

Ten Study Habits for Highly Effective Students
Bright, Hard-Working Students Who **Succeed** Brilliantly in Physics
Haven E. Bergeson

The Use of Efficient Study Habits

Remember that the goal in Physics is to develop understanding and skills in physics that you can use professionally. The following suggestions will really help you reach this goal.

1. Make a Weekly Study Plan. The stick to it so you will always be ahead of the game.
2. Frequently stop for a moment to reflect on what you have learned. When you read, do not treat the text as though it were a novel. Read a few paragraphs and then stop to rehearse to yourself what you have learned. Similarly, stop for a moment to reflect when the book shows a problem solution or when you work a problem.
3. Never Study Physics for More than an Hour at a Time. Study mathematics for an hour, physics for an hour, and then English for an hour, etc., then start over. There are three major benefits:
 - a. you avoid mental mutiny; (Mental mutiny is a better term than mental fatigue: your mind rebelliously wanders into all sorts of frivolous activities not involving physics.)
 - b. you avoid internal debates about what to study next; your mind immediately switches to the new subject;
 - c. your subconscious will continue organizing the material, filling in gaps, and finding new approaches when needed.

In the muscle-building analogy, this is like letting one set of muscles rest while another is exercised.

4. In your Weekly Study Plan, Include Short Breaks. These breaks are for the bathroom, a drink of juice, a *short* walk to get fresh air, a few pushups, a *short* phone call to someone, etc.
5. In your Weekly Study Plan, Include a Few One-Hour Uncommitted Blocks of Time. These blocks are each approximately one hour long. They are used to get caught up in whatever subject you are behind in.
6. If You Study in a Group, Be smart about it! Study with people having about the same ability and background as yours. If they are way ahead of you, you may just copy their solutions and never develop your own problem solving skills. If they are behind you, you may spend all your time bringing them up to speed without developing your own skills. In a problem-solving session, you should each try to solve each problem independently (perhaps prior to the session) and then compare only to the point where solutions differ; then decide what the correct approach should be from the point on;

finally, let each person continue independently. Otherwise, you may be doing something analogous to building muscles by watching someone else lift weights.

7. Stay Ahead. Do the homework prior to the discussion section; then you will know just exactly what help you should ask for. Read the text ahead of the lecture; then you will know what the tricky parts are, and you can ask the instructor for clarification. Note that this approach takes no more time than doing the work later.
8. Do the Easy Problems First. This advice applies to both homework and to examinations. In the homework, the easy problems are designed to prepare you for the harder problems. On examinations, you pile up points as rapidly as possible. (If you take the opposite approach, you may get stuck on one hard problem, never solve it, and then have no time for the easy problems.) This warm up is like lifting light weights before heavy ones.
9. Be Smart in our Examination Preparation:
 - a. Get a good night's sleep. If you have followed the procedure outlined above, you will already be prepared. In any case, you need to be bright and alert during the examination. Rarely will some concept learned just hours before the examination be as useful as mental alertness. Remember that you are going to be tested on our ability to apply skills you have previously developed to new problems; you will not get the chance to merely regurgitate material you have memorized.
 - b. Don't work really hard problems just before the exam. You will only convince yourself that you are going to fail, and you will go into the exam defeated before you start. If you want to work problems before the exam, warm up on relatively easy ones; that way, you will slip into a successful problem-solving mode.
 - c. Go prepared #1. Make sure your calculator has fresh batteries. Bring at least two sharpened pencils each of which has a good eraser.
10. Have fun. You should feel satisfaction as you master difficult material and develop skills that are relatively rare in our society.

Six Study Habits for Highly **Ineffective** Students

Bright, Hard-Working Students Who **Fail** in Physics

Haven E. Bergeson

The Use of Inefficient Study Habits

Remember that the goal in Physics is to develop understanding and skills in physics that you can use professionally. The following suggestions are guaranteed to defeat this goal despite hard work.

1. Never pause to reflect on what you have read in the text, you have heard in class, nor what you have learned doing problems. Instead, dash ahead frantically as though you were playing an action game on a Playstation. This way you keep your learning at the gut level, not involving the higher centers of your brain.

Study physics (and chemistry and mathematics) in the Largest Possible Time Blocks. For example, set aside Tuesday and Wednesday afternoons and evenings for mathematics, Thursday and Friday afternoons and evenings for chemistry, and Saturday all day and evening for physics. This may be the best way for a really hard-working student to fail, though the mechanism is far from obvious. Let us consider the Saturday physics session. You start out full of good intentions and vigor. After about an hour, you start developing mental mutiny. Now you are inefficient, but you must continue on because this is the time set aside for physics. Pretty soon, even though you cannot concentrate, but being the persistent person you are, you continue using your time with the utmost inefficiency. As mentioned in item #3 below, you do not allow your subconscious to work on the problems while you do something else. This approach has the same effectiveness as an exercise program in which one bench presses for five hours, then does arm curls for five hours, then does sit ups for five hours, etc.

3. **Always be behind.** Remember that physics is a hierarchical subject; that is, each day's work builds on earlier work, including that of the previous couple of days. By not having the foundation for a given lecture, you will not get much out of it. Furthermore, by not having read the material of a lecture before a lecture, you will not be able to ask the questions about the tricky parts. By not having made a serious attempt on the homework prior to a recitation section, you will not be able to tell when you are being given a tip that you really need.

4. **Keep Beating Dead Horses.** When you are not making progress, keep trying the same approach over and over. (If it doesn't work, do you think repeating the same thing will work?) Do not study something else for a while, thus allowing your subconscious to explore alternate solutions. By no means should you get just enough help to get you moving again.

5. **Get Help in Massive Doses**. This is the converse of item #4 above. Instead of getting just enough help to get going again on a hard problem, get the whole solution from someone, just copy it, and turn it in. This way you will get credit for the problem, but there will be no skill building. (You need skill on examinations.)

6. **Do the Hard Problems First**. Instead of building familiarity and confidence with the simple, one-concept problems, build character and confusion by attacking the multiple-concept problems first. (You can justify this approach by remembering that someone you respect told you to do the hard work first when you are fresh and save the easy work for when you are tired. This works for physical work, but not for learning physics.) This approach is like beginning muscle building by bench pressing 300 pounds.

Remember, anyone can work hard and still fail if inefficient techniques are used.