

Succeeding in the College Mathematics Classroom

Deanna Haunsperger and Eric Egge

1. Take responsibility for your own learning. One of the primary goals of a college education is to learn how to learn independently.
2. Attend class. When you feel the class is going well, this might seem relatively easy. When you feel the class is not going well, this might seem incredibly hard. But that's when it's most crucial not only to keep attending class, but also to increase your engagement with the course by bringing (more) questions to office hours, taking (more) advantage of the Math Skills Center, trying (more) extra problems, etc. Cell phones should be silenced and put away during class. Arrive in time for the start of class, and stay until the end.
3. Early in the term, find a "buddy" (or two or three) in class with whom you can study. On the first day of class I'll give you an opportunity to meet the people sitting near you so you can exchange contact information and have your first study buddy set up. The best way to learn mathematics is by explaining it to someone else. Doing your homework in a group will make this an easy habit to get into.
4. Be prepared for class. Doing the assigned problems is only one part of your preparation for the next class period. You should also read the text. Some topics in the text may not be discussed during class time. Read the assigned sections between class periods; you'll learn more than if you save it all for Sunday night. Practice reading, speaking, and writing mathematics as you would practice a musical instrument: daily. Frequent short study sessions are an effective way to implant mathematical information.
5. Know your professor's office hours, and when you have questions, go to them. It is best to have concrete questions in mind (or better yet, written down) when you go to office hours, but if you are having difficulty keeping up with the class, it is best to go to office hours even if you can't formulate a specific question. Going to office hours might be intimidating, especially at first, but you don't have to do it alone: bring a friend!
6. Don't be surprised if you find the course difficult; material in a college classroom moves much faster and is covered in much more depth than in an average high school class. Much of the learning in a college course is expected to take place outside of class. You may not understand everything as it is presented in class; many ideas must be studied, struggled with and "conquered" on your own. There is value in the struggle.
7. Consciously build your mathematical persistence: some problems take more than five minutes to do. If you can't do a homework problem right away, don't assume that means you can't do it at all. Keep trying, perhaps after a break. However, if you believe you are spending too much time outside of class, talk with your professor to see if your study activities are suitable for the course.
8. Build a "growth mindset." Studies have shown that students who understand that intelligence is not something fixed from birth, but rather something that grows with time, effort, and persistence do better!

9. Present your work neatly to get the best possible evaluation of it. Use scratch paper for the first draft of your homework, then rewrite it.
10. Read the textbook back and forth. When you read a novel for fun, you probably read it straight through, in order. When you read a math textbook, expect to do a lot of jumping back and rereading. For example, when you start a new section, read until you get confused. Then stop, return to the last place where you understood everything, and start again. Or return to the beginning of the section, and start again. When you see a concept from another section, stop reading, and try to write down the general idea connected with that concept, and specific types of problems you might see related to it. Then go back and review the relevant section.
11. Read the textbook actively. Calculus books are filled with examples. When you reach one in your reading, stop, and try to solve the problem yourself. If you succeed, then compare your solution to the author's. If not, then when you think you understand the author's solution, turn the page, and try again to solve the problem yourself. If it seems to be an especially important or challenging example, then you may want to add it to your list of problems to try again later.
12. Don't wait until an exam is near to study for it. Even though the exam is three weeks away, your current homework might still include problems similar to those you will see on the exam. Pick a couple of the hardest problems and a couple that seem the most representative of the material from the homework, and keep track of them, possibly on a paper list, on index cards, or in an electronic document. Write down the actual problems, not the problem numbers. Each day next week, pick one or two problems randomly from your list, and try to solve them again, without referring to your notes or your previous work. Try solving a couple of your math buddy's collected problems, too, and have her/him try to solve some of yours. Actively reproducing ideas and solutions from a week or two ago will feel hard, but it will also show you some of the things you need to review right away, and help solidify the material in your long-term memory.
13. Look for ways to practice active recall (even though it's hard), and avoid passive review (even though it feels good). When you study by rereading your notes, highlighting passages in your book, or rereading your homework, you make yourself feel like you're making progress, but you learn little. In contrast, when you solve problems, or list or outline the main ideas, without looking back at anything, you may feel like you're getting nowhere. But you're actually forcing your brain to move skills and information from short-term memory to long-term memory, where they are more likely to help you later in the term.
14. Sleep early, sleep long, sleep often. Every time you sleep, your brain consolidates your memories, moving information from short term memory to long term memory. In other words, a crucial part of your learning happens while you sleep. So if you sleep less, you learn less. Also be sure to give your body nutritious fuel to run on.