

# MATH-POSITIVE MINDSETS

GROWING A CHILD'S MIND  
WITHOUT LOSING YOURS



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# How to Use This Resource

## WHAT IS A MATH-POSITIVE MINDSET?

As the mom of a large family, I spend a lot of time pushing grocery carts. When I ran into a friend at the store recently, she asked how my semester teaching Elementary Math Methods was going. I beamed while telling her how much I love teaching teachers how to teach math. She listened politely but bristled, “I was never any good at math, and when my kids need help with their math homework, I just about pull my hair out.” She continued for several minutes detailing the horrors of sitting across the kitchen table from a struggling child and feeling like a struggling parent.

I offered a few words of encouragement, but the conversation left me wondering: Could other parents feel as frustrated and confused?

Curious, I asked my social media friends to share their experiences helping their children with math homework. I got dozens of responses—almost all negative—such as:

- Today I reviewed one of my son’s math tests and literally felt my right eye twitching and my heart racing. Anxiety does not begin to describe it!
- I freaking hate math!
- I am not exaggerating when I say that my brain shuts off where math homework is involved. Right now, my twin girls are only in kindergarten, so I can handle helping them, but I am horrified to think that I will have to assist in stuff I don’t understand. Guess I better save my money for a tutor.

Wow, I didn't realize that so many of my friends have what Dr. Carol Dweck would call a *fixed mindset* about math. A mindset, according to Dweck (2006), is a self-perception people hold about malleability and their brain's ability to grow and build intelligence. Putting the academic mumbo jumbo aside, a mindset is what you think about your thinking—if you believe you can improve your thinking and make it better. Simply put, a person may hold either a *growth* or a *fixed* mindset, believing they are “intelligent” or “unintelligent,” “good at math” or “bad at math.”

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But why does this matter? Aren't we all just born good or bad at math? Nope. Research from Dweck and others (e.g., Boaler 2013; Yeager and Dweck 2012) shows that what we believe about our mathematics potential profoundly affects what we learn. If we have a *math-positive mindset*, we believe that hard work and effort, not natural talent alone, are what lead to mathematics achievement. We believe that struggling in math is a good thing, because struggling means we are trying to understand, not just trying to get by. We believe that mistakes in math create real space for learning and growing the brain.

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Research has disproven the long-held myth that only a select few individuals are “good at math.” Everyone can do

mathematics. Still, too many people fool themselves into thinking that they must be born with a mathematical mind. That only nerds can do math. That making mistakes means you're not good at math. That struggling to understand math means it's a lost cause.

Enough already!

## WHO IS MATH-POSITIVE MINDSETS FOR?

Math is for everyone, and so is this resource! Too many adults (yes, even teachers) lack confidence in their own mathematical abilities. Math fear hinders their efforts to support and encourage children, even at the elementary-school level.

For those with children, I hope this book helps you evolve from a math-panicked parent to a *math-positive parent*. While it won't make you an instant math whiz, this book will set you on the path to a math-positive mindset. A math-positive parent keeps any lurking personal math anxiety in check. Math-positive parents speak positively about math. They help children work hard to understand math and support effort, not just grades. A math-positive parent creates an encouraging homework environment. Armed with persistence and patience, a math-positive parent provides help as appropriate. Math-positive parents may even feel safe saying that they learn *alongside* their children.

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Teachers, this book offers activities, lesson ideas, and resources that will support your math-positive classroom culture. Carefully selected math tasks can produce the “just-right challenge” that pushes students beyond their comfort zones into the space where productive struggle generates deep learning. Too often, teachers with a fixed mindset about math mollify children by patting them on the head and saying,

“Don’t worry, sweetie. I was never really good at math either.” Or, “You’re really more of a language arts person.” Don’t give children permission to dislike, fear, or avoid math. Rather, they will love, appreciate, and excel at math when they have the opportunity to feed off your math enthusiasm. The teaching tips sprinkled throughout this book help teachers replace fixed-mindset missives with math-positive prompts, pose challenging problems that push students to show persistence, and give practical advice on how to help students learn from their mistakes.

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### WHY THIS RESOURCE?

