

Learning Skills, Room 120

Math Learning Skills

Your Course

It is a really good idea to take some time to reflect on your math course as it relates to you:

- Why are you in this particular course?
- What do you expect to learn?
- Do you have the skills to be successful?
- What are these skills?
- What skills do you need to build to be successful?
- How will you do this?

Don't think of your course as a "must have" that you *need* to go on to other things; think of it as an opportunity to learn the math. So, instead of saying, "I am taking Math 041," you can say "I am learning introductory algebra." Attitude is everything!

Your Class

It is your instructor's job to *teach* and your job to *learn*. You must work together, and each do your piece.

- If you do not understand something, ask about it. Don't be shy!
- If you need another example worked out on the board, ask for it. Don't be afraid of holding up the class—if you don't understand something, the chances are good that someone else doesn't either.
- If the instructor is talking too fast, ask him to slow down.
- Take notes and draw and label whatever the instructor puts on the board.

Your Anxiety

Essentially, math anxiety is a *learned* emotional response to math—a sense of frustration and helplessness that comes from bad past experiences with math. It helps to think of math anxiety in terms of being learned, so that you can also think of unlearning those responses. Here are some ways to do that:

1. **Stop negative self-talk.** Of course you can learn math! Everyone can—it is an inborn human trait. However, due to past experience, learning math can be more difficult for some than for others. Stop telling yourself that you "can't do it" and start telling yourself that you "will learn how to do it." This way, you are taking *responsibility* for your own success and failure instead of blaming the text, the instructor, former teachers, the system, and yourself. Responsibility and blame are two different ideas entirely: one is positive, and one is negative.
2. **Understand that there is no tiger.** An example that is often used to describe the "fight or flight" response to stress is that of a tiger lurking somewhere in our environment, ready to leap out at us. We must be on guard at all times, ready to make the best choice about how to deal with this terrifying enemy. Well, this is fine for such physical dangers as tigers, but it is not such a great response to mathematics, is it? Numbers and symbols cannot actually *hurt* us. However, our bodies respond to emotions in the same manner as they responds to physical danger, by pouring stress

hormones into our blood stream that cause us to go into a state of hyper-alertness. By understanding that math is not a tiger—not an enemy at all—you may be able to better recognize the symptoms of your anxiety and work towards controlling them. Counsellors are available at Student Services to help you with anxiety issues.

3. **Learn to relax.** One powerful way to control anxiety is to learn to relax while it is happening. Deep breathing is an excellent *learned* response, as the oxygen will counteract the stress hormones in your bloodstream. Along with deep, purposeful breathing, it is helpful to repeat a “trigger” word that you come up with in a time of non-stress. This can be any word that is meaningful to you, such as “calm” or “slow”. The point is to focus on the word and the breathing to help get you out of tigerland. Don’t worry if your mind wanders—just bring it back to your focus on the word and the breathing. Give it a try!
4. **Consider math a language.** If it seems to you that your math instructor is speaking a foreign language, you are right! Like any language, math has a vocabulary (words, terms, and symbols), a grammar (rules for using the vocabulary), and a community of users (you, your classmates, your instructor, every other person in the world who studies math). Learning the language of mathematics has its own challenge, though, in that some of the terms seem familiar, like a , b , c , x , and y , but take on a whole different meaning. Like learning any language, learning math takes lots of practice. Math practice involves not only doing the assigned homework, but actively working on learning the vocabulary, talking and thinking about math, building and putting your energy into actually understanding what is going on and not just going through the motions. Learning a new language takes time, effort, and commitment, but it can be done.
5. **Learn the concepts rather than memorize the formulas.** Once you learn a concept, you will own it. Memorized data can disappear if it doesn’t make it into your long-term memory. More about how to learn concepts later; the point here is to point out that if understand something, you will be less anxious about it.
6. **Learn to persevere.** The thing about math is that it builds on itself, and quickly. If you don’t understand something that is presented in class, ask the instructor. If you think that you understand it in class but find when you start your homework that you can’t remember or don’t understand, don’t give up. Your textbook is a great resource—use it! Find the section that was covered in class and read it, work out the examples on paper, and do an easy question matching the step-by-step process in the example.

