
The Eightfold Path of College Math

Making the transition from high school to college mathematics courses

1. You are in College Now

If this is your first math class in college, you must remember: You are no longer in high school. The great majority of you, not having done so already, will have to discard high school notions of teaching and learning mathematics, and replace them with by college level notions. This may be difficult, but it must happen sooner or later, and sooner is better. The goal in college is for more than just getting you to reproduce what was told to you in the classroom. You must aim for mastery of the material.

2. The Speed of the Class

Expect to have material covered at two to three times the pace of high school. Above that, you should aim for greater command of the material, especially the ability to apply what you have learned to new situations. Remember that most freshmen here were in the top tenth of their high school class. A high school teacher attempts to teach to the average students. At college the average is much higher, and consequently there is a higher standard in these courses.

3. Learning Outside of Class

Lecture time is at a premium so it must be used efficiently. You cannot be “taught” everything in the classroom. It is your responsibility to learn the material, and most of this learning will take place outside the classroom. You should consistently put in at least three hours outside the classroom for each hour spent in class.

4. The Instructor’s Job

The instructor’s job is primarily to provide a framework to guide you in doing your learning of the concepts and methods that comprise the material of the course. It is not to “program” you with isolated facts and problem types, nor to monitor your progress. That is not to say that you shouldn’t ask your professor for help. By all means if you have questions or are having trouble understanding the material, then talk to your professor. But remember that you have to put forth at least as much effort as the instructor if you want to learn the material.

5. Reading the Textbook

You are expected to read the textbook for comprehension. It gives the detailed account of the material of the course. It also contains many examples of problems worked out, and these should be used to supplement what you see in the lecture. The textbook is not a novel, so the reading must often be slow and careful. However, there is the clear advantage that you can read it at your own pace. Use pencil and paper to work through the material, and to fill in omitted steps. As for when you engage the textbook:

1. Read, for the first time, the appropriate sections of the book before the material is presented in lecture; that is, come prepared for class. The lecture will then make more sense.
2. In lecture try to absorb the general ideas and/or take notes. Later try to sort out any questions you have while referring to the appropriate parts of the book and your notes.

6. Talking with the Instructor

If you are having problems in class or do not understand the material, do not hesitate to talk with the instructor. Do not fall behind. Particularly in mathematics, where new material often builds on previous ideas, getting behind can be devastating. Take advantage of the instructor's office hours. When you are confused talk to him or her right away. If you wait too long, your difficulties may compound to the point where you will be hopelessly lost. Talk to your instructor early and often to clear up misunderstandings and confusion.

7. Writing Up Solutions

It is the student's responsibility to communicate clearly in writing up solutions of the questions and problems in homework and exams. The answer to the question asked will often involve ideas and principals introduced in class, and consequently the solution should be more than just a number or expression — it should be a (sometimes short) argument explaining and justifying how the problem is solved and how the material of the course can be used to arrive at this answer. Remember: the solution is more than just the final answer — it is the process used to arrive at the final answer. This process, and all necessary steps, should be explained so that someone who is familiar with the material could read the solution and understand it. Finally, remember that the rules of language still apply in mathematics, even when symbols are used in formulas and equations.

8. Conceptual Understanding

Finally, and most importantly, you must realize the importance of theory in mathematics. It is not enough to be able to do the problems that are assigned. You must understand the mathematics used to solve these problems. The goal of this class is to make you able to do all problems — not just particular kinds of problems— to which the methods of the course apply. As such, exams will consist largely of fresh problems that fall within the material that is being tested. For that level of command, the student must attain some conceptual understanding and develop judgment. Thus a certain amount of theory is very relevant, indeed essential. Remember that a student who has been trained to do only certain kinds of problems has acquired very limited expertise.