

Praise for *Readers Read. Writers Write. Mathers Math!*

For far too long math has been thought of, and taught as, a noun—the facts to be memorized and the procedures to follow. But math is also a verb—it is reasoning, experiencing, wondering. Whereas it is difficult to inspire curiosity and creativity in math as a noun, it is easy in math as a verb. In this book, Deborah Peart Crayton shows us how to make math a verb, how to engage in the “-ings” of math, and how to turn math into something we *do*. In other words, she shows us all how to become mathers.

Peter Liljedahl

Professor, Simon Fraser University
Author, *Building Thinking Classrooms*
Vancouver, BC, Canada

This book is everything! Deborah Peart Crayton names the harm of traditional math practices and offers thoughtful, practical alternatives—with warmth, humor, and heart. We are all mathers—and this book will help you believe it too!

Pamela Seda

Coauthor, *Choosing to See: A Framework
for Equity in the Math Classroom*
Atlanta, GA

With straight talk and just enough personality, Peart Crayton suggests ways teachers can bring their expertise in teaching everything else to teaching math. Let’s heed her call to help all students know they are mathers who can math!

Pam Harris

Founder, Math is FigureOutAble
Author, *Developing Mathematical Reasoning*
Kyle, TX

This book reminds us that math belongs to everyone. It offers practical ways to shift math instruction so all students feel seen, capable, and confident. Whether you’ve always loved math or are still figuring it out, this is a thoughtful guide to building math communities where students thrive and math becomes just as natural as reading and writing.

Graham Fletcher

Math Specialist
Atlanta, GA

Deborah Peart Crayton has crafted a book that is as transformative as it is practical. *Readers Read. Writers Write. Mathers Math!* is an essential read for elementary educators, instructional coaches, and school leaders committed to collectively shifting the current narrative that math is optional, beginning with our youngest learners. By integrating literacy-based approaches and real-world applications, Crayton provides a path forward for making math a joyful, natural, and necessary part of learning. This book is not just about improving math instruction—it's about reshaping mathematical identities for generations to come.

Dionne Aminata

Founder and CEO, Math Trust
Emeryville, CA

Many educators feel unsure about math, while others love it and want to share that joy. The Mather Movement speaks to both. Whether you're working to overcome your own math story or hoping to inspire others, Deborah Peart Crayton offers powerful tools for reshaping your relationship with math. With empathy and wisdom, she provides a path forward: one that builds confidence, breaks old cycles, and helps you grow as both a learner and a teacher.

Robert Kaplinsky

President, Grassroots Workshops
Long Beach, CA

Finally, someone's calling it like it is: Math is just as essential, useful, and FUN as reading! If you're ready for a revolutionary approach to teaching that shatters the myth of the "math person" and helps reduce math anxiety, you've found it!

Vanessa "The Math Guru" Vakharia

Author, *Math Therapy: 5 Steps to Help Your Students Overcome Math Trauma and Build a Better Relationship With Math*
Toronto, Ontario, Canada

As a professional learning provider, this book is written in ways that I think could enhance the teaching practices for elementary and middle school math teachers. As a mother to young mathers, I have learned accessible ways to continue to include math in our every day outside of formal games and counting. I can't wait to try body-gons at home with my mathers.

Ayanna Perry

Director, Outreach and Dissemination, Knowles Teacher Initiative
Bowie, MD

A must-have for all educators who want their students to see themselves as mathers! Deborah Peart Crayton provides us with a lovely tool that leverages her voice and experience to help us become better Mathers ourselves while helping our students come to see themselves as Mathers.

Zak Champagne

Chief Content Officer, Flynn Education
Olympia, WA

This book invites educators to teach mathematics with care, creativity, and purpose. Through inspiring interviews with women in math and empowering “mathfirmations,” Peart Crayton reminds us that joy, brilliance, and belonging are at the heart of learning. This book nurtures teacher agency and equity-driven practice, and after reading, you’ll proudly proclaim, “I’m a mather!”

Desiree Y. Harrison

Elementary Instructional Coach
Farmington, MI

Deborah challenges us to connect our strengths in literacy instruction and consider how to apply that to math instruction. Grounded in real classroom practice, she demonstrates how storytelling, discussion, and language-rich routines can foster positive math identities and help every child see themselves as a mather. It is a call to action to change our culture’s negative attitude to mathematics. A powerful resource for everyone who strives to make math meaningful and empowering.

Marria Carrington

Director of Math Leadership Programs, Mount Holyoke College
South Hadley, MA

This book is a much-needed invitation to reimagine what it means to teach and learn math. Deborah writes from the heart and shares her insights and practical strategies to build math communities where all learners can thrive. If you are committed to nurturing joyful, inclusive, and empowering math experiences for all students, this book has everything you need.

Mike Flynn

CEO, Flynn Educational Consulting INC
Northampton, MA

READERS *Read.*
WRITERS *Write.*
MATHERS *Math!*

*I dedicate this book to my children, Naomi, Nehemiah, and Naja,
who shared me with all the students I have ever taught and to
the Village who helped me raise them. I also dedicate this labor of
love to my hubby, my friend, my Chief Support Officer, Derrick,
who has supported me every step of the way.*

READERS *Read.*
WRITERS *Write.*
MATHERS *Math!*

**Bridging the Gap Between
Literacy and Mathematics**

DEBORAH PEART CRAYTON

Foreword by Jennifer M. Bay-Williams

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FOREWORD



Gates and Gatekeeping

By Jennifer M. Bay-Williams

Whether you already are a big fan of the Mather Movement or you are just reading this phrase for the first time, this book will inspire you to be better at inviting everyone into mathematics. *Readers Read. Writers Write. Mathers Math!* is a powerful call for a cultural shift in mathematics in terms of how it is *perceived* and *received*. Through poetic writing, contrasts to reading and writing, and relatable examples, Peart Crayton illuminates what has led to mathematics being a gatekeeper and how we (the readers) can open that gate. In this foreword, I will briefly highlight ideas from the book related to these two constructs (and why they matter).

Gatekeeping comes in the form of (mis)perceptions about mathematics. Perceptions about mathematics, as Peart Crayton beautifully describes, are quite different than those around reading and writing. For example, a common perception is that reading and writing are necessary for everyone, regardless of career interests, while mathematics is considered a necessity for only *some* people in only *some* careers. Peart Crayton attends to numerous (mis)perceptions throughout the book, including that math is “not creative” and “some people are born with a math gene.” Collectively, these (mis)perceptions have led to a culture wherein it is okay to say, “*I am not good at math.*” Students who do not think they are good at math may not persevere on complex tasks, or pursue advanced math courses or math-related careers. These (mis)perceptions are gates that deny access to mathematical proficiency. It is through shifts in how we think about, talk about, and engage in doing mathematics that we can open these gates. For example, offering “mathfirmations” to students can change the way they feel about mathematics. As Peart Crayton writes, “Let’s invite them with our words and our actions to be *mathers.*”

How mathematics is *received* has resulted in the perceptions highlighted on the previous page (and many others discussed in this book). Teachers are gatekeepers, and thus, it is our job to figure out how to open the gates for all of our students. Mathematics is often received (taught) by watching the teacher do the math and then remembering what was shown. Mathematics is received in isolation from other topics. Mathematical tasks, even when they have a context, are not connected to students' interests or experiences. These teaching actions lead students to say, "*I don't like math,*" and thus keep the gates closed for too many students. When mathematics learning is meaningful, connected, and engaging, students develop confidence and competence in mathematics—they feel like a mather! This book is packed with content tips and rich tasks that offer such gate-opening ideas. For example, using oral storytelling instead of classic word problems, connecting to other disciplines, and doing math outside of the math block.