Your Learning

- You need to be organized to manage a course. Are you? Here are some tips: [Get Organized! Tips for Students](#) (Google: VIU academic support handouts) .is another good handout that is available in the Learning Centre (Room 131).
- Learn more about different ways of learning by working with the Learning Specialist in the Learning Centre.:
- It is a really good idea to give some thought to how you have been *approaching* learning math. Do you have a strategy? What is it? Does it usually work? Are you open to new ways? More on strategies in another section.
- Information on [Learning styles and strategies](http://www.aeel.gov.sk.ca/evergreen/mathematics/part4/portion03.shtml) (<http://www.aeel.gov.sk.ca/evergreen/mathematics/part4/portion03.shtml>) is also available at the Learning Centre.
- **Use your math text:** Your text provides much more than practice exercises for homework. It

provides learning objectives, explanations, new terms, procedures, examples that are worked out, summaries, practice exercises, answers, and assessment activities. That's a lot of information! Here are some tips for using your book effectively:

1. Become familiar with how your text is set up so that you can easily find what you are looking for.
 2. Use stickies to label pages that have important information.
 3. Pay attention to tables and shaded/coloured areas as well as diagrams.
 4. Read the words—before attempting to do the examples or the practice exercises. The words identify and explain the mathematical concept in that section. Read closely and don't move on until you understand.
 5. Don't just read the examples, work them out on paper. Verbalize what you are doing as you move from one step to another. Name each type of problem; for example, "Using Exponents" or "Finding Subsets" so that you are always thinking about *what* you are doing. A good idea is to work out the first example allowing yourself to look at the text if you need to and then covering the work in the next example, only looking if you really get stuck. Be sure to think about *why* you got stuck or looking at the example won't help much.
- **Use a math Quick Study Guide®:** These are laminated, hole-punched guides that are full of important concepts and formulas that can be accessed at a glance. They are available in the bookstore. Better still, create your own!
 - **Use alternate texts:** If you can't understand the way your text explains a problem or a concept, use another one. Texts are available for you to use in the Learning Centre (Room 131).
 - **Use your class notes:** You went to the trouble of taking them, so be sure to use them effectively! You can rewrite them, create concept summaries (discussed in "Your Strategies") from them, go over them before starting your homework, review them before the next class, and use them to study for tests. Here are some tips for taking good notes in class:
 1. Come to class prepared: This means that you have done your homework, worked on the concepts, practiced, and hopefully understood what went on last class. It also means that you have prepared for the next class by skimming the section in the text and noted the new concepts and formulas. This will give you a foundation for the information presented in class, and it really does not take long. Why not spend 10 minutes before every class doing this? It will pay off!
 2. Try making two-column notes, also called [Cornell notes](#). Put the concept on one side of the page and the formulas, steps, and examples on the other. If you want some help, come to the Learning Centre.
 3. Be particular: Don't try and write down all the formulas and examples, as they will also be in the text. You can use your time in class much more wisely by listening and watching and making notes of the key concepts—in other words, by trying to understand rather than copying.
 4. Read some general [note-taking information](#) (Google: suite 101 effective notes) and apply it your math class.
 5. Review and learn from your notes.
 - **Use learning skills handouts:** In the Learning Centre (Room 131), you will find lots of study guides, including topics such as procrastination, listening in class, study tips, time management, and other topics that are useful to math students. These handouts are also available online: [Learning Skills](#)

[Handouts](#) (Google: VIU academic support handouts)

- **Use internet resources:** There are lots of websites for math help. Here are a few good ones to Google:
[Purple Math](#) , [Paul's Online Math Notes](#) , [Math.com](#) , Google: Online Math Learning.
- **Volunteer Tutors:** A free tutoring service is available at the Cowichan Campus. Go to Student Services and ask for a request form.
- **Moodle Tutor:** Remember that Jean is your Moodle Math Tutor, and you can post questions online and also enter into a chat or discussion. Check it out!

