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How to beat maths anxiety

Getting stressed about maths is so common, yet there's no need. With the right approach, you can even start enjoying it

by Shayla Love

Key points – How to beat maths anxiety

1. **Maths anxiety is extremely common and it can hold you back.** It's defined as feeling any tension, apprehension or fear that interferes with doing maths or maths performance. If this leads you to avoid maths, it could affect your education and career and cause you stress in everyday life.
2. **Understand that there is no such thing as a 'maths person'.** There are many myths about maths but one of the most harmful is that only certain people can do it.
3. **Be aware of and challenge harmful maths stereotypes.** There are various misguided cultural beliefs about which groups – based on gender or ethnicity – are better at maths, and these could feed your anxiety. Seek out stereotype-defying role models to help you overcome these unhelpful influences.
4. **Slow down.** The idea that you have to race to complete maths problems can fuel your anxiety. Practise taking your time.
5. **Write down your feelings.** Writing before you do maths may help to unload your anxious thoughts so that they distract you less when actually doing a maths problem.
6. **Get out of a 'right or wrong' mindset.** Unlike humanities subjects, maths is often seen as a subject where you're either right or wrong, and this can create pressure. To counter this way of thinking, spend some time coming up with different ways of solving a simple maths problem – this will help you enjoy the process of maths instead.
7. **Teach maths to someone else.** Helping another person to learn can help make maths more fun and less anxiety inducing.
8. **Embrace the struggle.** Try to adopt a growth mindset and realise that finding maths difficult isn't a bad thing – it shows you're giving your brain a workout and you're improving through practice.

Need to know

In 1975, an anxiety clinic opened at Wesleyan University in Connecticut. This wasn't your typical clinic: people didn't go because they were fretful about their health or personal lives, they showed up to confront an overwhelming anxiety of doing maths.

Sheila Tobias, a US educator who wrote the book *Overcoming Math Anxiety* (1978), opened the clinic and interviewed hundreds of college students. Many were women who were told that 'girls don't do math', while others had concluded 'that they would either be good with numbers *or* with words but that they could not be good with both,' she wrote in a 1990 article. It's true that maths doesn't have the best reputation. It's not a subject widely known for being a good time or easy to do. 'Maths seemed dreary, never any fun,' Tobias wrote. For some people, however, this kind of negative perception translates into more than just a distaste.

Do this maths problem: 34 minus 19. Do it in your head without paper, and then imagine another person watching you. How does that make you feel? Mark Ashcraft, a US psychologist who studied maths anxiety, described how people in his studies responded to solving similar problems. Many showed 'unease or apprehension'. They had 'trembling hands, nervous laughter, and so forth,' he wrote. 'Many ask, defensively, if their performance says anything about their overall intelligence.'

If you had a comparable response – uncomfortable physical sensations and worry about getting the right answer – you might have some degree of maths anxiety. It can range from mild to extreme: it's defined as feeling any tension, apprehension or fear that interferes with doing maths or maths performance.

Maths anxiety is extremely common and it can hold you back

You may not have realised that maths anxiety had a name at all, but if you've tended to go out of your way to avoid maths, it's likely affected your life. Consider your past choices in school: you might have opted to take fewer maths classes, limiting your later educational and career options. If you have low self-esteem about yourself in regards to maths, you might have avoided jobs or hobbies that involve maths. Parents with maths anxiety can pass on the feeling to their kids: those children have been found to learn less maths over the course of a school year, and are more likely to develop maths anxiety themselves.

It's not shameful to bristle at the thought of doing maths problems, and you're certainly not alone if you're discovering you've set up your life to do as little maths as possible. The concept of maths anxiety dates back to 1957 when psychologists first tested college students for 'number anxiety'. Around the same time, a nun who taught maths at Catholic schools, Sister Mary Fides Gough, noticed that some of her students had what she called *mathemaphobia*.

Today, about 93 per cent of US adults say they have some amount of maths anxiety, and 17 per cent report high levels. Across 34 countries, surveys taken in 2012 have found that 59 per cent of 15- to 16-year-olds say they worry maths classes will be difficult for them. About a third feel tense while doing maths homework, and 31 per cent are 'very nervous' doing maths problems.

Maths anxiety is considered distinct from dyscalculia, a learning disability that affects a person's ability to understand fundamental numerical concepts, such as counting or recognising numbers, and which is beyond the scope of this Guide. Dyscalculia is usually picked up by teachers and, similar to dyslexia, is focused more on ability than negative emotions. It can lead to maths anxiety, but should be addressed separately through learning programmes.

Struggling with maths and having anxiety around it aren't always linked. Some people who perform poorly in maths don't get anxious about it, whereas others who are good at maths worry about it a lot. A study in the UK in 2018 found that more than three-quarters of children who had maths anxiety had normal to high scores on their maths tests.

