

Problem Solving Strategies For Mathematics Students

Each of us learns differently than others learn. Every human being is unique. Just because one person learns a certain way does not mean that you learn that way, too. If you can discover what works best for you as an individual, the quality of your math life will improve! If even one of the following strategies works for **you**, use it!

Budget your life.

To be successful, you *must* spend time on your homework on a regular basis. A good “rule of thumb” for learning math is to spend *at least 2 hours outside of class for every hour in class*. (For example, for a 3-hr class you should expect to spend at least 6 hours on homework outside of classtime during that week.) Fill out a schedule for when you eat, sleep, go to class, go to work, etc. Is there enough time for your math homework? Use one of the ***A Week in the Life*** forms to assist you in planning enough time for your math, as well as everything else in your life.

Use the 60-hour rule.

Add up the number of hours each week that you work, spend in class, and study. If this number is more than 60, you will probably find yourself feeling stressed out and unable to handle everything. This feeling might not occur right away, but will eventually catch up with you. Try to make some changes so that your major responsibilities add up to less than 60 hours. Remember to also consider family responsibilities, commuting time, etc.

Draw a picture.

Are you a visual learner? Many people are. Sometimes, pictures and diagrams are given to you. Use them! What if no picture is given to you? Make your own! Pictures and diagrams can be drawn to demonstrate and organize all sorts of situations. Be creative. Don't wait for someone to tell you to draw a picture. Just do it.

Read and read again.

If the first read-through of a problem doesn't make sense, read the paragraph or problem again. If it still doesn't make sense, read it again. On really tough problems, it might take five or more times of reading an exercise before the information starts to make sense. This is especially true when we deal with topics we are less familiar with. Be patient with yourself, but keep reading. Make notes as you read.

Look for patterns.

Mathematics is a study of patterns. Even most new material relates back to concepts you have studied before. By noticing patterns, you'll have fewer details to memorize. Look for patterns, and ask your instructor about the patterns.

Try to understand the big ideas.

If you don't know what the most important ideas and concepts are, ask! It is important to know what the “hierarchy” is, so that you know which concepts and procedures deserve most of your time and how they fit together!

Read directions carefully.

Trying to work out a problem without first reading the directions is like looking for a person in a crowd when you don't know who it is that you are looking for. Unfortunately, some students try to work on their math with this approach, and it can be very frustrating for them. But, if you first carefully read the directions, you'll be able to proceed.

Make up a similar problem.

Many real life problems contain numbers that make the exercise seem very difficult. If you can make up a problem with the same words but using easier numbers, the logic of the problem may suddenly occur to you. Then, you can use your newly found process to tackle the harder problem.

Use your book.

- Your math book has an *index*, just like other books. Learn how to use it.
- Work through the *examples* in your textbook before tackling your homework.
- *Read* what the author has to say.
- Do your *homework*.

Get enough sleep.

Recent sleep deprivation studies have demonstrated that a tired brain remembers very little. If you study and then stay up all night, you'll remember very little. If you are sleep deprived and then you study, you'll remember very little. And you need enough sleep *regularly*, not just right before a test.

Use color.

Color helps many people organize their thoughts and their notes. Colored pencils or highlighters might be a good tool for you. Give it a try if this appeals to you.

Don't just memorize.

Try not to view math as just a bunch of "factoids" or "tricks." That leads to a great deal of frustration. Of course there are a few geniuses in the world that can remember every little fact they ever read or heard. But, most of us will not really remember a lot of isolated facts. There will be certain key facts, processes, and concepts that you will *have* to memorize; but, try to keep this rote memorization to a minimum. Then, rely on patterns to remember the rest.

Use your common sense.

Guess (estimate) an answer before doing a problem using mathematical procedures. There are 2 good reasons for a guess. Making an educated guess should be able to get you started more easily on the mathematics necessary to do the problem exactly. Then, after you are finished doing the exercise mathematically, you can compare your result with your initial guess to determine if your result is reasonable.

Use your long-term memory.