I’m a college professor. I’ve hit the library and have written this book based on research from the National Council of Teachers of Mathematics and the National Association for the Education of Young Children. I’ve reviewed professional journals in child development and cognitive theory. I’m fluent in the best practices in education. I’ve taught teachers how to teach math for more than two decades. I present at national conferences and give workshops to teachers.

But most of all, I’m a mom.

When people ask me what I do, I don’t even blink before spitting out one word, “laundry.” Of course, that isn’t all I do. But I wash, dry, fold, and put away at least thirteen loads a week. That’s a lot of hours doing laundry. And, like you, I spend almost as many hours helping with homework.

Mercifully, I also carve out a few precious hours to study how kids learn math and how teachers can more effectively teach math. The two hobbies may seem completely disparate. But I have a vested interest in kids learning math and learning

it well (hopefully while wearing clean underwear). I'm the mom of eight kids!

My fourteen-year-old son, Duncan, has a particularly non-traditional/unique/sometimes-befuddling approach to learning. Our hours across the kitchen table working together on homework can be precious, cherished moments, but also periodically make both of us pull our hair out. His struggles make me want to encourage all parents to hang in there. No matter how tense homework time can be, your child and you can build a math-positive mindset as you learn math together.

## HOW THIS RESOURCE IS ORGANIZED

This book's question-and-answer (Q and A) format contains practical, plain-language responses that give instant access to helpful tips and explanations. Look to the Contents for a list of all questions addressed in the seven chapters in this book. In addition to the Q and A format, each chapter offers:

### *"Pause"ative Boxes*

A play on the word *positive*, the information in "Pause"ative boxes builds on what is conveyed through the corresponding Q and A and tasks the reader with pausing and thinking more deeply about the topic. These sections can also be used to promote positive conversation in book study groups or professional learning communities for teachers and math coaches who work collaboratively to improve math instruction in schools.



#### "PAUSE"ATIVE BOX

##### Jo Boaler on Growth Mindset

**T**ake a moment to pause and watch Jo Boaler's TEDx-Stanford video, "How You Can Be Good at Math, and Other Surprising Facts about Learning." In this video, Boaler, a professor of mathematics education at Stanford, shares what brain research about the growth mindset teaches us about learning and success in math. Wait 'til you hear what she says about mistakes in math! The findings of her research may surprise you.

An excerpt from  
a "Pause"ative  
Box in this book.

### How to Access Online Resources

To access the downloadable Quick Reference Chart for each chapter, please visit [mathsolutions.com/myonlineresources](http://mathsolutions.com/myonlineresources) and register for an account (even if you have one with our bookstore). Use key code **MPM** to register this product and download the charts.

### Teaching Tips

Teaching tips, sprinkled throughout, offer information specific to the teacher, from ideas for questions to ask to activities that support math-positive mindsets.

#### Wall of Mistakes

**C**ultivate a growth mindset in your students' parents by including growth mindset activities at family math nights. Here's one idea: Have parents add to a Wall of Mistakes by writing their foibles on a sticky note and hanging it up to celebrate how errors help our brains grow.

#### TEACHING TIP



An excerpt from a Teaching Tip section of this book.

### Quick Reference Chart

Every chapter features a quick reference chart at the end; these charts summarize the key concerns in the chapter and are formatted so they can be printed or photocopied and displayed as an at-a-glance reminder as you contribute to building math-positive mindsets.



#### QUICK REFERENCE CHART

##### Common Concerns about Math Attitudes

This table is a quick reference for some of the *most common concerns* related to math attitudes. The table lists the concern, an explanation of the thinking behind it, and an idea that addresses the concern. It really is true that our attitude determines our effort, which in turn affects our outcomes. Work to improve your math-positive mindset by trying out the suggestions in the *What to Do* column.

Concern	Explanation	What to Do	Question Number(s) (to Learn More)
Math myths (you must be born good at math)	This is a lingering misconception. Brain research shows there is no such thing as a math gene.	Go online and find Carol Dweck's TEDx Talk entitled "The Power of Yet" and watch it with your children. Discuss how the brain of a person with a growth mindset responds to challenges and to mistakes.	1, 2

An excerpt from a Quick Reference Chart in this book.

