

## The Homework Portfolio

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A portion of your *homework* grade will come from graded assignments handed in during each class period. The other segment will come from an evaluation of a homework portfolio which you will assemble over the course of the semester. The homework portfolio serves several purposes:

1. It is designed to help you think about how to effectively communicate the solutions to problems.
2. It is designed to allow you to integrate knowledge and understanding longitudinally across the course of the semester.
3. It is designed to be a useful tool for you as you continue to study physics (and related subjects) into the future.

The basic premise of a homework portfolio is simple: as you turn in (and I grade and return) homework over the course of the semester, it accumulates in a single repository which you then can refer back to at a later time. However, there are a couple of details which require additional consideration.

First, the solutions in your homework portfolio need to be correct (purpose 3). Remember, the point is to have a reference you can use at some point in the future, and an incorrect reference is more harmful than useful. This means that when portions of the solutions you turn in are incorrect (or incomplete) you need to make corrections and/or additions before putting them into your portfolio.

Second, your solutions need to be self-contained and easy to follow (purposes 1 and 3). Please follow these guidelines as you prepare your homework to go in the portfolio:

- **Begin each solution with a statement of the problem.** This can be briefer than what is given in your textbooks, but should include enough information for someone to try to solve the problem without having to look it up.
- **Each solution should begin on its own sheet of paper.** At this level, most problems will be long enough to require a full page (or more); you won't be saving much paper by crowding the problems, and having each solution start at the top of its own page makes them easier to find. Also, if it turns out that you need to add something to the end of a solution, you can do it easily without disturbing the beginning of the next problem.
- **Use only one side of the paper.** This will improve long-term readability of your solutions. I really don't care what kind of paper you use, but have found that for me, white unlined paper works best.
- **Include diagrams/sketches/pictures where possible.** Note that I say "where possible" instead of "where necessary". If you can possibly include a picture to make things more clear, do so.
- **Neatness counts!** I'm not going to require that you learn calligraphy to do your homework. However, it is true that if you can't read it, it isn't going to do you any good. If your handwriting is messy, slow down and try to be neater. This is especially true of Greek letters that you may not have had much exposure to in the past. Practice makes better.
- **Explain more than you think you should.** One conceptual model of homework is that you are trying to write enough to convince the grader that you know what you're doing. That is the wrong approach for this class. Your homework is supposed to be sufficient to teach a future you how to do the problem once you have forgotten it. Write enough so that you will be able to follow what's going on 6 months from now. Better yet, write the problem so that you would have been able to follow it a week or two before it was assigned.
- **Include references.** This is especially true if you use an example from the text (or a previous homework problem) as part of your solution. It's perfectly fine to say something like "Boas shows on page 103 that..." rather than showing it again yourself. You ought to make a note of anything and everything that helped you solve this problem. This includes coming to office hours or a group study session.

- **Provide large enough margins/whitespace for future notes and cross references.** Your understanding of these problems will undoubtedly evolve over the course of the semester. Give yourself room to add new insights to your solutions without having to rewrite them. Leaving room now will save you work later.

As you turn in your homework assignments, I will give you feedback on how to improve your presentation. Before too long the presentation issues should become second nature to you, and you won't have to think about them quite as much. At each midterm exam, I will evaluate your homework portfolio and give you feedback using the rubric which will ultimately be used to grade it (attached to this document).

To accomplish purpose 2, your homework portfolio needs to be cross-referenced. You will supplement your individual homework assignments with a table of contents and an index, as well as marginal notes directing the reader to other problems. Each problem should include an explicit list of index terms either between the statement of the problem and the solution, or at the end of the solution. The index should be an exhaustive list of the index terms from the solutions, with references back to the appropriate problems. Index references should give both a page number within your portfolio as well as the problem's original source (e.g., p. 35; Boas, 8.13.34). In the table of contents, you should include both the reference to the problem's original source as well as a very brief (just a few words) summary of the statement of the problem.

**How to use the portfolio:** When you are assigned a problem, you should begin by (tentatively) assigning index terms, and then looking at solutions in your portfolio which share one or more of those terms. If the solutions are useful in solving the problem, you should make marginal notes to that effect. Something like "Used in solution to Boas, 8.13.34, p.35", with the date. This is true even (or perhaps especially) if it is just a small portion of the solution which is used. For example, there may be a particular mathematical technique or physical idea which crops up more than once in seemingly unrelated contexts; making a note of this helps to develop the connections which are vital to a deep understanding of physics.

The easiest way (in my opinion) to store the homework portfolio is to keep everything in a three ring binder. Unlike a lab notebook, which you want to keep an accurate record of what happened in lab, the homework portfolio should be a dynamic document which represents your current state of understanding at any given moment. The flexible nature of a three ring binder lends itself to this end nicely.

I will collect your Homework portfolios toward the end of the semester (see syllabus for date), and return them to you on the last day of class. I will grade them based more on presentation than on content (the content will have been graded when you turned in the assignments the first time), however you should remember that correctness is one of the necessary features of a useful solution. That said, I will only look at two or three (randomly chosen) solutions in detail when grading your portfolios. The remainder of the grade will come from the usefulness/completeness of the index, table of contents, and cross references; the presentation quality of the package as a whole; and evidence that you have used the portfolio throughout the semester.