

How to Overcome Math Anxiety

"Do not worry about your difficulties in mathematics; I assure you that mine are greater."

-Albert Einstein

This guide was created by a group of Anoka-Ramsey Community College faculty and students. We hope you find it both informative and entertaining. It was developed to create awareness about math anxiety and to introduce students to some of the causes and symptoms of math anxiety. Math anxiety is a complex problem, however, and many students would benefit from more information and guidance than this handout can provide. Students may also want to consult their instructors and counselors to get guidance on an individualized program of dealing with math anxiety.

What Is Math Anxiety?

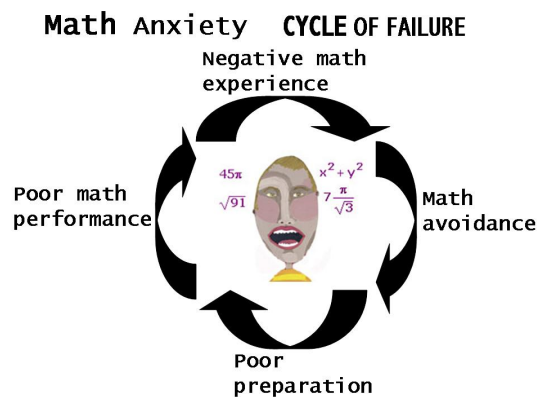


One definition of math anxiety is "the panic, helplessness, paralysis, and mental disorganization that arises among some people when they are required to solve a mathematical problem". (Source: Tobias and Weissbrod (1980)). Math anxiety is a serious and pervasive problem, especially in the college setting. Students may experience math anxiety in many forms and degrees, from "freezing up" during a math exam, to attempting to avoid anything having to do with numbers. Symptoms may be physical or psychological and may include (but not be limited to) any of the following:

Physical: Nausea, shortness-of-breath, sweating, heart palpitations, increased blood pressure.

Psychological: Memory loss, paralysis of thought, loss of self-confidence, negative self-talk, math avoidance, isolation (thinking you are the only one who feels this way).

These symptoms and other negative math experiences may lead to a "vicious cycle" in which fear of math interferes with learning math which leads to more negative math experiences. (Source: Preis, Christy; Biggs, Bobbie T. (2001) Can Instructors Help Learners Overcome Math Anxiety? ATEA Journal, Vol 28(4), 6-10, Apr/May.)



This "vicious cycle" may lead students to delay or stop taking math courses which often limits their educational opportunities. In today's increasingly technical society, it is more important than ever for students to have knowledge of math. According to Frances Rosamond of National University, **"Starting salaries go up \$2000 per year for every mathematics course after the ninth grade."** A recent *Business Week* article states "the world is moving into a new age of numbers....just look at where the mathematicians are now. They're helping to map out advertising campaigns, they're changing the nature of research in newsrooms and in biology labs and they're enabling marketers to forge new one-on-one relationships with customers. As this occurs, more of the economy falls into the realm of numbers." (Source: *Business Week*, "Math Will Rock Your World", Jan. 23, 2006).

Fortunately, there is help available for students with math anxiety.
 You too can learn to overcome your math anxiety and be successful in math.
Math success leads to educational success which leads to career success.



Do You Have Math Anxiety?

A Self Test (Source: <http://www.mathpower.com/anxtest.htm>)

Rate your answers from 1 to 5; add them up and check your score below. (1) = Disagree, (5) = Agree.

- | | |
|---|------------------|
| 1. I cringe when I have to go to math class. | 1 2 3 4 5 |
| 2. I am uneasy about going to the board in a math class. | 1 2 3 4 5 |
| 3. I am afraid to ask questions in math class. | 1 2 3 4 5 |
| 4. I am always worried about being called on in math class. | 1 2 3 4 5 |
| 5. I understand math now, but I worry that it's going to get really difficult soon. | 1 2 3 4 5 |
| 6. I tend to zone out in math class. | 1 2 3 4 5 |
| 7. I fear math tests more than any other kind. | 1 2 3 4 5 |
| 8. I don't know how to study for math tests. | 1 2 3 4 5 |
| 9. It's clear to me in math class, but when I go home it's like I was never there. | 1 2 3 4 5 |
| 10. I'm afraid I won't be able to keep up with the rest of the class. | 1 2 3 4 5 |

Check your score:

40-50 No doubt! You have math anxiety.
30-39 You're still fearful about math.
20-29 On the fence!
10-19 Wow! Loose as a goose! You can put this brochure away, or use it for your friends.