### Step I: Develop Your Math-Positive Mindset

To begin your evolution from math panicked to math positive, you should first explore what a math-positive mindset is and how to cultivate it. **Chapter 1** gleefully cheers, “All for math and math for all.” Reading this chapter should convince you that math is for everyone and, with effort, every parent and teacher can develop the attitudes, tools, and practices that support children’s learning.

### Step II: Get to Know Your Math-Positive Team

The second step in building a math-positive mindset is to learn more about your math-positive team. For both the teacher and parent, this means getting to really know the math classroom—and getting to know each other! **Chapter 2** gives parents a glimpse into the secret world of teachers and their classrooms. OK, it’s not quite as dramatic as that. But it’s helpful for parents to understand why teachers do what they do. The chapter opens with suggestions on how to have successful parent-teacher conferences and how to word emails to teachers (and back to parents) without freaking them out. For parents, the chapter then moves into understanding why your child’s math classroom might look and feel different from the classrooms you remember as a child. Among other things, this chapter explains why teachers emphasize problem solving (because we want children to *think* not just follow procedures) and why we ask children to explain their answers (because we’re interested in their flexibility in math reasoning). For teachers, the chapter provides helpful tips for using sentence frames to guide students’ reasoning and communication in math and alternatives to timed tests for assessing fact fluency. The chapter concludes with a couple of Q and A’s on state standards.

### Step III: Apply Your Math-Positive Mindset

Now that you’re on your way to developing a math-positive mindset and you’re working closely with your math-positive

team (parents and teachers alike), it's time to support children's math learning by encouraging a positive math environment at home and taking a deeper dive into the math content being learned.

**Chapter 3** explores ways to encourage math learning at home. It takes a look at homework and how to create a positive space for such, including what supplies to have on hand at home. It looks at what questions to ask to support children as they grapple with math and how to remain calm and resist the urge to take over (or give up!). For times when additional help might be needed, this chapter offers suggestions for adding a math tutor to your math-positive team and finding assistance online. The latter part of the chapter provides a list of children's books for encouraging math through reading at home or in school, as well as ideas for connecting math to everything done outside of school, such as grocery shopping.

**Chapters 4 through 7** offer specific advice for the content areas in math—Number and Operations, Geometry, Measurement and Data, and Algebra. These chapters break down confusing concepts, tackle common misconceptions, and present ways parents and teachers can reinforce mathematical vocabulary while supporting conceptual learning over memorized procedures. They are filled with simple explanations for some of the tricky, modern incarnations of the math you learned in elementary school and plenty of math-positive, attitude-building activities.

## **HOW MATH-POSITIVE MINDSETS IS MEANT TO BE READ**

I don't expect that you will read this book from cover to cover. Instead, I imagine that you'll pick it up during a particularly trying afternoon of a math lesson or fractions homework. I imagine that you'll refer to it for simple teaching ideas for reviewing basic addition facts. I imagine that you'll flip through it to find an anecdote that brings a smile to your face when you're at your wits' end. Some sections are better suited

to parents and teachers of young children. Some are meant for older kids. Teachers can find tips throughout. Feel free to skip around. Look in the contents to find a question that matches your own. Or skim them all. I hope you'll find plenty of support in your efforts to help children.

“*Feel free to skip around. Look in the contents to find a question that matches your own. Or skim them all.*”

As you try the tips and activities, remember:

- Parents do not have to know advanced math to help their child. In fact, parents who are open to it may find themselves learning from and alongside their child. That's positive for everyone.
- The math-positive support of teachers can foster an optimistic math attitude in students—an outcome with long-lasting implications for learning mathematics to a high level.

I am not a perfect mom, a perfect teacher, or a perfect mathematician. If my mistakes in the classroom and at home were lost socks, they would fill a jumbo capacity washing machine on an endless, sudsy loop of regret. But challenges are how we learn, and how we respond to mistakes defines them as shameful or valuable. I hope this resource's math-positive mindset is as contagious as a spring break stomach bug to parents, teachers, caregivers, and eventually to kids. Because, what we adults do and say matters. Our children, whom we love and care for, will emulate our math-positive beliefs and actions. And those kiddos are worth our incalculable effort.