The messages in this book attend to all mathematics topics, from counting to geometric shapes. And, a strong connection for me relates to developing fluency. Certainly our cultural obsession with learning algorithms has contributed to the perceptions people have about mathematics, but that does not have to be the case. Creativity and decision-making are at the core of mathematical fluency. For example, as children think about how they might solve $32-19$, they might make sense of the problem by drawing a picture, building something with manipulatives, or putting it in a context (create a story). Students might consider how they want to think about the problem, for example, by asking, do I want to count back (take away) or find the difference (compare) to solve the problem? Once this decision is made, the next decision is about how to jump back or up. As students engage in this reasoning, they develop competence and confidence in various ways to subtract. And, developing fluency can be fun. Peart Crayton notes that "There is a pervasive belief that mathematics by definition is not supposed to be fun that starts in elementary school and continues well into the upper grades and adulthood." This resonates with me, as so much of fluency instruction is rote practice. Yet, games provide substantial and enjoyable practice wherein students are able to think aloud to share their reasoning and to listen to and learn from their peers. Such play is joyful and builds their competence. Thus they engage as a mather and this supports their journey to procedural fluency. As Peart Crayton suggests, "Find time . . . to focus on math through games and other fun activities."

Peart Crayton brings her life experiences and her joy of life, reading, writing, mathing, and learning to this book. This includes many stories

and ideas from her 30+ years of teaching and leading. She is *the* Queen Mather and is on a mission to ensure that everyone recognizes that they are also mathers. Her background in literacy, early childhood, and communication are apparent in the beautiful way she brings out the human experience in the learning of mathematics.

Readers Read. Writers Write. Mathers Math! is an inspirational book, but it offers us more than inspiration. It is a call for much-needed change that helps us reflect on what math learning has looked like (and the consequences of this) and what it can look like (and the benefits of this). Peart Crayton notes, “There is nothing like witnessing Pure Math Joy!” True. And, this book provides you with a wealth of resources to ensure that you get to witness this joy in your own mathing and with your own students.

PREFACE

Little Debbie:



Mathers 4 Life

*People often ask me, if I am a mathematician.
My immediate response is, "Well that's just simply fiction."
Mathematician is a very fancy label
But I myself was never invited to that table
Even though math came easy to me
Each year teachers chipped away at my curiosity
Don't ask questions, just follow the steps with ease
Make the grades without understanding, simply perform and
appease*



Video of
Deborah
performing
a version of
this preface.

[https://qrs.ly/
kjgnms8](https://qrs.ly/kjgnms8)



*Math is only for those with the imaginary math gene and
gender is a factor*

*Let's be honest, sometimes to be the star in math class, you
just need to be the best actor*

And then we wonder why people say with pride

*Who me? I am NOT a math person, all of my math dreams
have shriveled up and died*

Mathematicians study math to solve the problems of the world

But anyone can choose the path and anyone can put in the work

Yes anyone, yes even a girl

*However, there must be a distinction between math for a
career and math for life*

*Because math is all around us and shouldn't cause us any
strife*

*I mean, scientists, dancers, construction workers, all
mathing, am I right?*

A reader reads and a writer writes, there is no opting out

*We read and we write for grades, but that's not what it's all
about*

Readers and writers get to use their imaginations

*And being literate in America, determines our life
stations*

*The truth is math is not just a subject but an experience to
be had*

*And maybe if there were more joy in math class, then math
class wouldn't be so bad*

*And if we helped students connect the math to their lives,
then they wouldn't be so darn sad*

*Because we are all born with math intuition and
mathematical ideas; and that's a fact*

*Just ask any toddler to choose between 2 or 5 of their
favorite snack*

*Our brains are wired to recognize patterns and solve
problems in all different ways*

Paint the picture, help others see Math's softer side and creativity?

Math for all, math for life, math for justice and liberty!

Because we say math is liberation, but liberation requires us to resist

We must stand against inequitable policies and practices

Instead of just telling kids they must persist

Of course, productive struggle leads to learning that will last

Key word, productive NOT just struggle

Can we leave the bootstraps in the past?

I implore you one and all to join the Mather Movement with me

Stand up, stand out, and be the mathers our students need us to be.

So, what's it gonna be? What will you choose to do?

I know I'm a mather! Wouldn't you like to be a mather too?!

P.I My Mathematical Mind Team

From left to right, Adrienne Baytops Paul, Tisha Jones, and Deborah Peart Crayton, the Queen Mather



Source: Deborah Peart Crayton

Language in This Book

Writing a book with practical strategies for educators made me think about the many conversations I've had with colleagues in the break room or hallways and in the cozy corners tucked away in conference centers between sessions. However, I am also a current doctoral candidate learning the nuances of academic writing. That said, I worked to strike a balance between conversational and informational tones in this book. At some points in the book, you will notice citations, research, and more formal writing, but in many places, you could likely imagine us having a friendly conversation about teaching and learning over coffee. I embrace both as a part of my academic and professional identity and hope that the message is not lost in translation.

I consider myself a word nerd and a lover of language, so my goal as a writer is to convey meaning, tell stories, and paint beautiful pictures with words to evoke emotional responses and provide vivid imagery for the reader. I also recognize that words have power and can be interpreted differently by each individual. My word choices were guided by my journey, my background and experiences, and the settings in which I have taught in the past 30+ years. I acknowledge that my choice of words might be interpreted in ways I may not have intended, and take ownership of the impossibility of perfection.

ACKNOWLEDGMENTS



There are many characters in the life and story of Deborah Peart Crayton, so it would be impossible to thank everyone by name who has ever planted a seed, shared an encouraging word, listened to me go on and on about my passions, or leaned in as I read chapters aloud. This book is a culmination of all of the experiences I have had inside and outside of the classroom, so to any teacher, parent, student, or friend who sees yourself in this story, I say thank you for the inspiration. This book would not have been possible without my students and their families who trusted me to try new approaches, celebrated our wins, and moved past our losses, so a huge thank you to all of them.

Family means the world to me, so I must acknowledge my parents Derrick and Valerie Peart for the sacrifices they've made so I could spread my wings and fly. I am grateful for the lessons my siblings taught me about perseverance and the stories we've written together. Thanks to my Crayton family who welcomed me with open arms and encouraged me to focus on the prize. I thank my children who have always been my greatest cheerleaders and my favorite students. And, of course, I acknowledge my wonderful husband, Derrick, and our fur babies, Dolly, Daisy, and Jax, for understanding when I had to write for hours. I am indebted to them for their love and patience.

