

The Exam Primer

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I often hear the following statement by many students after receiving a less than desirable grade on a test "But I studied HARD for the exam!" My question always is: "So, what does it mean to study hard"?!? Unfortunately, the majority of students equate studying hard with cramming several hours, often end on end, a day or two before the exam. While this may definitely feel "like hard studying" (well it certainly wears you out; it fatigues you; takes a large amount of time out of the day; all viable indicators for completing a strenuous & difficult task) it accomplishes very little in comprehending and applying newly acquired subject matter. Because of the way many tests are written, students have been successful with this cramming method in Highschool and many college classes alike and therefore are lulled into a false sense of test security. Along comes Dr.K with a totally different set of exam, that does not ask for much memorization (the kind of tests usually given in HS and unfortunately many college courses), but for the understanding of the total concept.

The analogy with athletic events may illustrate the dilemma. Could you imagine a marathon runner winning the medal by relaxing in a lawn chair all summer, but doing some exhaustive training just one or two days before the event? You may use any sport. Those that are successful will train on a constant basis to hone skill & endurance. No multimillion dollar contract NFL player in his/her right mind would skip summer camp and show up for barely one or two practice sessions just before the next big game. While such an athlete may feel like he is working out HARD (Hey, by all means he/she may apply himself or herself totally at these infrequent practices), his/her long-term success will be failure if continued in such a manner. I think you are getting my drift!

How do I design my courses for students to acquire real study skills to be successful not only in my classes but all other classes as well? Let me present you with some very useful tips, tricks, and habits!

1. Note Taking - a prerequisite for success

- 1a. The best note taking method BY FAR was developed by Walter Pauk, an education professor at Cornell University. The method is widely known as "Cornell Notes". Please review the following references and start using "Cornell Notes" for note taking in my classes.
 - 1a1. <http://coe.jmu.edu/learningtoolbox/cornellnotes.html>
 - 1a2. http://www.clt.cornell.edu/campus/learn/LSC_Resources/cornellsystem.pdf
- 1b. Right after the lecture, try to make up your own test question. "If you would be the teacher, what questions would you ask on a test using the material from the lecture?" You will be amazed how often your questions will match the questions on my exams.

2. Studying & Learning

- 2a. Research has shown: **It is best to review the material right after class when it's still fresh in your memory.** The technical term is "over-learning". A twenty minute additional study time after regularly answering required materials will increase retention & understanding by 90% compared to control groups. Students who make "over-learning" a habit have retained subject matter years after, being able to do well on entrance exams for example, with little or sometimes no additional studies as compared to the cramming control groups.

Take notes using the Cornell System mentioned above and review them right after class, especially your very own test questions. This IS my standing homework assignment! While you will not hand in your notes and receive a homework grade, the pay-off is seen during my exams. Those who study their notes regularly and apply "over-learning" receive the high scores in my classes, while last minute "crammers" usually don't. This is seen in my test results which are almost always bimodal (a typical grade distribution in a class of 50: A+= 4; A= 14; B= 10; C= 4; D= 13; F= 5) This distribution correlates nicely with those who apply the above methods and the crammers and sporadic class attenders, which make up the lower part of the grade distribution.

- 2b. Study tip: Even though my exam questions are predominantly multiple choice, when preparing for tests, try to avoid short, one word answers. Instead, attempt **answering ALL your questions in essay form**, even when someone quizzes you. This will force an understanding of the total concept or subject matter. The danger with short answers and study question flash cards is the association you create in your mind of an answer with a certain worded question. Works great for memorization and helps cram for many college tests, but here is the catch. If the sequence or wording of the exam question is changed, your learned or memorized associations fall completely apart. Hundreds of students have testified to this fact over the years. Phrases like "I knew this, but I couldn't remember!" or "I know I studied this but I had a mental block or something" are the common result!
- 2c. **Form Homework or Study groups.** These should not be "cramming groups" that meet only once shortly before the exam. Make this a regular. Side benefit: you will meet & make new friends. Quiz each other and encourage responses in form of an essay. If the answer is unclear, give feed-back. Re-read or re-visit the material until you and your partner(s) has/have an understanding of the subject matter. If you can answer in essay form, multiple choice or true-false tests will be a breeze!
- 2d. Learn the general concepts first; don't worry about learning the details until you have **learned the main ideas**. Many students get bogged down in the details without understanding of the subject matter. Make sure that you understand the material well, don't just read through the material and try to memorize everything. Interestingly, once you have the main ideas down, details can often be deducted from what you know using nothing more than some scratch paper, without memorizing anything. In fact, a good part of my exam questions are constructed in this manner, so bring scratch paper to my exams.
- 2e. Once the main idea is learned you **MUST** go beyond it. One problem I encounter with many students is a lack of depth. Most often students will be satisfied with the first simple answer that comes to mind while my questions are often designed to probe the depth of a subject. Hence answers might be poor or even wrong despite the perceived correctness of your answer. The study trick here is to develop the **little kid concept!** Little children are notorious for the infamous "but why?" question, exploring a subject of interest deeper and deeper. The same can be applied when studying for an exam. **Don't be satisfied with the first answer** but employ the "why?" question. Let me illustrate:

Question: Why are temperatures in our latitudes warmer in the summer and cooler in the winter? Answer: The sun's rays are more tilted in the winter (the sun is lower) and are therefore

distributing less energy per unit surface area than in the summer. Q: Why? A: Because the sun changes altitude during the year, being the highest in the sky and closest to the North during our Summer and the lowest in the sky and the furthest South during our Winter. Q: Why? A: Tropic of Cancer... Tropic of Capricorn ... Equator ... etc. etc. As you can see, with each "why?" the answer reveals more and more depth. And your knowledge base of the subject during your studies will also increase, given you a greater understanding and therefore chance in answering the question correctly during an exam.

