



Ask Chris

This month Chris Turner answers a question about math anxiety.

My student and I are working on decimals and fractions. She isn't doing her homework. She doesn't have a lot of confidence either. Do you have any suggestions?
Worried Tutor

There is a good chance your student is suffering from math anxiety. This is a serious and widespread problem that affects most of our math students.

What are the symptoms of math anxiety?

Math anxiety is very real and affects the body physically, chemically and neurologically. People who suffer from math anxiety feel very uncomfortable when they are put in a situation that calls on them to demonstrate math skills. Essentially they are experiencing the “fight or flight” reaction of someone faced with a dangerous situation. They may become short of breath and their heart rate increases. They may feel agitated and their mind may “blank out.” Their primary concern is generally to do what it takes to make the math go away. They might guess wildly or be stubbornly silent. They feel that they just can't do it and unfortunately, they are right.

“Math anxiety soaks up the resources of working memory,” according to Mark H. Ashcraft, who published a study on math anxiety in the *Journal of Experimental Psychology*. This means that students literally cannot do a problem because they do not have enough mental space to hold the information needed to solve it in their working memory.

What causes math anxiety?

According to Ashcraft, the main cause of math anxiety is poor teaching. Teachers place too much emphasis on getting the right answer rather than on the problem-solving process. This in itself generates anxiety. Girls, in particular, may have been discouraged from believing that they could succeed.

Adults with math anxiety report all kinds of negative experiences from their school days. At best, students experienced a barrage of harsh comments from teachers, parents or peers who said things to them like, “You'll never be good at math,” without fully understanding what a self-fulfilling prophecy that is. At worst, students were severely punished or teased for a failure to produce the right answer on time. Because math is accumulative, early failure is very difficult to overcome. Students get further and further behind, feel more and more stupid, and find math increasingly painful.

In addition, some of our students also suffer from processing difficulties, which make learning math more challenging for them.

How can I reduce my student's anxiety?

There are many things a tutor can do to help a student with math anxiety. The more you understand and accept the reality of your student's anxiety, the easier it will be for you to help your student develop confidence. Many math tutors love math and they want their students to love it too. However, you need to be realistic.

1. Help them to understand what is happening. For many students it is a relief to be able to talk openly about how much they hate math and about their early difficulties. Reassure them that you have every confidence that they can learn, but they don't have to like it or pretend they do. Let them know that together you will come up with strategies to make coping with math easier for them. Reassure them that math anxiety is a common problem and that it has NOTHING to do with math ability.

2. Teach your student to recognize the signs of anxiety and to learn to take short breaks to relieve the symptoms. Students with math anxiety are easily overwhelmed. The tiniest thing can trigger old trauma. Once their anxiety is triggered, it's like a bank vault slammed shut. They need to learn how to slow down and recover themselves. Be sensitive to what is happening with your student so you can help her to recognize when this is happening. The best thing to do when students are overwhelmed is to take a short break. Students will sometimes resist this, partly because they feel it is better to tough it out and partly because they want to get it over with. A break can be a quick stretch, getting a drink or even just averting their eyes from the page of problems. Even our books, though very good, are sometimes too dense. Help your student by placing a sheet of blank paper to cover everything except what you are working on.

3. Give your student some control over the process. For example, you might say, "There are fifteen problems on this page. Choose seven of them to solve." Give them explicit permission to stop work at any stage. Let them know that they can say, "that's enough," and that you will honor that. Help them to connect the math you are working on with examples that relate to their lives. Encourage them to bring real-life math problems to the tutoring situation.

4. Break math down into manageable chunks and go slowly. Most of the materials we use are very good at breaking the problem-solving process down. However, our students often need this "spoon-feeding" to take place over a fairly long period of time. If your student starts making a lot of mistakes, you are going too quickly. You will need to backtrack and/or to break the problem down into smaller pieces.

5. Encourage students to use study sheets. Using a crib sheet while working on problems is a great (and easy) way to study. We are used to calling these "cheat sheets," and we sometimes think they are a crutch. However, far from being cheating, these sheets can be a powerful aid to learning and can drastically reduce anxiety. Many students with math anxiety do not have a firm grasp of all the "math facts" or find it difficult to remember formulas or steps in a math process. Let them keep a study guide, for example a copy of the multiplication table in front of them. I often paste a copy right in the front of a student's book. Every time they look something up on the multiplication table, the multiplication process is taking place, even if it is not happening entirely inside their head. Slowly they will internalize it.

6. Give them credit for the process, not just the answer. Help your students learn to value the process of doing math by encouraging them to show their work and give them

points for every step they take in the right direction, even if the final answer is wrong. Help them to avoid guessing. Students need to understand the concept and see the big picture, not just learn a formula by rote. As they develop confidence in their ability to understand how to solve a problem, they will learn how to double check to make sure they haven't made any careless errors.

7. If they have to take a high-stakes test, teach them test-taking skills. We have a number of resources in the Council that you can use to help your student prepare for a high-stakes test like the GED.

8. Stay positive, confident and supportive. Your student can learn, it just may take some time. Don't give up on her or let her give up on herself. Your enthusiasm and belief that your student can do it might just tip the balance and help her overcome her fears. As she begins to experience success, her anxiety will diminish.

What about homework?

Be as firm and insistent as you can in encouraging your student to relate to homework. If students don't practice, they can't make progress. Naturally, you should not assign homework that is too difficult for your student to do independently. Make sure they really understand how to solve a problem before assigning practice.

Equally important is keeping the length of the assignment manageable. Students with math anxiety have to feel the end is in sight. As far as homework is concerned, adopt the motto, "Little and often is best." Explain to your student that they will get the best results if they do a few problems every day. If you meet with your student once a week, for example, I would suggest that you assign between 12 and 20 problems. Tell them to pick four nights during the week and to work on **ONLY** three to five problems a night.

If you would like to learn more about tutoring math, sign up for our first Math Workshop, which will be held at the Literacy Council on Saturday, June 8 from 9:00—1:00 am.