I acknowledge My Sister Circle for the love and support they have shared over the years and extend gratitude to my fellow members of the Mather Movement who have cheered me on, spoken my name in rooms where I was not present, and shared opportunities with me. Special thanks to Niky and Layla's Curve for our Mather Merch that has made the **#MatherMovement** visible.

Thanks to Debbie Hardin, my amazing editor, who took a chance on a girl from the Bronx with a story to tell, and to Nyle who is always working behind the scenes to move things along. I am honored and humbled by your unwavering faith in me to get the job done.

This book is inspired by you all and the greatest gift I have ever given.

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ABOUT THE AUTHOR



Deborah Peart Crayton is the founder and Queen Mather of My Mathematical Mind. She started the **#MatherMovement** to disrupt the idea that math is optional. Deborah is a sought-after keynote speaker and dynamic elementary education consultant. With over 30 years in the field of education, Deborah speaks on a variety of topics related to math identity, elementary math content and instructional practices, and liter-

acy connections to mathematics. She has shared her message at the local, regional, and national levels at state, district, and community events, and educational conferences.

Deborah is an expert at creating inviting and nurturing environments to cultivate positive mathematical identities, and has served in that capacity as a mentor and coach for elementary educators for over 20 years. She has had success with adapting instruction while maintaining grade-level expectations and possesses a deep knowledge of instructional practices and frameworks to engage all learners, including Cognitively Guided Instruction, Math Recovery, the Orton-Gillingham Approach, and Mathematical Language Routines.

Deborah holds a bachelor's degree in speech communications and early childhood education, a master's degree in educational studies with a concentration in literacy, graduate endorsements in elementary mathematics and teacher development, and is pursuing a doctorate degree in education program development and innovation. Her research interests are focused on the connections between math anxiety and math teaching efficacy and effective practices for developing



My
Mathematical
Mind

<https://qrs.ly/h7gnms9>



high-quality professional learning. Deborah has dedicated her career and doctoral studies to supporting educators with innovative teaching strategies that allow students to see themselves as assets to the learning community and curious problem solvers. Deborah believes that all children deserve high-quality instruction and the opportunity to become competent readers, writers, and *mathers*.

FEATURED MATHERS

Musicians Are Mathers: Ashley Cuthbertson



Source: Ceylon Mitchell

Ashley Cuthbertson, EdM, NBCT (she/her) is a nationally recognized arts consultant, speaker, and author of *Music As a Vehicle: A Practical Guide to Implementing Culturally Responsive Teaching in Today's Music Classrooms*. Her work explores how the arts are a vehicle for building the skills needed for success in school, career, and life.

Previously, Ashley was a dedicated music educator, teacher leader, and adjunct professor with extensive experience in diverse school settings. Today, she partners with schools and districts, supporting them in reimagining their arts programs through a culturally relevant lens that builds critical skills for success both inside and outside the classroom. She also works with organizations to help them integrate arts-based strategies to strengthen team culture and leadership.



Learn more
about Ashley
Cuthbertson

www.AshleyCuthbertson.com

Bakers Are Mathers: Sara Fludd



Source: Boyzell Hosey

Sara Fludd is the founder and Queen Waffler of Pop Goes the Waffle. She is known across Florida for her sweet and savory treats. She is a waffler, a baker, and a mather.



Entrepreneurs Are Mathers: Brittany Rhodes



Learn more
about
Brittany
Rhodes

[https://math
equalsme
.com/](https://math
equalsme
.com/)



Brittany Rhodes is the founder and General MATHager of Black Girl MATHgic and Math = Me, where she curates supplemental K-8 math confidence kits, workshops, and professional development to reduce math anxiety and strengthen math confidence in students and educators. With a bachelor

of science degree in mathematics from Spelman College and an MBA from Carnegie Mellon University, Brittany's work has been featured in *Black Enterprise*, *Good Morning America*, and *Forbes*. A proud Detroit native, she is dedicated to closing the math confidence gap and empowering the next generation of math enthusiasts.

Triple Threats Are Mathers: Rose Jackson Moye



Rose Jackson Moye is a gifted actress/dancer/singer, who has graced stages from London to Los Angeles. Along with several stints in regional theater and on Broadway, Rose has had several roles in both television and film. Rose has also been an energetic and engaging dance instructor for over 26 years. Rose has never met an audience she did not love. However, Rose's favorite audience consists of her husband, retired TV Producer Michael G. Moye, and her favorite psychologist, daughter Memphis.

Source: Bob Capazzo

Coaches and Trainers Are Mathers: Angelina Perrone



Angelina is native New Yorker who ventured to the Carolinas to play both field hockey and lacrosse at Belmont Abbey College. She graduated with a business degree and double minored in sports management and criminal justice. Later, Angelina attended Wingate University where she was the graduate assistant for the women's lacrosse team while pursuing a master of business administration degree. She now serves as a collegiate lacrosse coach at Catawba College and a trainer at

Burn Boot Camp Belmont. During her free time, she loves to travel, work out with friends, read books, and enjoy her favorite artists live in concert.

Artists Are Mathers: Naja Brooks



Naja Brooks is a freelance illustrator with a wide range of work and an impressive multimedia portfolio. She completed her undergraduate studies at Savannah College of Art and Design and is currently pursuing graduate studies in digital media at Kennesaw State University. Even though math is not something immediately thought of when it comes to the creative arts, it is something Naja has always enjoyed. Naja is the creator of the Mather Kids and the illustrator for this book.



Learn
more about
Naja Brooks

[https://
WorkByNaja.
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INTRODUCTION

Is Math Optional?

When was the last time you went out with friends and someone asked you to read the menu because they said they weren't reading people? I'll bet your response is never. If I ask a similar question with mathematics at the center, I feel confident the answer would be quite different. Intellectuals toss their credit cards into the center of the table expecting that the one "math person" in the group will do all the calculations and let everyone know what they owe. Why is it acceptable for someone to publicly admit that they are not a "math person" when it is time to split the check or calculate the tip for a large group but this same person would never publicly proclaim that they needed someone else to read the menu to them? It might have something to do with the pervasive idea that some people are born with math brains while others are not.

This is unequivocally false.

We are all wired to do mathematics, so why do so many people reject mathematics as a part of their identity? Why do so many citizens view mathematics as something they don't need to function in society? More importantly, what can we do to solve this math problem? First, we need to acknowledge that math is NOT the problem.

Many people can remember the moment they fell in love with mathematics, but even more individuals have a story ready to share about why they fell out of love with mathematics. My earliest memories of engaging with mathematics happened long before the first day of

my formal education. I was curious about how things work and often designed patterns using blocks, drawings, or food items. Solving problems and asking questions was a daily occurrence for me. School was the place where I thought I might find the answers to my questions, but by fourth grade I realized that asking too many questions was sometimes perceived (even by a teacher!) as being sassy, rude, or disrespectful. In my quest to be a model student, I yielded to the pressure and assimilated, stopped asking questions, and instead learned math passively, following steps and prescribed procedures to achieve success. Unfortunately, many have similar stories of their earliest classroom math experiences that shaped their math identities as adults.

