned “Fig. 1: The parachute”. It is best if the figures appear near the text in which they are referenced, but it is acceptable to “float” the figures all the way back to the end of the report. |
| Graphs | Indexes <u>as figures</u> . Graphs should have the axes labeled and demarcated -- that is, both what it is (“velocity”) and a series of marks <u>with units</u> (10 m/s, 20 m/s, etc.) |
| Tables | Indexed as “Table 1”, etc. and pre-captioned “Table 1: Terminal Velocities”. Each column must include each of the following in the headers: <ul style="list-style-type: none">∞ Physical name∞ symbol∞ unit |
| equations | Generally equations belong on their own line and indexed as “Eq. 1”, etc. For short, commonplace, or obvious equations, it is permissible to “inline” them straight into the text. Such equations are <u>not</u> indexed and cannot be referred to later. |
| symbols | Recall that variables belong in <i>italic</i> face and constants in straight face. |
| orphans | Do not orphan section headers on their own page; force them to the next page to rejoin the text they head. Likewise, do not split a unit from the magnitude attached to it, nor allow equations to break across lines. |
| sections | Major sections should have their own headers (“Equipment”, “Procedure”). Significant and obvious subdivisions of a section should have their own subheadings: “Building the parachute”, “Finding the terminal velocity”. NB: Section and subsection headers <u>each</u> go on a separate line from the text they head and should probably be in a different font or in boldface. |
| references | You can reference parenthetically or by endnote -- <u>not footnote</u> -- and you must reference anything that influences your work. Be sure to cite the textbook if you use it. |
| typos | Typographical errors (primarily misspellings but also egregiously bad grammar) are simply unacceptable in a work that has been edited by three people (or more!). They will be penalized harshly. |

INDEXING

Each type of special item (figure, table, equation) maintains its own count. That is, if you had a picture, a graph, and a table, you would refer to them as, respectively, “Figure 1”, “Figure 2”, and “Table 1”.

REVIEW

See separate handout (LA0003) for details on the peer review system.

RUBRIC

You will be assessed in 8 areas, most of which are rated 1 to 10. Getting a 7 or 8 should be easy but getting a 9 or 10 will require considerable effort in your report.

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| Professionalism | The language used should be professional, clean, without "slang". | Theory | You <u>must</u> include a brief discussion of the theory behind the experiment. It should make your choice of procedure clear; that is, the quantities you're going to measure should appear here. |
| Presentation | The report is well-formatted, with clear presentation of graphs, sections (with headers), appropriate indices (Figure 1, etc.) Equation are set off and properly italicized, and so on. | Conclusion | Obviously, your conclusions should be consistent with the data you show. This is where you tie it all together. |
| Abstract | The abstract should be complete and concise. | Procedure (Clarity) | Can a reasonable person follow your procedure, in order to replicate your work? Diagrams or pictures are a must here. |
| Analysis | The work done processing the data is done well and makes sense. Meaning is effectively and correctly drawn from the data. | Procedure (Quality) [1-5 pts] | Does it seem reasonable that your procedure could yield the data you sought? |