When you learn new math concepts, procedures, and facts, you are using your short-term memory. Without repetition and regular use, those facts and processes will simply disappear from your mind. But, if you spend time regularly on your math, your brain will shift the information into your long-term memory. It's like riding a bike, playing baseball, or playing a musical instrument. You can watch someone do it and you can try it, but that doesn't make you an expert. You must practice and practice and practice to become good at it, and for the information to be stored in your long-term memory.

Make a list of words and notations you do not understand.

Learning the language of mathematics and the language of each course is just as important as learning the words in a foreign language. Whenever you see a word that is unfamiliar to you, write it down. Then, use the index of your textbook to find the page where the word is first defined. Write out the definition, since the act of writing will help you learn. If you make a list of *new* words and definitions for *every* assignment, you'll find that the class lectures make more sense, and you'll know what is asked for in assignments and tests.

Make your own flashcards.

Do you have concepts, words, or procedures that you must commit to memory? Make your own flashcards!

Study with other students.

A network of friends can provide you with a great deal of confidence and support. When you realize that you are not alone in your efforts, there will be less stress. You'll find that others have the same frustrations as you do. You'll be able to help other students with some concepts, and they'll be able to help you with others.

Talk about your math with others.

By talking about your math and using mathematical words, you'll be improving your understanding. It may not feel comfortable at first to talk about math, but keep working at it. Ask your teacher or tutors for help in speaking mathematically. It will become more natural with time.

Write down what you know.

When you first read a math problem, it is sometimes overwhelming. Start by writing down all the information you **know**, given the information in the problems. Write down what you are being asked for. Then jump into the problem.

Be neat.

When you look at your homework later, you'll want to be able to make sense of it. Of course, if you write neatly, your instructor will be able to read your work, too!

It's OK to make mistakes, but keep trying.

We learn from our mistakes. Sometimes we learn more from our mistakes than from our successes. Be brave enough to try something. If you have to throw away your attempt and start over, that's fine! Even the great mathematicians made mistakes regularly, as do current mathematicians. Give yourself a break, but don't quit. Keep trying!

Write brief notes for yourself while working on your homework.

Math is not just about numbers. Writing notes to yourself as you do your homework may be just the thing you need. The act of making notes will help you to learn and remember. Then, you'll have those notes to look at later, too.

Ask questions.

If you are puzzled about a math concept, ask for help after you've worked with it a bit. Your effort is important, because you are learning as you try. But, if you are not making any progress, asking for assistance will get you started again. Just "spinning your wheels" does no good and can lead to a high level of frustration. Practicing problems the wrong way could make you remember procedures the wrong way. So, ask for help when you need it.

Take a break.

Everyone has an attention span different from that of others. Don't judge yourself against friends and classmates. When tackling problems that are a challenge, taking periodic breaks in study time is a good practice. Coming back to a topic after a break can shed new light on the situation. What was difficult a few moments before, or the day before, may become clear.

Use a calculator.

You can learn a lot about a problem by using a graph or a table. Why not let the calculator help you with a graph or a table of values? You might gain some new information that will allow you to make progress. The calculator can't do the math problem for you, but it can be a useful tool, to complement your own thinking.

Study your math right before you go to sleep at night.

If your math is the last thing you think about before you go to sleep, you will remember more of it in the morning. This is particularly helpful right before a test.

On a test, if you are confused about a question, write down SOMETHING.

Don't just leave the page blank. Your instructor will see what your thoughts are and that are trying; your instructor cannot read your mind. Also, by writing down what you know, you might just figure out how to proceed.

On a test, plan your strategy.

Don't spend all your time on one troublesome problem. First, do the problems you are the most confident about, and then work on the tougher ones. Quite often, by first doing the problems that you *do* understand, your brain is able to tackle the tougher ones better than it could a few moments before.

Eat healthy foods and get enough exercise.

Your body cannot exist on junk food, though it is tempting to do that while studying. Junk food has no nutrition. Try to eat healthy foods regularly so that your body and your brain can operate at their best for you, instead of getting tired and run down. Also, make time for exercise in your life. Studies show that regular exercise not only relieves stress, but actually improves brain function as well.

Give yourself a pat on the back.

Brain research tells us that no one absorbs all of what they see or hear. Write notes. Ask questions in class. Keep up on your homework. Every student in your class is at a different place mathematically. Just keep up and do the best *you* can.