The Legacy of Gatekeeping

Historically, public education focused on literacy skills for all and mathematics for some. It was believed that common folks, the laboring class, had no need for advanced mathematics or deep conceptual knowledge, so math instruction was limited to basic computation skills. This is why the core academic skills known as the Three Rs—reading, writing, and ‘rithmetic—became the focus in the common schools. Math was taught using the rule method: A rule for a problem was introduced, the rule was memorized, and then came drill and practice. Only privileged boys aged 12 and older were given access to high-level mathematics in preparation for the path to college. Some believed that girls and women were too “delicate” to study mathematics since it was such a challenging subject. This legacy of discriminatory practices in mathematics lives on, and the gatekeepers stay poised to redirect anyone who doesn’t fit the stereotype yet is bold enough to believe they can achieve success in the field of mathematics or other STEM careers to exit stage left.

Unfortunately, the expectations for success with mathematics continue to be high for a select group and virtually nonexistent for others. In schools, there is still an emphasis on literacy, and teachers are supported more heavily through professional development to improve literacy instruction. In society there is a goal for everyone to be literate, and adult literacy programs are offered to improve literacy skills. Over time, the criteria for being literate has changed, but in general being literate in the United States is having the ability to use written or printed information to function in society, develop knowledge, and achieve one’s goals. Most jobs often require a high literacy level, and the topic of adult literacy is researched extensively. This

level of support for improving math skills and expanding math content knowledge just isn't there.

A 2019 report by the National Center for Education Statistics determined that mid to high literacy in the United States was 79 percent with 21 percent of US adults categorized as having “low level English literacy.” But I wonder what our numbers would look like if to be considered literate in the United States, you also had to be numerate, a problem solver, and good at mathematical reasoning. What if we redefined what it means to be literate as the ability to read, write, speak, and listen in a way that lets us communicate effectively **and** to use mathematics to make sense of the world?

Who Is This Book For?

This book is written for the teacher who is nervous about teaching mathematics. If you identify as someone who is math anxious but would like to explore options for elevating your math teaching, you will find strategies to support you on your math journey as you develop your math identity and become the mather your students need you to be. It is also for the teacher who is confident teaching mathematics. If you recognize that you have always loved math so you wonder why others can't see its beauty, it is important to consider the experiences that supported your math identity development to create similar positive math experiences for students. In this book, you'll find strategies you can use to create a sense of belonging and engagement to help your students thrive.

This book is also written for coaches and instructional leaders who have a math vision they hope their teachers will be prepared to strive toward. If you want to nurture positive math identities in students, it begins with your faculty and staff. You will find strategies for developing a math culture in which adults model a growth mindset (Dweck, 2016) and share beliefs that cultivate math joy with their students and the community beyond the classroom. Honestly, this book is for any educator who is invested in giving all students access to high-quality math instruction and a lifelong love of math learning.

How Can This Book Help?

This text provides strategies for reclaiming mathematics, as adults, to address the societal issue of separating literacy skills, which are needed for life, from math learning, which is presented as needed for

STEM careers. By redefining the core academic skills and rebranding mathematics as necessary for everyone—even those who do not go on to STEM careers—reading, writing, and mathing become standard. Mathematics is a necessary part of our lived experiences and can be enjoyed if we understand its multifaceted nature.

How Is This Book Organized?

This book is divided into three parts. Part 1, *Readers Read. Writers Write. Mathers Math!*, shares evidence from neuroscience that dispels the myth of the “math brain” and explores practical ways in which we can capitalize on the natural math intuition that we are all born with. In this section, a brief history of the origins of elitism in mathematics is highlighted to expose the legacy of discriminatory practices in math spaces. By proposing alternative instructional practices and sharing practical tips, we establish the groundwork for changing the narrative about what it means to be good at math. We examine the habits of good learners and celebrate the power of storytelling across disciplines as ways to support students and adults with overcoming the angst that exists when facing word problems. The section ends by leveraging structures and practices used for literacy instruction, to empower teachers to lean into their strengths and bring joyful experiences into their math instruction. By mathematizing literature, students can learn more about using mathematics to make sense of the world and connect math to their lives. One day at a time, we can strive to change our language and redefine the core academic skills to embrace reading, writing, and mathing as necessary skills for success in school and life.

Part 2, *Mathers Gonna Math!: Taking Math Outside of the Math Block*, focuses on building bridges between content areas and highlights ways for students to connect mathematics to everyday tasks and experiences. We demonstrate the ways in which math supports science exploration and how essential mathematics is to developing compassion toward one another and affecting change. This part of the book zooms in on ways in which mathematics is present in places and ways that are often overlooked, like reading a map, solving logic problems, or noticing patterns. It is important to help students celebrate the ways they are already mathing every day to disrupt the narrative that math is optional. Don’t skip the fun stuff when time is short! We discuss the need for students to see mathematics as more than just a class subject. In this part of the book, mathematics comes to life, as we focus on math in action and how mathematics can be used as a tool for solving not only **word** problems but **world** problems.

Part 3, *Building a Community of Readers, Writers, and Mathers*, shifts focus to the work of creating safe math learning spaces for students. We explore strategies that move math mindset work from the bulletin boards to our classroom culture. As educators create the conditions for positive math experiences, students feel empowered to lead their learning and lean on classmates as they develop collective agency. Children are born with math intuition and have dreams that could be supported if we help them develop their sense-making superpowers. To create thriving math communities, there are necessary shifts that adults need to make to ensure they are representing mathematics in a holistic way, equipped with strategies for alleviating math anxiety in themselves and their students. As we examine our own math stories, rewriting negative narratives we have replayed for years, we explore alternatives for math instruction that have the power to nurture positive math identities in our students.

Part 3 also focuses on teacher experiences and collaboration. To create joyful math experiences for students, teachers must know what it feels like to experience math joy. I introduce the Comfort B4 Confidence Framework as a tool for guiding educators as they hone their craft. As we develop our comfort with mathematics, confidence will follow. This section highlights the benefits of exploring new approaches for teaching mathematics and offers powerful solutions for building a community of mathers. As teachers find safe spaces where they can be vulnerable, adult learning can happen. Adults who engage in math play begin to see math in a new light and can anticipate student strategies together, as they do the math of the lessons they teach. Through professional learning and purposeful planning, educators sit in the seat of learner, teacher, and analyst and sharpen their lenses as they get curious about student thinking. We must see ourselves as mathers, understand the math we teach conceptually, and model a growth mindset for our students. Learning mathematics won't always be easy, but our students need to know that on the other side of productive struggle is victory. We have a responsibility to lead the way!

How Can You Use This Book?

This book can be used to spark conversations about what it means to be good at math. It can be read in order, one chapter at a time, or it can be used as a quick reference to find tips, activities, historical tidbits, and connections between mathematics and the world. Readers can use this book to lead a book study or guide professional learning to

support math identity development and enhance mathematics instruction by leveraging the strengths teachers bring from teaching literacy. This book is a tool for disrupting the current narrative that math is not for everyone and establishing the counter narrative that reading, writing, **and mathing** are necessary to function in society. Starting with educators, this book guides adults through a process for reclaiming mathematics as a part of their identities and building up the confidence to explore mathematics in new ways, so they feel empowered to create thriving math communities for their students.

