

My Unsolicited Advice on How to Study and Learn Mathematics

by Joan Kessler

Before I get into the strategies for how to study math, I want to say that we all learn and study differently. Some of you are visual learners, some of you must write every step down, some of you have succeeded in the past with very little work, and some of you struggle every day with mathematics. It is my intent to give you a little guidance as you go into College Level Mathematics.

From my experience there are a lot of you that just do not have great learning and studying habits. And furthermore, what has worked in the past may not work for you as you go into Calculus. Cramming the night before an exam may have worked to get you a good grade, but has it helped you to thoroughly understand the concepts taught? This is important in Calculus. You may find that all those A's and B's you got in the prerequisite courses unfortunately do not reflect what you actually learned and remember. On top of learning totally new material, you are pretty much responsible for everything you have ever learned in mathematics with very few exceptions. You will not believe how important fractions will be; adding, subtracting, multiplying, dividing, reducing, and simplifying. Factoring, did I mention factoring? You will be asked to factor expressions you never knew could be factored. Additionally, you may come to realize that there were some topics skipped in PreCalculus which you now need. For a variety of reasons they may not have been covered or, you were sick that day, or missed it on the test and never went back to learn it, or you were suffering from spring fever. *"But, my teacher skipped that section,"* is not going to be an excuse. To succeed, you will have to go back and learn it. Hopefully the tips and guidelines that follow will help you manage your time and learn to study efficiently and successfully.

- **Math is Not a Spectator Sport.** It is not like going to the movies, a basketball game, or a play. You don't watch it. You must actively participate in the process.
- **You must attend class.** Get a decent alarm clock. Get to class on time. Sometimes important announcements are given during the first few minutes of a class. You may not know anyone in your class to call or ask, at least not for awhile. Sit close to the board or screen. Always come prepared with pencil, notebook, and calculator.
- **You must pay attention while in class.** Sometimes the teachers are really boring. Live with it and pay attention. Whatever he or she is telling you live is easier to digest than searching the internet for a video on what appears to you to be a similar topic, or trying to figure it out yourself. Listen to the teacher to see what he/she emphasizes or gets excited about. This will surely be on the test.
- **You must take good notes.** I have had students whose notes were so good they could be sold on Chegg®. But more often, they are incomplete and messy. I always suggest to my students that they use loose leaf paper to take notes and copy them over neatly as part of their studying routine. Fill in any missing material through the text book (which is why they sell for \$200) or notes which the teacher may have posted online. Keep your notes in a separate binder (not a 4" one for all your classes) so that you can add worksheets and handouts. Having them in the trunk or back seat of your car or scattered in a book bag is not a good idea. **ORGANIZATION IS CRICIAL!** Do not use your math notebook for anything else. Keep your notes organized, date each day's notes, and write the section numbers. When you are studying with your text go back and put in page numbers. Keep in mind that there is a 99% chance your Final Exam is cumulative and your notes are the key to success. Use Post It® notes to add or fix something in your notes. They are also great for fixing mistakes on a test or a quiz. Keep old exams and tests. They are the best study guides, once they are corrected. Avery® removable write on tabs are another fabulous way to organize notes. It only takes a second to bookmark your notes.

- **You've got to do homework problems regularly.** Looking at the solutions manual and nodding, "*Oh yeah, I understand that.*" does not cut it. The reality is that you will probably have to work harder at this class than you ever have before, and probably harder than any other class. A few hours before an exam will not be enough. The homework problems are critical. You can't just memorize. Teachers expect you understand the material and can apply it, often in ways that were not part of the lecture. Practice as much as possible. The only way to really learn how to do problems is work lots of them. The more you work, the better prepared you will be for the exam. A good rule of thumb for a college level class is to spend two hours a week per hour in class. But this is CALCULUS! 10 hours? Bare minimum. Most likely you will be spending much more on this course. Expect it. Make sure you can do the homework without cheat sheets or looking at the text. Use practice exams. Many teachers post old tests online. Or search the internet, but search for ones with solutions posted.
- **Memorizing formulas is not enough.** Yes, there are many, many formulas and you need to determine which ones will be given, if any, and which ones you need to learn. You also have to learn restriction on formulas and Theorems. In Calculus, there are always restrictions.
- **Read the book.** Many teachers use totally different example in class than in the textbook. The text gives you additional examples with virtually every step done out and explained. It is not a \$200 door stop. Use it. Most higher level math texts are organized for optimum study skills. Important things are already highlighted or boxed in.
- **Form a study group,** not for social reasons (though that might be an added benefit), but for the learning dynamic. No matter how well you take notes and do your homework, you may have missed something. Study groups help everyone. This is not the time to be shy. Ask your classmates if they want to form a group. Come prepared with your email address or phone number on a piece of paper. Your classmates can take a picture of it and have your info.
- **If you are in dual enrollments, go to the school's Learning Center or Center for Success for help.** A valuable resource on every campus, many of these have student tutors graduate students for tutors. DO NOT WAIT if you do not understand something. Get help immediately. Sometimes 10 minutes with a tutor can put things into perspective. Sometimes it may take hours. The early part of Calculus is very difficult. Don't get discouraged, GET HELP. It is readily available and free. Even if you have never had to ask for math help in your life, you may have to now. It is not a sign of weakness, but of strength. Eventually you may be the one getting the job in the learning center. If you really like a particular tutor, get their name and check their hours.
- **See your instructor/teacher. Note the times they are available and make use of it.** Most instructors welcome the opportunity to get to know their students better. But, do not go for help if you have not tried the problem on paper and already looked at the solutions manual. First try the HW on paper, then check the manual, then go see the instructor.

I am sure there are more tips I could give you, and everyone and their mother will give you suggestions, but this guide should get you started on your soon to be successful mathematical journey. Use this guideline and the materials in the packet to help make this transition to college level math not only successful, but fun. Don't forget to mark and highlight important dates on the paper calendar and post it where you can see it. Good luck and let me know how you are doing and let me know if this Survival Guide helped you.

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