Even if your objective is not to switch careers and become a mathematician, maths anxiety can be a burden, causing you stress whenever you encounter maths in daily life, whether that's at work, out shopping, sorting your personal finances or supporting your children with their homework. The good news is there are some proven ways to start changing your relationship to maths, even if your day-to-day life doesn't currently require you to do much of it. These steps won't easily propel you into a higher-level maths class, or turn you into a mathematical genius. But they can boost your confidence and make the prospect of doing maths in any situation more feasible, less stressful – and perhaps even fun. Some of these methods do involve sitting down and doing some maths, but many do not. This is because maths anxiety doesn't emerge from maths alone: it stems from our ideas about maths, what we are told by parents and teachers, and cultural stereotypes about what maths is and who it's for.

What to do

Understand that there is no such thing as a 'maths person'

If you stop to think about it, it's somewhat odd that so many people are more intimidated by numbers than by other kinds of information, says Alex Moore, an associate professor of psychology at Illinois College. 'Why that is, we're not entirely sure,' he says. Learning a foreign language or reading *Beowulf* can be just as cognitively demanding or complex as manipulating numbers, yet people tend not to be as intimidated by these sorts of linguistic activities.

'Maths anxiety seems to be a commoner problem than fear of other academic subjects,' says Ann Dowker, a developmental psychologist at the University of Oxford in the UK who studies the development of mathematical cognition.

There are a number of myths surrounding maths that could contribute to people feeling anxious about it, more than other subjects. They might assume maths is monotonous, too abstract, or consider it a subject devoid of feeling. But one myth prevails above them all, says Jo Boaler, a professor of mathematics education at the Stanford Graduate School of Education in California, and that's the notion that only some people can be good at maths. This creates a unique performance anxiety that can make doing maths fraught.

This myth is fed by the trope of the maths genius, like in the scene from the film *A Beautiful Mind* (2001), in which a mathematician sees equations appear before him like magic. Even if you don't expect to have *that* experience with maths, you might still identify as not a 'maths person'. Because so many people often express fears about maths, it reinforces the narrative that maths is difficult, or that only certain people are good at it, and that there's something to fear when starting to work with numbers. If you had anxiety around maths at school, you might have come to see yourself as 'not a numbers person', and then concluded that you will never like it. If that's the case, it's understandable that you started to feel anxious whenever it was time to do some maths.

The first step to overcoming maths anxiety, then, is to remind yourself that maths isn't just for certain people. Anyone can do at least some maths. Once you set aside pressure to become really good at it, and stop worrying about how much innate aptitude you may or may not have, this should help your anxiety fade away naturally.

Be aware of and challenge harmful maths stereotypes

The myth of a 'maths person' has problematic origins. Long enmeshed in the myth is the notion that it's not just that some people are better at maths, but that those people fall into certain groups. Most common is the cultural belief that men thrive more in maths (along with other STEM fields) than women. Consider how in 1992 Mattel released 'Teen Talk Barbie' who spoke a number of phrases, including 'Want to have a pizza party?' and 'Let's go shopping!' but also 'Math class is tough!' This led to criticisms that Mattel was perpetuating the widespread idea that maths was especially difficult for women.

If you have maths anxiety, especially if you're a woman, it could be helpful to recognise how pervasive these stereotypes have been. Moore wrote a book chapter with Mark Ashcraft, published in 2013, in which they provided other examples of harmful stereotypes being perpetuated. For instance, the clothing store Forever 21 made pink magnets that read 'I'm too pretty to do math!' and JCPenney sold sweatshirts that read 'I'm too pretty to do my homework so my brother has to do it for me.' These stereotypes can fuel maths anxiety and doubtless feed into the fact that maths anxiety tends to be higher in women. In experiments, when women feel the pressure to prove such stereotypes wrong, it can lead them to perform poorly on maths tests.

These kinds of gender stereotypes haven't gone away. Boaler says it's still widely believed that 'people with a maths brain are male'. There are unhelpful racial stereotypes related to maths too, she adds, such as that 'certain racial groups: white or Asian' are better at maths.

To counter the harmful influence of stereotypes surrounding maths ability, it's worth spending some time questioning your assumptions of which groups are supposedly 'good' at maths and which aren't. It might help to expose yourself to examples that challenge these stereotypes, such as by reading about female mathematicians.

One reason why Tobias's work on maths anxiety made such an impact is that she considered it a feminist issue to help women overcome their maths anxiety. 'She described for the first time that

there is no more a math mind than there is a history mind,' the US writer and feminist Gloria Steinem said in a 2007 interview about Tobias. 'It is just that people learn in different ways.'

Slow down

In school, you might have done maths under timed conditions: taking tests, and solving problems as quickly as possible. The notion that maths has to be done at rapid speeds is a toxic one, Boaler says. 'Anybody who's in a learning situation where they're put on the spot and have this kind of procedural teaching is going to have anxiety,' she says.