Through the *Where's the Math in That?* feature at the end of each chapter, we connect math to art, music, dance, and more. Educators are equipped with practical conversation starters and real-life examples for expanding their students' view of what it means to be a mather for life. Through interviews and personal stories about the role math has played in shaping lives, educators hear different perspectives of why math is necessary across disciplines. For the students who don't believe they need math because they plan to be a rock star, professional athlete, or entrepreneur, these testimonials equip teachers with some of the reasons why, no matter the career path we choose, math is a necessary part of the journey. This feature provides the simple answer to the question, "Where's the math in that?" Right here!



You can read this book to learn practical strategies for cultivating curiosity and joy in math classrooms and for creating the conditions for shifting mindsets and beliefs around who is born to do mathematics. Math isn't optional! Together we can rebrand mathematics and build a community of competent readers, writers, and **mathers**.

PART 1

READERS READ. WRITERS WRITE. MATHERS MATH!



WE ARE ALL READERS, WRITERS, AND MATHERS!



Source: [istock.com/JohnnyGreig](https://www.istock.com/JohnnyGreig)

Have you ever seen a friend cringe at the mention of filing taxes, as they proclaim, “I am not a math person”? Have you ever seen parents avoid reviewing their child’s math homework, sighing, “I am not a math person”?

But we don’t hear adults say, “I am not a reading person.” In fact, adults who have reading challenges typically go to great lengths to hide the fact that they struggle with reading. Whether they fear shame and

ridicule or believe that reading is critically important to their success, no one boasts that they cannot read or write. To be literate—that is, able to read and write—is perceived as being educated. The definition of *literate* clearly articulates that an adult needs to be able to use printed or written information to function in society. But what does it say about society’s perception of math if many of us are willing to admit—sometimes proudly—that we aren’t good at math?

Reading and Writing for All! Math for the Few?

Where does this acceptance of the idea that math is optional come from?

In classrooms, we call students readers and writers, which clearly involves the students in ownership of the doing of the reading and writing. But when it comes to math, it is almost as if math is done *to* students. Classrooms typically don’t emphasize the ownership of being a math person by labeling those who do math as “mathers.”

There has been much written about who belongs in math (Gonzalez, 2023), math identity (Aguirre et al., 2013), how to overcome math trauma (Vakharia, 2024), how to feel less anxious in general about doing math (Boaler, 2022), and how to help students see the importance of struggle in math (SanGiovanni et al., 2020). What would it take to shift mindsets and beliefs about what it means to be literate to include math—so that once and for all we can dispel the myth that math is optional?

Let me say this up front: Math is *not* optional!

It’s time to normalize mathematizing our world. Throughout each day, educators should pause and ask students to use math to solve real problems. “PE starts at 10:15. It is 9:50 now, so how many minutes do we have to finish this activity, clean up, and head to the gym?” Handing out supplies or materials is a great time to consider whether we have enough for everyone to have their own or if we will need to share with a partner or small group. By helping students recognize when math shows up throughout the day, they begin to see that math happens outside of the math block. More importantly, students experience math in practical ways that reinforce the role math plays in helping us to make sense of the world.

TIP

At the start of the day, pose a thought-provoking question that requires math thinking. This can be posted on a board or asked as students trickle into the classroom. For example, “If everyone is present today, I wonder how many (buttons, pockets, etc.) there will be in the classroom. Let’s make predictions and see how close we are after taking attendance.”



Source: [istock.com/lisegagne](https://www.istock.com/lisegagne)

APPROACHING THE TEACHING OF MATH LIKE THE TEACHING OF READING AND WRITING

When it is time for reading, students are welcomed to the reading area with smiles, as they anticipate the beautiful pictures and funny voices that will tell the story. They dream of the day they will be fluent readers. When students learn to read and earn the title of Reader, they beam with pride. When learning to read is challenging, students persist because they know they need reading to be successful in life and to pursue their dreams. Before they can read a chapter book inde-

pendently, they begin to embrace “Reader” as a part of their identity. And if they feel defeated and want to quit reading, we as educators (as well as family and society in general) will not allow them to opt out of improving their reading skills. We exhaust all our resources to get students the support they need to sound out words, comprehend passages, and hopefully develop a love of reading. Ultimately, we push and encourage students to have a healthy relationship with reading and develop the skills needed to become competent readers.

The same is true for writing. Even when young children are just scribbling, we encourage them to write their stories and read them to us. They learn that writing

When learning to read is challenging, students persist because they know they need reading to be successful in life and to pursue their dreams.

is necessary for communication. We can spin tales from our wildest dreams and use our imaginations to create worlds for others to enjoy. When learning the mechanics of writing, when challenged by spelling, or when our sentences run on and on, students are encouraged to “just write.” Get your ideas out and organize them in ways that make sense to others later. Making mistakes is an important part of the writing process. Writing a rough draft is expected and revising your thinking is necessary. Whether you are a talented writer or not, “Writer” becomes a part of our academic identity.

Teachers and parents call students little writers before their stories make sense, and children relish the idea that their words have meaning and power. When writing is difficult and the essays are covered in red ink, the suggestions push us to make improvements. There is not an option to give up on writing forever or to choose a college major that will release us from our obligation to write. A student may not have a future as a journalist, but they will learn at least the basic skills needed to become a competent writer.

And then there’s math . . .

Many parents and teachers begrudgingly explain the steps needed to solve problems and sigh to ourselves about not being “good at math.” Adults unknowingly project negative mindsets and beliefs about mathematics and validate thoughts of perceived inadequacies swirling in children’s minds. Parents reassure students by letting them know they were the unlucky recipients of their “non-math gene.” Teachers let students know it is okay to not be good at math because they have so many other talents. The problem is that this reinforces the idea that some students can’t learn math—which further reinforces that idea that math is optional. (Let’s say it again: Math is not optional!)



READ. WRITE. MATH. CONNECT.

We require students to submit rough drafts of their writing and revise based on feedback. Dr. Amanda Jansen makes the case for rough drafts in mathematics to support sense-making or “revising to learn” (Jansen, 2020). Creating a culture in math class where sharing your unfinished ideas is welcomed, is critical to learning and develops collective agency.

HOW DID WE GET HERE?

Historically, the working class was expected to learn only basic computation skills, while thinking deeply about mathematical ideas was considered unnecessary for most students, especially those designated to the laboring class. Education in colonial America was focused on reading and writing, but by the late 19th century business and civic elites shifted the attention to leveraging education to grow the nation's economy. Mathematics became an accelerator for those with "mental superiority," the wealthy, as "proven" by IQ testing, which was used to sort students based on perceived intellectual capacity. Common schools were compared to factories, and the goal was to create punctual, obedient, dependable worker bees, not deep thinkers. Star pupils accepted their positions in the classroom and society, sliding into their "appropriate" jobs designated for those who were not college-bound.

Mathematics has a legacy of exclusion because of its use to determine one's station in life.

Let's be clear: This system was built for the privileged classes, which 100 years ago largely did not include women and girls or people of color. Mathematics has a legacy of exclusion because of its use to determine one's station in life. These discriminatory practices shaped the math landscape and planted the seeds that continue to

shape the math identities of many students, especially those from historically marginalized groups.

