

# Strategies for Success in Math

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## What Can I Do Differently To Become Successful in Math?

Changes in attitude must be accompanied by changes in behavior. This topic includes the specific behaviors and strategies that encompass a “Study Smart vs. Study Hard” mentality. There are specific study skills that will help you do your best and succeed in math.

## Success Story of My Student Named "M"

“M” was a student who first took Beginning Algebra with a certain instructor, where he demonstrated marginal skills. Because of perceived weaknesses in Beginning Algebra, it might have been necessary for “M” to repeat this course. However, because his skills seemed borderline, it seemed a shame to make him go back and spend another entire semester redoing Beginning Algebra. Because he was willing to do double homework, I agreed to let him work on the skills in *both* Beginning and Intermediate Algebra until we could determine where he really belonged. Because “M” had plenty of time for homework, he spent most of the semester doing the homework for both classes. Even after passing the first Intermediate Algebra test, “M” continued to do the homework, reviewing the skills of Beginning Algebra as well as Intermediate Algebra. Near the end of the semester, with his confidence growing in Intermediate Algebra, he decided to stop working on Beginning Algebra skills, and to focus entirely on Intermediate Algebra. The strategy worked for “M”—he not only was successful in remediating a weak background in Beginning Algebra, but he was successful in passing Intermediate Algebra on this first attempt. And this all in one semester! Way to go, “M”!

NOTE: “M’s” situation is not typical! Most students do not have time nor energy to continue working on two levels of math at the same time as “M” did. In “M’s” case it was a specific solution to a specific problem for a specific student. It does illustrate the need to be creative, especially when it comes to prerequisite skills and placement.

## What Should I Do Before My First Class?

As you learned in the last topic, you must begin the road to success in math by changing your attitude towards math. You must believe in your ability to learn math. If your confidence is not growing, then perhaps you should go back and read the topic “Changing Your Attitude!” Assuming that your attitude is improving, the next step is to learn some study skills and make appropriate changes in the way you study math.

## **How Do I Select the Right Math Course?**

Even before you sign up for a math class, there are several things you should decide. First, you must be sure that you are entering math at the right level. Trying to learn math without the necessary prerequisite skills is not difficult—it is impossible. Keep the following important questions in mind when you are determining what math course you should enroll in first:

1. What previous math classes did you take?
2. How much did you learn in those classes?
3. How long ago did you take these classes?
4. How well do you remember what you learned?

These are all questions that are relevant to your placement in a math class. Mathematics instructors and/or counselors will probably use your previous math background as well as placement tests to help determine where you belong.

If you find yourself in a math class in which you seem completely lost, sometimes it is possible to change to a lower level of math. If it is not possible to change to a lower level, then stay in the class as long as you can (without getting a failing grade!) and learn as much as you can, so you will be able to succeed the next time. Frequently, it takes two attempts (or more) to pass a class, especially if learning disabilities are involved.

## **How Should I Schedule My Math Classes?**

Sometimes you may need to decide whether to take a long semester course (usually 15 or 16 weeks) or a short semester or summer session course (perhaps lasting only 6 or 7 weeks). A short semester course may be a good idea for some students who do not need an extra day between classes to do the homework. These accelerated courses provide a fast way to learn math. While this is good for some students, the experience for other students is like trying to drink from a fire hose. For students who need that extra day between classes, the long semester is advisable.

If you have a choice of a course that meets once, twice, or three times per week, remember that the less times per week the class meets, the more new material you will have to learn in each class period. Many students, especially evening students, cannot schedule a class more than once per week. However, a class that meets twice or three times per week allows you to break up your learning sessions into smaller, more digestible pieces.

### **Is It Important To Choose the Right Instructor?**

Math instructors often note that students within most math classes are extremely diverse. Students come in all shapes and sizes with wide ranges in natural abilities, motivation, discipline, effort, character, personality type, and so many other qualities. Alas! The same can be said of math instructors. Yes, math instructors are people too! They come in all shapes and sizes, complete with different personalities, teaching methods, grading systems, communication skills, and even mathematics ability. It is extremely important that you find a math instructor who not only knows the math, but can communicate these skills on your level and make math do-able for you.