The US mathematician Steven Strogatz has talked to Boaler about how he is a 'slow' mathematician. 'In terms of being the fastest kid and the most powerful logical brain, I was always near the bottom of my class,' he said in an interview. 'I really was. I mean, if I had let that stop me, I would have stopped.' Instead, he accepted that maths is not about speed. 'I'm slow,' he said. 'So what. Many mathematicians are slow and real math is not about speed.'

There are studies showing that intelligent people solve easier problems quickly, but they take their time finishing more difficult ones. One study from 2017 found that in Finland, unlike most other countries, children's maths anxiety seems to go down, rather than increase, after the beginning of primary school. That might be because there is relatively little high-stakes testing, Dowker says.

Return to the subtraction problem from earlier: 34 minus 19. Even if you can do this quickly, experiment with solving for the answer in a much slower way, without any pressure. Do it slowly enough to notice your body calming down, and how you still arrive at the answer eventually, no matter how long it takes.

Write down your feelings

When facing a maths problem, whether in school or in life, once you've accepted that it's not important if the answer doesn't come quickly, you might also spend some time writing down what feelings arise.

This might not work while in a restaurant calculating the tip, but carve out some time at home or in your free time to do simple maths problems while also doing expressive writing. Expressive writing is when you write for a specific period of time about your emotions and thoughts that come up in response to a stressful maths situation, such as sadness that you're not good or smart enough, stress that you're going to fail, or anxiety or anger that it's too hard. Many studies have now shown that writing about maths anxiety can help reduce it. Writing before you do maths may help to unload your anxious thoughts so that they distract you less when actually doing a maths problem, Dowker says.

This kind of writing exercise can be done 5 to 10 minutes before doing maths, if you're still in school and about to take a maths test. Or, if you're doing maths homework or practising maths exercises, you could consider doing expressive writing at the same time. To do that, draw a line down the centre of a piece of paper, do maths on one side, and write down the emotions that

come up next to it. Write specifically about your anxiety, and why you feel that way, Dowker says. If failure is a concern, write about why failure would be important. Writing about your maths anxiety may help to unload your anxious thoughts so that they distract you less when doing a maths problem during a test or in an everyday situation.

Get out of a 'right or wrong' mindset

Unlike humanities subjects, maths is often seen as a subject where you're either right or wrong, and this can create pressure. 'It's taught in such a rigid way that it makes people think: "I'm just supposed to memorise this set of rules",' says Gerardo Ramirez, an assistant professor of educational psychology at Ball State University in Indiana.

'For some people, being wrong can feel threatening,' Dowker says. If you feel this way about maths, it's not your fault, but a reflection of how maths is presented in school. 'We teach maths as a right-and-wrong subject, where your role is to come up with answers,' Boaler says. 'Often under time pressure. Often, you get negative feedback that those answers aren't right.'

The mathematician Claudia Zaslavsky wrote in her book *Fear of Math: How to Get Over It and Get on with Your Life* (1994) that maths is not only about coming up with the right answer, but also the process used to arrive at that answer. She thought that teaching students about this process could help them confront their fears of being 'right or wrong' about maths.

The free online course 'How to Learn Math' developed by Boaler contains an exercise to counter this way of thinking. It asks you to do 18 x 5 in your head without writing on paper. 'It doesn't matter if you are wrong,' Boaler says in the video. The answer is 90, but 'the most interesting part of the problem is not the 90. It is the ways people get to 90, the different pathways they use.'

Boaler interviewed people on the street in San Francisco as well as Stanford students to solve this same multiplication problem. She found that everyone solved it in a slightly different way. Some people first did 10 x 5 to get 50. Then, 8 x 5 is 40. And 50 + 40 equals 90. Others did 5 x 20 to get 100, then subtracting 10 to get 90.

Take a moment now to try coming up with a few different ways to solve a simple maths question: this will help you get out of the right-or-wrong mindset and begin enjoying the process of maths instead. When maths is taught as open problems, valuing different ideas, or even valuing mistakes, students don't develop as much maths anxiety, Boaler says. This is called flexible maths thinking.

Ramirez cautions that sometimes this approach can make maths feel more complicated and abstract – so if flexible thinking brings on more anxiety, leave this trick to the side. But for other people, there can be a sense of freedom knowing that multiple maths paths lead to the same destination.

Teach maths to someone else

In the late 1970s and early ’80s, the US mathematician Uri Treisman learned that many students were failing calculus classes at the University of California Berkeley. After investigating further, he found that the students who did better were the ones who talked about maths with each other, and did their homework together, which he called collaborative learning.