It is no surprise that the legacy lives on, and students often accept that they are not capable and, in some cases, not worthy of a relationship with mathematics. According to educational psychologists Dale H. Schunk and Barry J. Zimmerman (2008) academic identity comprises self-concept, one's belief about whether they are capable, and self-esteem, whether one believes they are worthy. We have a responsibility to our students to help them develop healthy relationships with mathematics and a positive math identity. Math identity is defined by Aguirre and colleagues (2013) as "the dispositions and deeply held beliefs that students develop about their ability to participate and perform effectively in mathematical contexts and to use mathematics in powerful ways across the contexts of their lives." Our students deserve experiences that will help shape positive math identities because, increasingly, math literacy is required for daily living and for the careers of the future.

Students often dissociate from mathematics because they don't recognize the role math plays in everyday tasks. To counteract this misconception, make time for students to share math happenings regularly. For example, start the day with a simple prompt like, "How did you use math outside of

school yesterday?” Initially, you will likely need to provide guidance or give examples from your own life to help them see how math supports us in simple and powerful ways. It is one step toward helping students see that math is for everyone and math is NOT optional.

Introducing Math-ers



Source: [istock.com/Eleonora_os](https://www.istock.com/Eleonora_os)

The irony is that reading and writing are not intuitive and must be taught, but we are all born with math intuition, the capacity to learn languages, and mathematical ideas. Our brains are wired to recognize patterns and solve problems in different ways. For example, infants as young as 16 weeks (about 3-and-a-half months) old notice the difference in small quantities. Prentice Starkey conducted research with 72 babies at the University of Pennsylvania that supported the claim that babies notice the difference between two versus three black dots on a slide (Starkey & Cooper, 1980). Since this study, similar experiments have been conducted by various research teams, all resulting in the same findings. Each time, babies were able to notice differences in quantities and inconsistencies with objects being switched (Sousa, 2015, p. 11). Number sense is innate, but we typically don't capitalize on this numerosity.

In my time spent working in daycare centers and preschools, I observed little ones bopping to musical beats and mimicking rhythms before they could walk, talk, or learn to count. I've witnessed toddlers sorting shapes and fitting round pegs into round holes based on trial and error. Preschoolers shared snacks and demanded their fair share when their pile of fish crackers was smaller than another's.

One thing we can do to reinforce numerosity and encourage children in math literacy is to attend to the vocabulary with which we describe kids as they engage in math tasks. As children make connections, identify patterns, solve puzzles, or use logical reasoning, what language could we use to support students in recognizing how they are engaging in math tasks outside of math class? What can we call students using mathematics to make sense of the world? Mathers! We are born mathing.

We are born mathing.

Imagine if, on arriving at school, we as educators viewed a child's innate ability and math curiosity as the foundation on which new concepts and deep mathematical understanding could be built. As young students arrive on the first day of school, their mathematical ideas and creative math terminology are celebrated. When they share fantastical stories about imaginary creatures, we capitalize on opportunities to mathematize their stories with them. We present new concepts as problems to solve and discoveries to be made by them, the math explorers who have everything they need to be mathers. We use positive language, share our authentic enthusiasm for even the strategies that are only partially correct and affirm the parts that are mathematically sound before we point out the errors students have made. Students recognize that math is not the enemy, even when they are challenged by it. Students experience math joy and smile often when collaborating with friends to find creative solutions to common problems.



Mathnote

The Math in Music



Jenna Laib's
Fraction
Intervention

[https://qrs.ly/
dugnmu0](https://qrs.ly/dugnmu0)

Did you know that a love of music can be used to connect to fractions? From clapping out rhythms to reading music, fractions help us find the steady beat. Reading music requires a basic understanding of fractions because each measure represents a set length of time. For example, a $\frac{4}{4}$ -time signature means a total of four counts for the whole measure. A whole note, two half notes, four quarter notes, or eight eighth notes are equivalent fractions that represent the whole. Check out Jenna Laib's blog post where she shares a Fraction Intervention designed around music.

To nurture positive math identities and present math as useful and enjoyable at any grade level, the adults in the room need to reconcile their differences with mathematics and commit to forging a new path. Math is not new, but new approaches to teaching mathematics are needed. It starts by viewing math as an experience to be had, not just a subject to be taught. We disrupt sense-making when we introduce “the right way” or step-by-step procedures prematurely. Once students believe there is a path the teacher wants them to take, the path less traveled is off the table. It becomes too risky.



Pam Harris's
FigureOut
Able Math

<https://qrs.ly/dkgnmu2>

Unfortunately, school is often the place where math dreams come to die. Children are often forced to abandon sense-making in exchange for rules and procedures, and mathematics becomes an unfamiliar thing that is not for everyone. If we want to develop great math thinkers and problem solvers, we need to join Pam Harris in the mission of exchanging algorithms for math flexibility and help students realize that math is “figure-out-able!” (Harris, 2025).

Given our inborn affinity for patterns, shapes, and number sense in general, math more than the other subjects should be at the heart of our academic identities, but it is quite the opposite for many students. They are counting on us to write the counternarrative about what it means to be “good at math.” It is time for math dreams to flourish and every student to confidently embrace the idea that they are **Born Mathers!**



Source: Nzingha Montenegro

Let's Redefine the Core Academic Skills!

Based on the Three Rs,

- ▶ reading,
- ▶ writing, and
- ▶ arithmetic,

the core academic skills in school should focus on reading, writing, and basic computation. Consequently, the study of mathematics is often reduced to memorizing facts and procedures to find speedy

Given our inborn affinity for patterns, shapes, and number sense in general, math more than the other subjects should be at the heart of our academic identities.

solutions with accuracy. As we discussed earlier, historically, basic computation skills were all that the members of the laboring class needed—at least that was the prevailing wisdom—given mathematics was used as a sorting mechanism. With updated standards and new ideas about what it means to be proficient in mathematics, it is time to change our language, practices, and beliefs. It is time to redefine the core academic skills.

I argue that the core academic skills should be redefined as

- ▶ reading
- ▶ writing, and
- ▶ mathing.

If readers read and writers write, doesn't it make sense that mathers math? Math deserves a verb! A *math*er is defined as a person who uses mathematics to make sense of the world. In case you're wondering, that definition includes everyone. We are

Children who are exploring their environments with curiosity and thinking mathematically should be celebrated for their math intuition and sense-making of mathematical ideas.

all mathers. Introducing this language to our youngest learners is just one way we can ensure they can grow up believing that math is a necessary asset to our identities and pursuit of our dreams. When students engage in tasks in all subjects, we must point out the ways in which math connects. Whether it's a science lesson and students are using math to do conversions, or it's story time and students are counting objects on a page, take time to connect mathematics to the tasks at hand. Children who are exploring their environments with curiosity and thinking mathematically should be celebrated for their math intuition and sense-making of mathematical ideas. It is time to embrace being readers, writers, and mathers.