Your Math Homework

Homework is absolutely a fact in all math courses. Figure out what, when, where, and how long, and then stick to it. Here are some homework tips:

- **What:** Be very clear on what homework is assigned, write it in your agenda book, and be prepared to do some reading, practice and study as well. You will read more about that in “Your Strategies.”
- **When:** A great plan is to do your homework and studying at school, so that when you get home you can concentrate on other things. Unless you get a lot of work done at school, though, you may need to finish up or review at home as well. Good [time management](#) (Google: VIU academic support handouts) is essential for studying efficiently and effectively. If you want some help, sign up at the Learning Centre or attend a workshop.
- **Where:** Studying in a suitable place is important to good learning. Consider the following: comfort, good lighting, fresh air, and relative quiet. Do you have such a study space? What can you do to create such an environment for yourself? Remember that we have quiet study spaces in the library.
- **How long:** A good rule of thumb is to expect to do one hour of homework for every hour in class—and more if you are struggling with the course and when you are preparing for tests. It is important for you to know how long *you* can concentrate at one sitting. There is no point in setting yourself up for an hour's work if you can only concentrate for 20 minutes. Also, there is no point in packing it in after an hour if you are not finished your assignment or haven't understood what you were doing. “Chunking” your homework into reading, practice, assignments, and making study notes is a good approach.

Your Strategies

Concepts are at the heart of mathematics, and strategies are the approach to learning those strategies. There are some excellent strategies that will move you beyond memorizing formulas and into the world of mathematical thinking. The book “Learning for Success” (Fleet, Goodchild, Zajchowski, 1999) presents three important strategies. The book is available in the Learning Centre. Here is an outline of the strategies:

- Put your energy into studying what you don't know instead of what you do know
- a brief summary that includes the name of the concept, key formulas, new terms, other important information (such as meaning of zero values), and simple examples. Watch the online video [Problem Solving 2](#)
- For more information about conceptual learning; Google: macmaster academic skills—scroll to math.

Record decision steps: For each step that you take in solving a problem, track the decisions that you

made, in your own words, revising as necessary. You can do this right in the concept summary. Watch the online video [Problem Solving 3](#) (Google: macmaster academic skills—scroll to math) for information about decision steps.

Identify the range of problems: Have you ever noticed that the problems on tests seem harder (or seemingly not related to) the problems you did in class and for homework? Well, each concept may have a range of problems, from simple to difficult. Your task is to identify these, note the *different* wording or presentation of the problems, and anticipate that they might be on the test—which really means *learn* them! You can list the range of problems in your concept summary. The book outlines eight common kinds of difficult problems:

- hidden knowns
- multipart; same concept
- multipart; different concepts
- multipart; simultaneous equations
- work backwards
- letters only
- dummy variables
- red herrings/unnecessary information

For more information about the range of problems, come to the Learning Centre.

Use memorization and substitution: [Muskingum College](#) (Google: Muskingum math 2) has a good webpage on how to do this.

Make concept summaries: These are like study notes—one page per concept. For each new concept, write Your Test Prep

OK, here comes the good news! If you have prepared for classes, made notes, done homework, and used resources and strategies, you really won't need to do much preparation for tests, because you will have understood the concepts. Sure, you do have to learn the formulas and procedures, but that part is much more intuitive when you understand the concepts. Really! Nonetheless, here are some other test prep ideas:

- Use [Moodle Math Tutor](#) (Google: VIU moodle math tutor) to review concepts and take practice tests
- Go to [math.com](#) (Google: math.com prealgebra) to take online pre-algebra tests
- Make [cheat sheets](#) (Google: lamar cheat sheets) to summarize the concepts and formulas and steps even more. For example, see how much information you can cram onto a large sized recipe card. Imagine that you can take this with you to the test—you will have to choose the most important points. Of course, you will not be able to take this with you to the test, but the act of making it is a good [active learning](#) strategy. (Google: unimelb active learning)
- Sleep well the night before the test; there is not point in staying up too late and being too tired to concentrate.
- Eat well on the day of the test— that means plenty of water, good food and not too much coffee or pop. Feed your brain and hydrate your body.