How do you select the right instructor? There are a variety of different sources of information on campus about the faculty. First, you can seek information from a guidance counselor, but you should take care to ask the right questions. If you ask, "Who is a good math instructor?", the counselor will probably ask, "What do you mean by 'good'?" To say, "This instructor is good," or "This instructor is not so good" is a matter of opinion. Generally, counselors will not give such opinions because it is considered unprofessional. However, it is completely professional and appropriate to describe what you need in an instructor and ask which instructors have these qualities. For example, you can explain that because you have always had trouble understanding math, you need an instructor who is able to explain the skills on your level! You can say that you are looking for an instructor whose students succeed in his/her class and perform well at the next level. Make it clear that you are not just looking for an easy teacher. It would be appropriate to

ask if the instructor seems to enjoy teaching and if the students seem to enjoy learning.

Consider the story written by "J", an International student from Hungary.

## **Success Story of a Student Named "J"**

The last time I studied math was in Hungary 18 years ago in high school. In elementary school I had difficulties with math but I usually managed to earn a B. In high school my difficulties worsened because my math teacher was sure that I had no talent for math, and she wanted to prove it. I will never forget those embarrassing moments when after my oral exam she told me this in front of the whole class. Because of her authority, I believed and internalized her opinion that I could not succeed at math. I didn't try to prove the opposite. Because I had low self-confidence in math, I didn't like it and I was sure that I would not be able to achieve a grade higher than B. I was glad that I had to study only physics for the admission test to the university (it turns out the required math for this admission test was simple.) I was able to finish the university without taking any math courses because in Hungary math is not always required to get a degree.

Then I had big change in my life. I moved from Hungary to the United States and now I am studying at the local college. When I heard that I have to take the computer placement test (CPT) in math, I became very concerned. When I studied for the CPT I realized the huge difference between the math material that I learned in Hungary and the American material. I had considerable difficulties with word problems in particular because English is my second language. Based on my previous experiences with math, I was quite intimidated when I thought about taking my first math course. I thought it would be such a shame if I received a bad grade, especially since I already had a degree from Hungary.

I did some research in order to determine which instructor I would have for my first American math course. I saw in the bookstore that one particular math instructor had written his own textbook that seemed very clear and easy to read to me. One day, I listened outside the door of one of his classes, and I found that he spoke very clearly which is very important to me since English is not my native language. I registered for this particular instructor's course. I was very happy after the first lecture because my prediction proved to be true. The instructor I had picked out created a very comfortable environment during his class, which helped me to concentrate and changed my views about math. He spoke very clearly, so I could understand easily. His teaching method was excellent. He often showed associations between math and real life. This totally new concept of math caught my attention and fascinated me. I realized that there are many more connections between mathematical concepts and real life than I ever thought before. Knowing this helped me to feel a lot more comfortable about math.

My instructor encouraged us to ask questions both during and after class. He gave us good advice and handouts concerning study habits. I followed his instructions, did my homework every day, and attended every class. Because of this very positive experience with an excellent instructor, I learned that despite my previous bad times, his excellent

teaching method proved to me that I am able to understand math and that even I can survive a math course!

Another good source of information is the instructor himself or herself. Look at the schedule of classes to see who is teaching the class you need to take. Then, visit that instructor in his/her office, explaining your previous problems with math, and ask for recommendations about your situation. If you prefer not to meet the instructor face to face, look at the *current* semester's schedule to see when and where this particular instructor is teaching right now. Then, stand outside the classroom like "J" did, and watch the instructor teach. Even more revealing, observe the students during the class. Do they appear to be understanding what's going on? Are they participating in class discussion, or do they appear confused or disinterested?

### **My Hero is a Man Named "J" Takes This Advice To Extreme. His Story:**

I am 55 years old, and I **have a learning disability**. I have always been told that I could *never* learn algebra, and that I could not survive the rigorous demands of any university, so going to college would be an exercise in futility. I surely proved them all wrong, because I am now a graduate of the University of Central Florida with a Bachelor of Science Degree in Communications Disorders. College Algebra and Statistical Methods I & II are required courses to earn this degree. Next year I plan to be back at the university pursuing my Master's Degree.

It is my belief that "Algebra" is a language, and I have a very limited ability to learn a language. My learning disability has also prevented me from mastering any foreign language. Today, I still do not know my left hand from my right hand (I only know my left hand because I wear my watch on that hand). The things that you take for granted, I would have to take two to ten times longer to work them out. That is why timed tests always give me a hard time. I must also let you know that I was never in a class for students with learning disabilities. I wanted to appear as normal as possible. None of my classmates knew of my problem, and I was able to help motivate a lot of them to be successful.