Source: istock.com/Lordn

Young children with fragile identities need to be acknowledged and affirmed as they develop foundational skills. As young students build towers with blocks in preschool and count using rote memorization of the number sequence, we can encourage them by calling them mathers. Just as we instill the importance of reading and writing, we can include mathing as critical to our future success and connect it to all careers. Children also need to recognize they are mathing when having fun to avoid perpetuating the lie that math is scary and intense.

When children are still learning to read, we encourage them by calling them readers. This includes the student learning to sound out words phonetically and the fluent reader focused on improving their comprehension skills. Young children hold books upside down and pretend to read words, yet they, too, earn the title of Reader. Even when learning to read is challenging, we persist because we know reading is necessary to be successful and pursue our dreams. Learning to read is not presented as optional, and students embrace being a reader as a part of their academic identities, whether they are good at it or not. Even those who have a tumultuous relationship with reading recognize the goal of being a reader as one that cannot be abandoned.

TIP

As often as possible, encourage students by calling them mathers and point out all of the mathing they are doing. Just as we hand out compliments when students are “caught being good,” we should cheer our students on—“Wow! Look at all this mathing going on.”

We cultivate joy and a love of reading, by reading stories aloud, requiring students to read at home with family members, and allowing students to choose what they read independently. Students choose books based on their interests and often associate quiet reading time with some level of freedom. Reading is positioned as a required skill and something to be enjoyed at your leisure. Math puzzles and games are often reserved as a reward for fast finishers, which reinforces the notion that being fast in math is the goal and only a select few deserve to enjoy math. By having math puzzles and games available outside of the math class and offering fun math activities to all students—even if they don't finish first—just as we offer silent reading time, students begin to connect math with leisure and choice instead of only drill and practice. It is equally important to encourage students to share math activities with their families as it is to encourage reading together.



READ. WRITE. MATH. CONNECT.

When reading books together, pause to ask questions about objects that can be counted, make predictions, and consider how math could be used to solve characters' problems. Any good bedtime story can be mathematized!

See Table 1.1 for some ideas about connecting leisure to math.

1.1

Connecting Leisure to Math

Activity	Cite	Brief Description
Math Puzzles	Math Puzzles https://qrs.ly/9qgnmsn Perplexors: Basic Level MindWare https://qrs.ly/wxgnmsq Tang Math https://qrs.ly/swgnmss	Assign ungraded math puzzles for “homework” that students can solve with family members or friends. Discuss the experience and solution in class during morning meetings.
Card Games and Board Games	Chutes and Ladders https://qrs.ly/95gnmst Farkle https://qrs.ly/uwgnmsv Prime Climb https://qrs.ly/wsgnmsw Q-Bitz https://qrs.ly/rkgnmsz Shut the Box https://qrs.ly/c4gnmt1 Yahtzee https://qrs.ly/zlgnmt3	Teach students about the math involved in their favorite card games and board games. Many old and new games require a lot of mathing. Let’s help children make these connections by calling them out!
Bedtime Math	Bedtime Math https://qrs.ly/ywgnmt4 Bedtime Math Book Series https://qrs.ly/ktgnmt5	Read a story at bedtime and talk through the number relationships. Reading books from the Bedtime Math series or using the app encourages daily engagement with math tasks and exploration.

Mathematics, unlike reading and writing, is treated as a subject that is taken and passed or failed. As students are introduced to new math concepts, the content is taught, assessed, graded, and left in the past. A student who fails the fraction chapter test rarely has the opportunity to learn from the mistakes and deepen their understanding. There isn't a chance to demonstrate the progress that is made with a "do over." The grade is final, and we move on. Even when a student memorizes formulas without understanding and regurgitates them for the test successfully earning an A, they don't retain the information because the brain holds it in temporary storage or short-term memory. When students pass the unit test for geometry, they believe they are done and never have to see that information again. If mathematics was taught as a series of connected ideas that tell a coherent math story, more students could see the benefits of persisting, and failing fractions wouldn't mean failing at mathematics forever. Having a clear purpose for learning the math being taught and being encouraged to solve problems in ways that make sense to them would empower students to take control of their learning.

Knowing that there are practical ways to apply the math learned in classrooms to their lives could lead to a desire to understand math deeply, not just to pass a test. When learning new concepts or skills, math homework should not only be pages of practice. We can design math tasks for homework that inspire students to apply the new skills to practical situations. Knowing that math is used to make sense of the world and solve everyday problems could help students realize that math isn't just for school and using mathematics doesn't end. We must read, write, and math to function in society.

TIP

When students learn to play math games at school, have them teach the games to family members and friends for "homework." Encourage students to explain to their family and friends how they are using math to win the game.



ACTIVITY TO TRY

Get Cooking!

Have students interview a family member about a favorite recipe. They can write the list of ingredients, how much of each ingredient, the steps for preparation, and how many people the dish serves. Students

(Continued)

(Continued)

can share pictures of the dish and pictures or video of them preparing it, if appropriate, and discuss any personal connections. Have students work together to determine how to make double or half of the recipe.



Source: [istock.com/Prostock-Studio](https://www.istock.com/Prostock-Studio)

Learning Math for Life

To support the vision that all students are mathers and that math isn't optional, we need to start distinguishing between using math to prepare for a math or STEM career and using math for life. While it is true that anyone can choose to become a mathematician, it requires a commitment to studying mathematics to the highest levels. Mathematicians study mathematics to solve the problems of the world and sometimes dedicate years to finding solutions to the same problem. Some of the most challenging math problems remain unsolved for many years. This isn't for everyone! Mathematics that is necessary for STEM careers can also be very complex and require deep study of math concepts specific to the chosen field of study. Students need to know that this level of math is within reach but requires hard work, not a special brain. Likewise, all students need to understand that even if they have no plans to be mathematicians or major in a STEM field in college, they still need math as part of their future careers and their lives as good citizens.



Mathnote

Mathers Make History



Calcea
Johnson
and Ne’Kiya
Jackson

[https://qrs.ly/
bngnmt7](https://qrs.ly/bngnmt7)

High school students Calcea Johnson and Ne’Kiya Jackson proved a 2,000-year-old math puzzle that was deemed impossible. When it was implied that they were math geniuses or math is just easy for them, they both denied these claims and credited their discoveries to their supportive school environment in which all students are taught that they have immeasurable possibilities and that they can accomplish any of their goals with hard work. At St. Mary’s Academy in New Orleans, Louisiana, students believe they are all mathers, even if they choose a career path that is not in the field of STEM.

Unfortunately, in many schools and homes mathematics is often attached to STEM career choices in a way that makes students believe that if they don’t choose to pursue these paths they can opt out of mathematics. If we say things like, “If you want to be an engineer, you will need lots of math,” a student can easily decide that if they don’t choose to be an engineer, they can avoid math forever. Competent mathers can approach high-level math courses with confidence because they know we are all wired to do math and mathers are prepared to work hard to learn new concepts. Dispelling the math gene myth and replacing it with the truth that hard work and perseverance are the criteria for succeeding in math class can begin to shift our mindsets about who belongs in these spaces. (Spoiler alert: *Everyone* belongs!) Ensuring that all students see themselves as mathers provides the counter-narrative that mathematics is not just for certain careers, but for everyone. Whether or not they choose to pursue a career in STEM, students (and adults) can maintain a healthy relationship with mathematics and keep on mathing.

