

Math Study Tips

Learning

Be responsible for your own learning. Know your own learning style and use it in studying. Don't give up on concepts you don't understand. It is never too late. Mathematics is logical and cumulative. **The more** material from previous courses and from earlier in current courses that **you understand, the better equipped you are** to understand what comes next, connect it to other material, and apply it in different contexts.

Get involved and stay involved. Always go to class (on time). Listen actively. Participate whenever the opportunity is offered. Don't be afraid to ask questions. Probably over half of the students there are wondering the same thing. Think about mathematical concepts every day. Do some mathematics every day. Join a study group. Learning mathematics is a lot like learning a language. It happens gradually over time with commitment to immersing yourself in it. **In mathematics, measures of engagement turn out to be measures of success; students who are fully engaged in a course experience greater satisfaction and get better grades.**

Keep the odds in your favour. We know that the average course grade for students who do all the term work is in the B range, compared to the F range for students who don't. We also know that students who neglect the term work are between 2 and 7 times more likely to fail than students who do all of the term work. **Do all you can to help yourself.**

Set specific, clear, study goals. "Do the practice problems until I get them all right", or "work through the examples in Section 6.4", or "write the practice midterm" are examples of objectives where it is clear what you need to do and when you're done. Not only that, the outcome will give you clear feedback on how you're doing. By contrast, a goal like "understand everything" or "study math for an hour" frequently leads to flipping through your notes or the text without active participation or constructive feedback.

Get out a pencil and paper, and try to **work through every step** of each example or proof rather than trying to read your text or notes like a novel. If you get stuck, don't give up. Go to the Assistance Centre and / or Office Hours, and bring your work.

Understanding beats memorizing. If you understand, then you'll remember. Unfortunately, it doesn't work the other way around. The first step in grasping a definition or theorem is being able to write it down, precisely, without any help. Trying to apply concepts when you're struggling to remember what the words mean is a tough battle. Be kind to yourself. **Learn the vocabulary and the methods.**

Learn from your mistakes. If you make a mistake, try to understand what went sideways, and then **take steps to improve your understanding** of that. Keep going until you're satisfied that you really understand. Go over returned class work and try to take advantage of the feedback you've been given. It will help you identify concepts or techniques that need more attention. Do the same with practice questions. Remember, your instructor and the Assistance Centre are available to help you.

Keep a running list of concepts, methods, and vocabulary. Keep track of the parts that you have questions about, and then seek out help with those questions. Do the same with problems that you're having difficulty with. Keeping track of how your obstacles were overcome can help you **understand how to learn and study.**

Get help right away. When you're having trouble with something, go for help on the same day if possible, and **don't wait longer than the next day** that help is available.

Be aware of all of the resources available. Assistance Centres, Office Hours, Study Groups, textbooks, notes, friends, supplementary materials (online or otherwise – be sure to check the Bookstore!), Peer Support & Learning Skills in the Learning Commons, Study Skills / Anxiety Management Workshops and through Counselling Services, Test Writing Workshops, etc.

Working

Achieve in practice. Remember that, in the end, it is necessary to answer questions by yourself without any help. Prepare for that by learning the material and developing your skills. Keep trying. If you're working through practice questions and get one wrong, keep coming back to it and similar questions until you can do them yourself. Reading someone else's solution, or getting help from another person, can give insights and helpful pointers to things that need work, but that's only part of what's needed. Like swimming or cycling, **mathematics is something that you do**. It is tough to learn how by reading about it or watching someone else. When you have learned the concepts, and accumulated a lot of experience using them through regular practice, you'll have confidence in your abilities. Keep your goals in focus.

Start early. Begin thinking about assignments the day you get them. **It takes time** to think about the questions and how the different methods you know might apply. Start studying for tests at least four or five days beforehand. This will give you lots of time to fill in any blanks in your understanding.

Learn to work systematically. Analyzing situations, reasoning logically, connecting what you have so far to other things you know, working towards a solution, and finally articulating it clearly in a way that someone else can understand, are skills that are developed in math class and applied everywhere in your education, work and life. When working on problems, the **first** thing you should do is **read the question carefully**. And the **second** thing you should do is **read the question carefully**. Make sure you **understand the vocabulary** being used, everything you're being told, **and what it means**. If not, review. **Write down what you're asked to do**. **Think about principles and methods** that apply in these situations. Usually there are several, and you might need to try more than one before succeeding. On the other hand, **often more than one method will work**. There is no right way to solve a problem, but some ways are better than others. Make a summary of what's given; **draw a picture** if that's possible. **Do anything that will help you organize your thoughts**. If you can **estimate the answer before starting**, then you have a chance of figuring out if something has gone astray with your work. At each stage, ask yourself: "What are the consequences of what I have so far? Can I see how to get to the end? If not, is it possible to **break it into small steps**? With the method being tried, what is usually done next? Can I work forwards for a while and backwards for a while and then connect the two parts? What facts do I know that might be pertinent?" **Problem solving isn't always linear**. Only in the end is the solution presented as a logical sequence of applications of facts and skills learned earlier. But it is crucial to **carefully write your solution** in that way so someone else can understand your approach, and believe your answer.

Talk math with your friends and classmates; start a study group. Trying to explain an idea to someone else is a good way to find out how well you understand it. You'll **find out which concepts you're comfortable with**, and which need more time. Both outcomes are good.

Minimizing Anxiety

Be comfortable with the basics. If there is something you never grasped, **take the time to learn** about it **now** (so it doesn't bite you later).

Always start with things you can do. Look over all of the questions on every assignment or test and **pick the low-hanging fruit** first. Build on success.

Break big tasks into smaller steps. Don't be overwhelmed. Almost every proof or question relies on one or two main ideas, principles, concepts, or methods. Practice and experience can help you see which ones in your mathematical tool bag to try. Once you **have the main ideas in place**, the rest is filling in details. But, remember that solutions don't always start at the beginning. Sometimes working backwards from the end helps a lot.

Go into every test knowing you are as well prepared as you can be. This will help you do the best you can, not to mention be less anxious.

Rehearse. If you find test situations difficult, practice by simulating them as closely as possible. Write practice tests using the same time limit and resources (no notes, etc.) as you'll have on exam day.

Keep a positive attitude. Thousands of students before you have succeeded. **You are smart, and you will succeed too.**