I grew up in Jamaica, where math was taught under the British system. Math was divided into three distinct areas—Arithmetic, Geometry, and Algebra. I was quite good at Arithmetic and Geometry, but I was often told that I did not have any ability to solve most algebra problems. I was the only one in my class who could not do algebra. Thank God that math was not mandatory in order to graduate from high school in Jamaica.

Thirty years later, when I enrolled in the local community college, I was advised to take this really simple course, Beginning Algebra. This was just an introductory course to review all of the very basic facts of algebra before going on to Intermediate and College Algebra. It was my first semester in college, and the net result was that I had 2 A's and 1 F. You guessed it right—I failed *Beginning Algebra*. I received the only F in my class. As a matter of fact, that was the only F in my college career. At that moment I thought that my college days were over, because I could not pass a simple course in Beginning Algebra. This failure forced me to ask myself a few questions? Was it me? Was it the instructor? Was it the textbook? Or was it the fact that I was told that I would never be successful at algebra?

I remembered that a few good teachers played a very important roll in my academic development. I decided that I would do some research to find out who was the best math instructor at the local community college (by “best”, I mean, who could explain and teach the subject at an understandable level). After interviewing over 1,800 students at the local community college, I found an instructor that seemed to have the qualities I was looking for. . This instructor brought me from failure to success in math.

It is not what you teach that is important, but how you teach it. It is not what you write in your textbook that is important, but how you write it. It was the belief of this instructor that you learn math by taking small steps. You solve a problem by solving each line one step at a time. You solve each problem by doing it step, by step, by step. You have to show all your work in the textbook, so if you have a problem, you can spot it and make the necessary changes to guarantee your success.

Recently, my fourteen-year-old daughter had a problem in her algebra class. She was having difficulty solving equations. She could not understand how to solve equations using the textbook that was provided by her school. Her teacher was not able to help her either. So, she came to me for help. I gave her a few pointers and gave her a copy of a math book that she could read and use. One hour later, she was an expert at solving equations. Now, she claims that math is so easy. I told her that math is only easy when you have the right instruction and follow the basic rules “one step at a time.”

#### Five Steps to Succeed in Math

1. You need to have a good, easy to understand textbook that is written in a language that you can understand.
2. You need to have a good instructor, who understands that some students need a little extra help in order to be successful.
3. You need to learn how to be neat and solve problems in sequential order, completing each problem using a step-by-step approach (don't get into the habit of taking short cuts).

4. Remember that paper is cheap. Use a lot of paper to show all your work, and please always use a sharp pencil, with a good eraser.
5. You need to find a quiet area where you can work on math uninterrupted each day (seven days a week). It takes time to be successful in math. Success will come if you work diligently. Your brain tends to retain negative thoughts, so stay away from those people who put you down. Instead, seek those who want to help you get ahead.

Our final source of information about instructors is the students themselves. Ask around. Of course, you will probably not have the wherewithal, let alone the time, to do an extensive survey like "J" in the preceding student success story, but an informal polling of students in your spare time will almost always prove very helpful. Ask students in the student center or cafeteria about their instructors and their experiences in math classes at your school. Ask them to tell you what they liked and disliked about former math instructors. They will LOVE to tell you about their experiences.

Also, knowing about your own personality and learning style preferences may be helpful in selecting an instructor who will meet your needs. (See the previous topic!)

### **Does It Matter Where I Sit in the Classroom?**

Once you have selected your math class and instructor, you are ready to attend your first class. If possible, try to get there early enough to get a good seat! Where in the classroom should you sit? **The most important thing to remember is that the best seats are near the front, especially if you have vision problems or if you are easily distracted!** Of secondary consideration, should you sit on the left, center, or right side of the room? It depends upon **whether the instructor is left-handed or right-handed**, and whether he/she writes on a chalk (grease) board or uses an overhead projector? If the instructor is right-handed, then you should sit on the right side of the classroom. As a right-handed instructor writes on the board, he/she tends to block the view of students on the left side of the room. Likewise, if the instructor is left-handed, then you should sit on the left side of the room. If the instructor uses an overhead projector, then the projection

unit may block the view of certain seats in the classroom. It will be helpful to avoid these seats.

As previously mentioned, the best seats are *always* near the front! Besides allowing you to see better, it is easier to concentrate if you sit in the first two rows. Are you easily distracted? If you sit farther back in the room, there are more distractions between you and the instructor. Any movement of any kind, whether something as simple as a sneeze or as disruptive as students talking, will break your concentration and divert your attention from classroom activities. Especially if you are easily distracted, it is important that you sit near the front in order to keep focused on math.