According to Treisman’s insights, it’s beneficial for students to talk through their maths problems or larger maths concepts together. Even if you’re not a student, there’s a way to use this philosophy to make maths a shared experience and boost your maths confidence. All you need is to learn a basic maths process or principle, and then teach it to someone else.

Flip through an elementary- or middle-school maths book, watch maths lessons online, and then tutor your child, a cousin or a friend’s kid with those problems, Ramirez suggests. ‘Even if they don’t need tutoring,’ he says.

This promotes collaborative learning, and can also increase your sense of ‘self-efficacy’ in maths, which is your belief in your ability to be successful at maths problems. Often, people have a low sense of self-efficacy because of their past experiences, and these memories can follow you around even when you know more maths than you think. Redoing assignments, practising maths that you’re now good at, or helping another person to learn can all help make maths more fun and less anxiety inducing.

Embrace the struggle

Getting over maths anxiety doesn’t mean that maths will never be difficult, or that you’ll become a maths whiz overnight. What’s more important is how you feel about your experience of doing maths. ‘There’s a lot of research showing that your general appraisal of your anxiety plays a huge role in how well you learn and also how much you persist in learning those skills,’ Moore says. Thinking about your anxiety not necessarily as exciting but as a challenge can help.

It’s like public speaking. There are many excellent public speakers who still get nervous before they go on stage, or before talking to groups. ‘Regardless, they’re able to use that physiological response, that arousal as a challenge, and so to go in and really give a good performance out there,’ Moore says.

This is in line with the psychologist Carol Dweck’s work on the benefits of a growth mindset versus fixed mindset. Having a growth mindset involves seeing that competence in a subject isn’t something you’re born with – and that anyone can grow to be better at something. In one of Dweck’s studies, a group of students were given difficult problems to complete; afterwards, the researchers complimented some of them for being smart, and complimented the others for working hard. Those students who had been praised for being smart selected easier follow-up problems to take on than the others. The researchers’ interpretation was that this is because they became concerned with maintaining the appearance of being smart, and didn’t want to get a maths question wrong. The others, who’d been praised for effort, were less concerned about performing well and were up for the challenge of a harder problem. You can do the same: rather than trying to overcome maths anxiety by telling yourself how ‘smart’ you are – which can feel like a fixed trait – praise yourself for your efforts and how much you’re willing to try.

Boaler is eager to disseminate a similar message – that a bit of struggling is good for your brain. ‘If you’re not struggling, if everything is easy, then you’re not getting a good brain workout,’ she says. She even developed a maths app for children called Struggly offering maths and pattern games that are intended to be tricky to solve.

When you change your mindset to embrace the challenge of maths, you might find it can even be fun. ‘We’re hearing from kids who love this app,’ Boaler says. ‘And they’re even saying to each other now: “Will you come and struggle with me today?”’

Remember, the goal is not to be perfect at maths, but to feel less stress during the times you do it. If the pressure and tension around maths lifts, you may discover a new relationship to it. Something you once avoided at all costs could turn out to be a source of fun, or play.

Learn more

Notice the maths all around you

People tend to think of maths as a unitary thing, Dowker tells me. ‘If someone has difficulty in one particular problem, or some aspect of maths, one starts labelling oneself as no good at maths,’ she says. But the reality is that people can find some kinds of maths easy, and have difficulty in others.

A field called ethnomathematics studies cultural variations within maths, and the different ways that people have come up with quantifying the world around them. In the maths anxiety clinic at Wesleyan, one teacher taught students about a number system, ‘used by the Inkas, which is based on five and involves many different ways of handling symbols’. Zaslavsky developed a course at Teachers College of Columbia University on African mathematics, using information from anthropologists and missionaries on the ways that people counted, and wrote children’s books on the topic too. Learning how other people do maths, and that there isn’t only one right way, can be a tool to achieve that flexible maths thinking that Boaler talked about earlier in this Guide – that is, recognising that there’s often more than one way to solve maths problems.

Maths isn’t a monolith, and it isn’t only what you do inside a classroom either. So try to notice and appreciate all the maths you do throughout daily life, Dowker suggests. For example, maths is present in measuring sugar for cooking or fabric for sewing. It is working out change, spacing out seeds while gardening, doing home carpentry projects, or playing Sudoku on your phone. Maths is all around us in nature, too. Maths explains how the ratio of the Moon’s size to the Sun makes an eclipse possible, the shape that snails’ shells grow in, or how the leaves of ferns contain fractals. Maths is in sports: in the angles of the serves that tennis players hit, in batting averages, or in the statistical likelihood of winning in hockey or horse racing.

By seeing maths in your environment, in all its diversity, it becomes less about achievement or the ‘right answer’, and more about the basic act of understanding quantity, or the way objects are shaped or move through space. As the Indian mathematician Shakuntala Devi once said: ‘Everything around you is mathematics. Everything around you is numbers.’