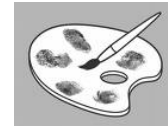
Math Myths

These "math myths" may contribute to students' feelings that they will never be good at math because of conditions that they cannot control and cannot overcome. Understanding that these are actually myths will help you to limit the power of the myths over your thoughts and perspective.



~ Myth One – You have to born with a mathematical brain ~

People who are successful in mathematics aren't usually born that way. Learning math, like learning in general, takes knowledgeable teachers, willing students, and, most importantly, a great deal of time and practice. Learning math is, in fact, much like learning a language. The symbols and notation make up the rules of grammar and the terminology is the vocabulary. Doing math homework is like practicing the conversation of math. Becoming fluent (and staying fluent) in math requires years of practice and continuous use.



~ Myth Two – You can't be creative and be good at math~

Can you be an artist, writer, or musician and be good at math too? Yes! Math is found throughout literature, art, music, film, philosophy, and is essential to many "creative" fields. Leonardo DaVinci, Mozart, M.C. Escher, and Lewis Carroll are just a few of the artists who used math extensively in their works. Here are a few interesting quotes about math in the arts: (source: <https://platonicroalms.com/quotes>)

A man should be learned in several sciences, and should have a reasonable, philosophical and in some measure a mathematical head, to be a complete and excellent poet.

– John Dryden (poet)

Geometry is the right foundation of all painting.

– Albrecht Dürer (artist)

I am interested in mathematics only as a creative art.

– Godfrey Harold Hardy (mathematician)

A mathematician, like a painter or a poet, is a maker of patterns. If his patterns are more permanent than theirs, it is because they are made with ideas.

– Godfrey Harold Hardy (mathematician)

The mathematician's best work is art, a high perfect art, as daring as the most secret dreams of imagination, clear and limpid. Mathematical genius and artistic genius touch one another.

– Gosta Mittag-Leffler (mathematician)

Math is a wonderful thing

Math is a really cool thing

So, get off your "ath" let's do some math

Math, math, math, math, math....

-- Jack Black in *School of Rock* (rocker/teacher)



~ Myth Three – Women are not as good at math as men~

This myth still keeps women out of the field of mathematics. Even today, very young girls may not be encouraged to investigate the world in the same way that boys are. Boys are given blocks, science kits, and construction tools and are encouraged to explore their world in a more mathematical way than are girls. If more girls were given the same support and opportunities that boys have to excel at mathematics perhaps there would be many more high-achieving girls and women in mathematics. (Author's note: I was never really encouraged in math in high school. Not because I wasn't good at it but because it wasn't traditionally something that girls excelled at. Fortunately, I found the encouragement and support to go into math in college (it was a women's college) – NSB).

For more discussion of this math myth, check out the Association for Women in Mathematics website: <http://www.awm-math.org/>



Ten Ways to Reduce Math Anxiety

1. Learn stress management and relaxation techniques.

Techniques such as deep breathing and meditation that help you to relax in any stressful situation can also be helpful when dealing with the nervousness and tension that affect students with math anxiety.

2. Combat negative thinking.

Lack of confidence can be a major impediment for students with math anxiety. Replace those negative thoughts ("I can't do this", "I've never been good at math", "I won't finish in time") with confidence-building affirmations ("I know this", "I'm prepared", "I can do this").

3. Visualize yourself succeeding.

Athletes use the technique of "visualization" to prepare for major competitions. Imagine yourself being relaxed doing math and during a test and confidently solving the problems.

4. Do "easiest" problems first.

Build up your confidence by first doing those problems in an assignment or on a test that you "know" best. It'll help you relax when you tackle the "harder" stuff.

5. Channel your stress into something else.

Free up your mind by relieving some of your physical responses to stress. Get up and run around the hall for a minute before the test or squeeze a stress ball like crazy during the test.

6. Start preparing early.

If you try to "cram" the material quickly, you are likely to forget it quickly too. If you practice the material over a period of time, you will have a better understanding of it and are less likely to forget it when under stress.

7. Take care of yourself.

Although it's not easy when you're in school, eating and sleeping well helps your body and mind function to their fullest potential.

8. Try to understand the "why" of math concepts rather than memorizing.

The first thing to go when you are under stress is your short-term memory. This is one reason it is so important to understand that math is not just a set of rules that you have to memorize but that each concept builds on what came before. If you understand the reason behind the rules, you will remember the concepts better and be able to apply them in many different types of problems (not just ones you've seen before).