Suppose the instructor in your class asks, “Are there any questions on the homework for today?” Suppose it was a tough assignment, and six or eight hands go up at exactly the same time. Whose hands do you think the instructor will see first? Who will the instructor call on first? This is not bias on the part of the instructor. It is simply a matter of geography. The instructor sees the front of the room first! Students who sit in the front of the classroom probably get more attention from the instructor than those who sit near the back of the room.

In addition to the distance that physically separates you from the instructor in the classroom, there are also often psychological factors to be considered. Instructors usually notice that certain students sit near the front of the class while other students tend to sit in the back of the room. Although it is unfair, many instructors subconsciously assume that the students in the back of the room are less interested, less diligent, and even less serious about learning math than those who choose to sit near the front. For many instructors, it is often difficult to overcome these stereotypes. Even though the students sitting in the back of the room may be totally dedicated to learning math, this subconscious message may still be there! Aside from these potential stereotypes, the fact remains that the instructor is naturally closer to students in the front of the class from both a physical standpoint as well as a psychological one. If there is an advantage, it goes to the students

who sit near the front of the classroom every time! Clearly, not everyone will be able to sit in the first two rows! Therefore, try to get to class early, in order to get a good seat!

### **Math Success Secret**

When choosing a seat in your math classroom, always sit near the front (within the first two rows, if possible). If the instructor is right-handed, sit on the right side. If the instructor is left-handed, sit on the left side. Be careful about sitting near overhead projectors, since they tend to block the view of the board.

### **Why Is There So Much Homework?**

#### **Success in Math and Long-Term Memory Versus Short-Term Memory**

You may have asked yourself at one point or another, “Is it really necessary to spend all that time on math homework? After all, I come to class every day, and I pay close attention, too! I understand the material when it is explained. Isn’t that enough?”

While the strategy of paying attention in class and taking a few notes may be enough in some classes, math is different. Math is cumulative, that is, each skill that you learn usually becomes a part of the foundation for the next new concept you will encounter. In this way, learning math is very similar to learning a foreign language. In fact, some people even refer to mathematics as the **language of numbers**. You might think of the various skills you learn in math as your **math skills vocabulary**. Your ability to speak the language of math, that is, to succeed in math, is mostly dependent on your ability to master and *retain* the skills (vocabulary) that you learn. Unlike some other disciplines, the cumulative nature of math even crosses the boundaries between courses. Again—much like the progression from beginning to intermediate French, you can't afford to forget crucial vocabulary from one course to the next. So it is with math. Each new skill will either directly or at least indirectly impact the next. The skills that you learn now will be prerequisite skills for work that you will need later. In order to be sure that you have these skills later when you need them again you must have them in **long-term memory**.

This happens only through practice! Everyone knows that if you don't use a particular language, you will soon forget it. Only continual practice will insure that you retain what you learn in math in long-term memory.

During class time, the new math skills that you learn become part of your **short-term memory**. Short-term memory is similar to the Random Access Memory (RAM) of a computer. It works just fine until you turn the computer off, and then it is gone. **Long-term memory** is similar to the kind of computer memory on a hard drive or floppy disk. After the computer is turned off and then turned back on, only what was stored on the hard drive or floppy disk can be recalled.

Likewise, what you learn while you are in math class becomes part of your short-term memory. When you take what you learn home and practice it by doing homework problems, eventually with enough repetition and hard work, it becomes part of your long-term memory. Though clearly very necessary, short-term memory is ultimately not reliable over the long haul. Just like during a power failure, data that you haven't saved to the hard drive or to a floppy disk on your computer is gone for good! It is not uncommon for short-term memory to completely blank out when an exam is handed to you! Have you ever had that experience? This is precisely why homework is so important. Long-term memory is the only memory you can count on when skills that you learn now are needed later. Practice is the only way to transfer these important skills from short-term into long-term memory.

Consider other similar situations in real life. For example, consider the preparation of professional musicians and athletes. It is not enough for a musician to have skills or for an athlete to know a few plays. It takes hours of practice to develop the execution and timing that are critical to amateurs as well as professionals in these arenas. Just as in sports and music, real success in math cannot be achieved without **practice, practice,** and **more practice**—hours of practice!

## **Should I Study Alone or Study with Friends?**

Studies in educational research clearly illustrate the importance of studying with friends, instead of studying alone! It is critically important that you connect with other people in your effort to succeed in math.

As your math class progresses, take advantage of opportunities to get to know other members of your class. It might be a good idea to meet with friends either before or after class to share ideas and to help one another with the homework. This might be the beginning of a study group that will be very helpful in this class and perhaps even continue into your next math class.