- 2f. Here is an **experimental study enhancer**. If your brain can be forced into it's alpha state (relaxed, meditative) before or better yet, during your studies, retention of the subject matter is increased. In one study, foreign language students could learn and retain over 3,000 new vocabulary words instead of the usual several hundreds during one semester course by switching into the alpha brain wave mode while learning. So, how do you switch into the alpha brain mode? Most yoga and breathing exercises for relaxation will produce the desired mode, but there is another sure-fire way. Baroque classical music is notorious for inducing the alpha brain state. The most famous example is Pachelbel's Canon in D (Johann Pachelbel; 1653-1706). Even if you are not into classical music, listen to a few baroque pieces to get a feel for the musical mode. Then try to find some modern music compositions with similar qualities. It is important, however, that there are no lyrics! While I can not vouch for this learning strategy, you are welcome to try it. I have mentioned it to a few students with learning disabilities or test taking anxieties and they told me that it has really helped them.

3. Test Taking

Since most of my exams are multiple choice tests, the following ideas are geared toward these type of exams:

- 3a. Read the questions carefully. This can not be overemphasized. Matter of fact, read the question and try to answer it in your mind or on a piece of scratch paper **WITHOUT** looking at the provided answer choices. In this manner the choices given on the test won't throw you off, trick or sometimes confuse you (or distract you from reading the question carefully). Here is an example from my oceanography class:

Ocean depths are routinely determined by...?

- (A). sending a sound through the water and timing it's return signal
- (B). Using a pressure reading device near the sea floor
- (C). Using a line and weight.
- (D). Both A & B are right.
- (E). A, B, and C are correct.

Even though all three A, B and C answers are viable, the correct answer is only A. Why? Read the question carefully. The key word is routinely. If this one adjective is removed from the question, then the answer would be indeed E. But because routinely is in the question, it changes the whole scenario because only echo sounding is a routine method for the determination of ocean depths while the other two or only occasionally employed.

- 3b. Many of my questions are in the format shown in the sample question in 2a where answers (D) or (E) invite more than one correct answers. While you may have heard that the multiple choice answer "All of the above" or "None of the above" is most likely an incorrect choice for a multitude of multiple choice tests out there, be aware that this is definitely not true for my exams. "None..." or "All of the above" are viable answer choices. Many students get stumped when presented with such options. Let's look at another example from my environmental science class and see how best to approach such a question:

If nitrogen does not like to form compounds, what methods occur naturally to accomplish this task?

- (A). Bacteria associated with certain plants are able to make nitrogen compounds from atmospheric nitrogen.
- (B). Lightning can combine atmospheric nitrogen with atmospheric oxygen producing nitrogen oxide compounds.
- (C). Volcanic eruptions will contribute massive amounts of nitrogen compounds to the atmosphere.
- (D). A and B are correct.
- (E). A, B, and C are true.

If you are faced with such type of a question where more than one answer choice is possible, treat each answer as a TRUE or FALSE statement. In this case:

- (A). Bacteria associated with certain plants are able to make nitrogen compounds from atmospheric nitrogen. True or False?!? It is true, so it is a possible answer choice! ✓
- (B). Lightning can combine atmospheric nitrogen with atmospheric oxygen producing nitrogen

oxide compounds. True or False?!? Well, this one is also true, which makes this another viable answer choice! ✓

Immediately you know that the answer can NOT be (A), (B), or (C), but must be either (D) or (E). So we need to check (C) as inclusive for answer (E) to make sure!

(C). Volcanic eruptions will contribute massive amounts of nitrogen compounds to the atmosphere. True or False?!? Reading the answer carefully will reveal that it is false. Volcanoes do not usually contribute nitrogen compounds, but elemental nitrogen to the atmosphere, which excludes this one as a possible answer! ✖

Now you know that the answer must be (D)!

3c. If you have absolutely no clue and must guess, try the following. These will work for many multiple choice tests in other classes. However, be warned that my exams will not necessarily follow this common pattern:

- Usually the correct answer is the choice with the most information which is routinely the longest answer
- Actually a "No-brainer", but sometimes we forget. Try to eliminate answers you know can not be right!
- In "All of the above" and "None of the above" choices, if you are certain one of the statements is true don't choose "None of the above" or one of the statements are false don't choose "All of the above". Also, in a question with an "All of the above" choice, if you see at least two correct answer statements, then "All of the above" is probably the answer.
- A positive choice is more likely to be true than a negative one

3d. And lastly, don't keep on changing your answer, usually your first choice is the right one, unless you miss-read the question.