9. Find a support group.

A support group is especially helpful for adults with math anxiety.

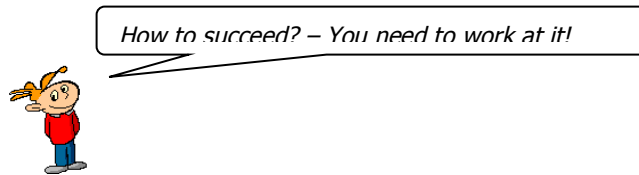
10. Reward yourself for hard work.

After completing a difficult assignment or an exam, it's time to give yourself a break. Have a chocolate... or a party!

There are, of course, many more strategies that can help with math anxiety.
Check out these websites for more self-helps techniques:

<http://www.mathpower.com/>
<https://www.prodigygame.com/blog/math-anxiety/>
<https://blog.mindresearch.org/blog/math-anxiety>
<http://www.math.com/students/advice/anxiety.html>

Note: The suggestions listed above are a good way to start to work on overcoming the fear associated with math, but, since students may suffer from different levels and forms of anxiety, students may also want to consult their instructors and counselors to get guidance on an individualized program of dealing with math anxiety.



Studying Mathematics

"If you care at all, you'll get some results. If you care enough, you'll get incredible results."
– John Rohn (Author and motivational speaker)

"No one has ever drowned in a sweat."
– Lou Holtz

"The most practical, beautiful, workable philosophy in the world won't work – if you won't."
– Zig Ziglar

Sometimes good study habits can be the key to overcoming math anxiety. Some students do not realize how important studying skills are. The following material contains tips on how to study mathematics at home and in class, how to prepare for tests, how to take tests, and how to use your time studying the most efficient way.

1. How to Plan Your Time

(Source: Supplementary Packet assembled by Barb Schewe, Anoka Ramsey Community College)

Is your credit load realistic with respect to your other commitments? The following chart will help you determine the number of hours you need to study every week.

School vs. Work vs. Home/Family

12 credits/hours in class
+ 24 hours of study time outside of class
36 hours needed for college per week

You may want to limit your number of credits if any of the following apply:

- you have a job
- you are the primary caregiver for children or have many family responsibilities
- you were recommended to take a writing and/or reading course
- you are concerned about the amount of time one or more of your classes will take

TIME WORKING	CREDIT LOAD HOURS IN CLASS	STUDY TIME OUTSIDE OF CLASS	TIME COMMITMENT TO COLLEGE
None	16–18 credits/hours in class	+ 32 – 36 study hours	= 48 – 54 hours/week
1 – 10 hours	12–16 credits/ hours in class	+ 24 – 32 study hours	= 36 – 48 hours/week
11 – 20 hours	9–14 credits/hours in class	+ 18 – 28 study hours	= 27 – 42 hours/week
21 – 30 hours	6–12 credits/hours in class	+ 12 – 24 study hours	= 18 – 36 hours/week
31 – 40 hours	3–8 credits/hours in class	+ 6 – 16 study hours	= 9 – 24 hours /week
More than 40 hours/week	3–4 credits/hours in class	+ 6 – 8 study hours	= 9 – 12 hours/week

A good exercise: There are 168 hours in a week. Determine your total hours for a week using work, family/home, college commitment, eating, sleeping, commute time, etc. Does it fit in a week? Does it allow any "down" time for you to "recharge?"

2. How to Study at Home

Homework is extremely important in learning mathematics. It helps you understand the material, and find out what types of problems you have difficulty with, so that you can ask your teacher about those problems later.

Make sure you:

- Set aside adequate time each day to study and discipline yourself to use it.
- Read over and tidy up your notes.
- Do enough exercises to achieve mastery.
- Try to solve every problem in the homework.
- Make notes to ask your teacher about the problems you could not do or had difficulties with.
- Ask questions early and often.
- Analyze your error, make note of it.
- If possible, find a group of students or a study-buddy to work with.
- Discuss the homework problems with classmates before class.
- Help other students with the homework, if you can. There is no better way to learn the material than to explain it to someone else.

3. How to Study in Class

- Be ready for the lecture: Have the homework done. Look through the chapter which will be discussed next, it helps to be more comfortable with the new material.
- Have everything you might need for the math class ready: pencil, eraser, graph paper, calculator, textbook, and your notebook.
- Ask questions every time you don't understand something. Don't wait until later, new material is usually based on the previous chapters.