Do you know any other people who might be able to help you with math? Are there family members or personal friends who are good at math? These may be excellent sources of help, especially if they are able to explain concepts in simple terms that you can understand! However, even a person who is really good at math will NOT be helpful to you if they intimidate or confuse you! If this happens, quickly shake it off, and find a friend who knows math but can also be sympathetic to your situation. Whatever you do, **never allow yourself to be isolated when it comes to studying math.**

### **Math Success Secret**

**Never allow yourself to be isolated when it comes to studying math!**

## **Does It Matter When I Do My Homework?**

If you want to minimize the time it takes you to do your homework, then you should do the homework as soon as possible after class while the explanations are still fresh in your mind! For example, if you have a Tuesday and Thursday class, suppose you leave class on Thursday, and you do not get around to doing the homework until Sunday or Monday. By that time, you will have forgotten the explanations you had in class on Thursday. It

will be like starting over, and it will probably take you twice as long to understand the assignment as it would have if you had done the homework right after class!

Another advantage of doing the homework right after class is that if you have questions on the homework, there is still time to call for help long before the next class (such as your instructor, someone in the class, or other math contact). Often times instructors will encourage their students to ask questions by email. If you have access to email and feel comfortable asking your questions this way, it could save you a lot of extra time—especially if you have a job or are a parent in addition to being a student. On the other hand, if you don't feel comfortable with writing down your questions or using email or a computer, nothing can really substitute for a telephone call or a brief, personal visit with your instructor.

### **Math Success Secret**

**Always do your homework as soon as possible after class!**

How long should you spend on the homework? Would it be better to exercise discipline, staying with it until the homework is finished (even if it takes 6 hours)? *Absolutely not!* This is a good way to learn to increase your fear and dislike for math! If you spend 45 minutes or an hour on homework, you are probably ready for a break. Don't violate your own attention span or punish yourself by working too long at one sitting. Go do something else for a few minutes, but then don't forget to come back and finish your homework!

### **Is It Better To Do “All of Some” or “Some of All” of the Homework?**

Suppose you don't have time to do all of your homework on a particular assignment. Would it be better to do “all of some” or “some of all” of the assignment? If you do “all of some” this means you were able to finish all of the first part of the assignment, but you didn't do any of the last portion. Now, you will be going into the next class a half assignment behind, and you don't even know if you had any questions on the last half of

the assignment. On the other hand, if you do “some of all,” then you did every other problem, and you did some of everything. Don’t forget to come back and complete the assignment as soon as possible, or at least when you begin to study for exams. Clearly, the latter is the better way to do your homework. **When the circumstances of life do not permit you to complete all the homework, then as a temporary fix, it is better to do “some of all” of the work. However, this is for emergencies only! This strategy will NOT be enough to place the skills into your long-term memory, and you will probably NOT be prepared for the test. To retain the math you will need at the next level and to succeed on exams there is only one strategy—you must do “ALL OF ALL!”**

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### **In a Nutshell**

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In order to succeed in math, be sure to begin at the correct level. Select a teacher who can explain math on a level you can understand. Attend class faithfully, and keep up with the homework day by day! If for some reason you are not able to make it to class, have a friend in the class take notes for you or pick up any handouts that you missed.

When it comes to homework, always use a sharp pencil, and have a BIG eraser handy. Do the homework as soon as possible after class. It is important to have a comfortable place at home to do your homework. Try to make friends with one or more students in the class, and if possible, form a study group to work on homework before or after class. When you have questions, get help immediately either directly from your instructor, from a campus math resource or tutoring center, or even from a trusted friend whom you know is good at math and can also be patient with you.

Above all else, remember that success in math comes only after hours of hard work and practice. With the right attitude and determination you *can* and *will* succeed in math!

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## **Do You Remember?**

1. What 3 decisions need to be made before you register for your first math class?
2. In order to be successful in math, is it enough to have a positive attitude? What else is necessary?
3. Does it matter where you sit in the classroom? If so, where are the best seats?
4. Explain the difference between long-term memory and short-term memory.
5. When is the best time to do your homework?
6. Is it better to study alone or with friends?
7. Is it better to do your homework for 6 hours and get it over with, or is it better to break your study time into smaller sessions?
8. If your schedule does not permit you to do all of the homework in a given assignment, is it better to do “all of some” or “some of all” of the assignment, with the intention of catching up on the rest later? Will this be enough to enable you to succeed on the exams?