How to Study: Tips for Physics students[1]

Learning Physics

Acquiring proficiency in physics involves each of the following:
(a) *Complete familiarity* with the *fundamental concepts* that constitute the real basis of the subject: come to lectures and take notes.
(b) *Reading of detailed textbooks* which provide the thorough explanations necessary for a proper understanding, and which described experimental work in some detail.
(c) *Ability to apply the basis laws and principles to both familiar and unfamiliar problems*, an ability that is developed by constant practice (i.e. homework).
(d) A laboratory course of *practical work*.
(e) Talk with your T.A.'s and your professors. *It's very hard for professors to mark down someone they know!*
(f) Unless instructed otherwise, you can and should discuss general methods for tackling homework problems with your peers, *but the solutions you hand in must be your own*. (See the separate guidelines "How Not to Plagarize".)

Revision

Well before the exam draw up a *written timetable*, and keep to it.

(1) Set aside for each day a definite length of time.
(2) Find a place where you will not be distracted (i.e. *not* in front of the TV or computer).
(3) Have a pencil and paper to hand
(4) Choose a particular topic to revise, and then devote *all* of your attention to that topic.
(5) Pay particular attention to diagrams and their labels
(6) Repeat to yourself the full meaning of a graph (e.g. emphasize which is the dependent, and which is the independent variable, and whether some other quantity is by implication held constant).
(7) When you think that a topic is mastered, test yourself by *re-writing the main ideas*, as though explaining them to someone who has no previous knowledge of that topic.

Revision should be very much an active (not a passive) *occupation.*

[1] Adapted from *Essential Principles of Physics* by P. M. Whelan and M. J. Hodgson (John Murray, London, 1978).

Examination Technique

An examination is an exercise in efficient communication, and therefore also requires planning.

(1) *Read the Instructions* at the top of the paper very carefully to see exactly what you have to do.

(2) *Read ALL the questions CAREFULLY at the start of the exam*. This allows you to select the easiest question to answer first (you do NOT have to answer questions in the order they appear in the exam paper); also, it allows your subconscious mind to mull over the harder questions while you are writing the answers to the easier ones (which is impossible if you only give them a cursory inspection rather than a careful read-through).

(3) *Time Discipline* calculate how much time can be spent on each question, and do not exceed it. Resist the temptation to spend more time to finish one tough question: it is a far better to move on and start racking up points on a new question, and you can always come back to finish a partially completed question later. If you run short of time, make your answer shorter, but make sure it includes the fundamentals.

(4) *Read the Question* that you are answering carefully to see exactly what is required. Do not spend time giving details you are not asked for, and do not repeat yourself. Work out the order in which different parts of the question are best answered: it is usually better to tackle a numerical or algebraic problem before a lengthy description.

(5) Diagrams: Illustrate your answer with very large clearly labeled diagrams and graphs whenever you can. A quick sketch rather than paragraphs of description can convey far more information. If you are asked to do a scale drawing, draw it as accurately and as large as the paper will allow. State your scale.

(6) Procedure for quantitative problems (i.e. where calculations are required):

(i) Read the question carefully to see *what has to be calculated*.

(ii) Summarize the information given in the question, making the *units* explicitly clear. Often, this can most conveniently be done using a diagram.

(iii) State clearly the principle of physics on which your approach depends. Often an equation is enough.

(iv) Do the numerical computation in such a way that the marker can spot a error: you will usually get partial credit for a problem in which you take the correct physical approach but made a small slip in math, *provided the marker can tell that is what happened*. State answers using the appropriate units.

(v) State your answer with a complete sentence, and make sure it is of sensible order of magnitude. If you think that it is not, then say so.

(7) When describing experiments, list events in the order in which they happen. Illustrate by symbols the measurements to be taken, and demonstrate how the result is to be calculated.

(8) Good English and legible handwriting are essential: without them you cannot communicate.

However good your examination technique, there is no substitute for knowing your subject.