4. How to Prepare for Test

- The best way to prepare for the test is to do the homework when it is assigned. Practice every day; don't try to learn everything in one night before the test date.
- Writing the summary of the main concepts and formulas helps a lot. Make a cheat-sheet even though you will not use it on a test.
- Ask your teacher questions if you do not understand or remember something. Try to do it ahead of time; there might be many students who need help right before the test.
- Solve every type of problem you had in the homework or test review problem set.
- Get plenty of rest before the test. Don't study all night. Get lots of sleep instead.



5. How to Take a Test

"When you're prepared you're confident. When you have a strategy, you're comfortable."

– Fred Couples (professional golfer)

(Source: Department of Mathematics, Saint Louis University, <http://euler.slu.edu/Dept/SuccessinMath.html>)

- First look over the entire test. You'll get a sense of its length. Try to identify those problems you definitely know how to do right away, and those you expect to have to think about.
- Do the problems in the order that suits you! Start with the problems that you know for sure you can do. This builds confidence and means you don't miss any sure points just because you run out of time. Then try the problems you think you can figure out; then finally try the ones you are least sure about.
- Time is of the essence - work as quickly and continuously as you can while still writing legibly and showing all your work. If you get stuck on a problem, move on to another one, you can come back later.
- Work by the clock. On a 50 minute, 100 point test, you have about 5 minutes for a 10 point question. Starting with the easy questions will probably put you ahead of the clock. When you work on a harder problem, spend the allotted time (e.g., 5 minutes) on that question, and if you have not almost finished it, go on to another problem. Do not spend 20 minutes on a problem which will yield few or no points when there are other problems still to try.
- Show all your work: make it as easy as possible for the Instructor to see how much you do know. Try to write a well-reasoned solution. The instructor might assign partial credit based on the work you show.
- Never waste time erasing! Just draw a line through the work you want ignored and move on. Not only does erasing waste precious time, but you may discover later that you erased something useful (and/or maybe worth partial credit if you cannot complete the problem). You are not required to fit your answer in the space provided - you can put your answer on another sheet to avoid needing to erase.
- In a multiple-step problem outline the steps before actually working the problem.
- Don't give up on a several-part problem just because you can't do the first part. Attempt the other part(s) - if the actual solution depends on the first part, at least explain how you would do it.
- Make sure you read the questions carefully, and do all parts of each problem.
- Verify your answers - does each answer make sense given the context of the problem?
- If you finish early, check every problem (that means rework everything from scratch).



The Math Anxiety Bill of Rights

(Source: *The Math Anxiety Bill of Rights* by Sandra Davis, in Donaday & Auslander (1980) *Resource Manual for Counselors/Math Instructor: Math Anxiety, Math Avoidance, Reentry Mathematics*)

- I have the right to learn at my own pace and not feel put down if I'm slower than someone else.
- I have the right to ask whatever questions I have. *(And I had better ask them. Which makes you feel worse: to ask a stupid question or to fail an exam?)*
- I have the right to need extra help.
- I have the right to ask a teacher or tutor for help.
- I have the right to say I don't understand.
- I have the right not to understand. *(When I am at the end of my rope from frustration I will call on the people who love and understand me to give me pep talks).*
- I have the right to feel good about myself regardless of my abilities in math. *(It's not like there's nothing I do well. I have my own place(s) where I have confidence and skill. I am more than who I am in the math classroom).*
- I have the right not to base my self-worth on my math skills.
- I have the right to view myself as capable of learning math.
- I have the right to evaluate my math instructors and how they teach.
- I have the right to relax. *(If you don't take your vacations, your vacations will take you).*
- I have the right to be treated as a competent adult.
- I have the right to dislike math. *(Or to love it, but have it confound me nonetheless).*
- I have the right to define success in my own terms.

Power to the math-anxious people! We shall overcome!



We wish you the best of luck in your studies and great success in Math!

- Anoka-Ramsey Community College math faculty Nina Bohrod Nina.Bohrod@anokaramsey.edu , Candace Blazek Candace.Blazek@anokaramsey.edu , Sasha Verkhovtseva Sasha.Verkhovtseva@anokaramsey.edu .

Many thanks to Barb Schewe, Ken Grace and Barb Brown of the Mathematics Department, and Jan Pomeroy of the Academic Support Center for their help in finding the material for this brochure.