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So, what does it look like to use mathematics to make sense of the world? It starts by acknowledging how we already use math every day. Adults need to use positive language to describe tasks that involve mathematics instead of reacting to any mention of math with sighs and groans. Children need to see their teachers tackling math tasks with a growth mindset, understanding that abilities can be developed (Dweck, 2016), and viewing challenges as exciting. It is important to expand our definition of mathematics to include simple actions like deciding which route to take home or planning our budget for a trip to the grocery store. We should cheer for children as they play board games and solve puzzles by saying things like, “Look at you mathing!” or “I am so proud of this little mather!”

WHERE’S THE MATH IN THAT?

Musicians Are Mathers!



Some people believe that we have to choose between being creative and being mathematical. The truth is mathers are creative and have a place in both the arts and mathematics. For example, musicians rely on mathematics even when the connection is not made explicitly. Mathematics is all about patterns and so is music. As a matter of fact, mathematics is an integral part of music, and the skills needed to master one enhances the ability to master the other. Both require

working memory, sustained focus, practice, curiosity, and collaboration. Both benefit from working independently to master skills, and then coming together to share ideas and create something magical. Reading music

requires us to learn new symbols that represent notes, pitches, pace, and patterns. Mathematical symbols demonstrate the relationships between numbers so we can manipulate them to find solutions to all types of problems. Some mathematicians would argue that a well-written proof is a beautiful representation of a puzzle that has been solved. Well, isn't that similar to the combination of notes on sheet music that gives us a beautiful song?



Source: [istock.com/nisaul khoiriyah](https://www.istock.com/nisaul_khoiriyah)

In an interview with Ashley Cuthbertson, musician, music teacher, and education consultant, we explore the connections between music and mathematics and the impact access to music and math can have on one's identity development.

Deborah: Tell us about your music journey as a learner, teacher, and consultant.

Ashley: I have always been around music. While my family members weren't all musicians, they were all music lovers. I learned to play piano at eight years old, I later learned to play flute, and sang in choruses. Eventually, I trained as an instrumentalist and hoped to be a principal flutist of a major symphony orchestra. I participated in competitions, trained intensely, and even performed at Carnegie Hall. Everything shifted when I decided to teach music on the side to make money while pursuing my music career. I answered an ad to teach music to children and I loved it. Teaching music lit me up in a way that performing never had. I wondered if I should continue on the path of training as a professional musician or switch to pursue a future in education.

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*Math is all over music
and music is all over
math because music
is all about patterns.*
—Ashley Cuthbertson

After graduating from college, I studied abroad in Venezuela and volunteered in a program designed to affect social change through music. I saw the power that music had in so many different communities. The work was about so much more than music; it was about children having access to positive experiences and the change that can happen. Music became a vehicle for helping children see the possibilities in life. I knew that this was what I wanted to do. I wanted to see what types of change would be possible through teaching music. Music education could be leveraged to show how we can engage in the world and understand how things work in an accessible way. I entered the teaching force and later earned a Master's degree in Education.

During my 12 years of teaching, I desired to make stronger connections between music and social change. While I didn't know it at the time, I had developed a way of teaching music through a culturally responsive lens. I realized that there was a lot I had to figure out on my own, and that other teachers could benefit from what I had learned. The work I had done in my classroom eventually became the core of my current professional development work. As a consultant, I support educators with examining how music can be a vehicle for change and how students can be engaged in class while making connections to how the world works. I call it culturally responsive music education, and music serves as a vehicle for making connections and granting students access to all types of learning.

Deborah: What was your relationship like with math?

Ashley: In the elementary years, I played the game of school well. But math was the one subject I began to struggle with past middle school. In spite of having great teachers in a supportive school environment, my school math experiences lacked real-world connections. I believe math became hard for me around seventh grade because I was unable to see the relevance. Looking back, I realize that I never understood how learning math could help me understand other things in my life. When I became a teacher, I made it a priority to help students see how music connected to the real life they were experiencing.

Deborah: What connections do you see between music and mathematics?

Ashley: Math is all over music and music is all over math because music is all about patterns. You have to be able to count rhythms and you have to understand the formulas of how music is made up. If you understand the function of a major scale for instance, which is just

a formula really, you learn which notes must be included for the scale to function and can replicate it in a different pitch. Another example is when performing musicians need to sight read and recognize patterns that will help them learn a new piece quickly. When musicians are called to sub, they might only have a short period of time to become familiar with the piece. They rely on familiar patterns and formulas from other songs to play new songs fluently.



There are core progressions that our ear naturally hears based on our experiences with basic core music progressions and because our brains are wired to recognize patterns. Pop music is extremely popular because the music relies on the same formulas and chords in different contexts. As a teacher, I looked for real-life connections between music and other subjects, and it was often math connections that were easiest to make. Students learned that if they knew one core progression, they could transfer the knowledge to a different key. If you knew a scale starting on one note on the recorder, you could move your fingers in the same pattern starting on a different note to get similar results.

Deborah: Wow! What an amazing connection between studying patterns to internalize musical formulas and doing the same in mathematics when balancing procedural and conceptual understanding. It aligns with the ongoing debate about rote memorization versus sense-making. The truth is we need both in math and it sounds like we need both in music as well. It is necessary to practice scales and learn to read music as a foundation for being a great musician but there is something more that has to do with intuition and passion. I like to think of it as playing beautiful music requires skill AND heart. Technique leads to correct execution of the notes, but having heart results in a moving performance. I believe this is true in math as well.

What would you tell a student who believes they can be a musician without mathematics?

Ashley: I would start by asking if they want to have a successful career as a musician because that means they need to be business minded. The

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business of being a professional musician is all about math. You have to know how much money you are going to make, how much it costs for the upkeep of your instruments, the type of ongoing training or coaching you will need to pay for, and that is all about math. Ultimately, you will have to plan a budget and determine how many gigs you will need to book to cover all of your expenses.

Deborah: How do we help teachers see the connections between literacy, math, and music?

Ashley: The thing I realized while teaching was that the key to my students being engaged in music was making cross-curricular connections. Arts integration is critical for overall success because in life we don't silo aspects of our lives like we do with subjects in school.

Deborah: What else would you like to share about how your work impacts students' lives and learning?

Ashley: Even though I was a student who loved music and didn't have to be convinced that music was important, as a teacher I encountered students who didn't know why music, art, or even math mattered. We can't just follow the curriculum regardless of what the students are experiencing. The reality is that we work with human beings, and there is not one plan that works for all. You must juxtapose the required standards with what works best for the students in your care. I didn't get into teaching to follow a curriculum. I got into teaching because I saw what was possible when students get involved with music. The most rewarding feedback from educators is when they leave my sessions believing they are now equipped to reach students they've been unable to reach by making content more relevant. When more students have access to high-quality music instruction, they can make connections between themselves and others and the world around them.

In our classrooms, we have many opportunities to invite music into math. We can clap out rhythms as a call and response, when we need to capture students' attention. As students entered my classroom, they heard the soundtracks from movies playing to welcome them. They learned that once the tunes switched to classical music it was time to settle down and get ready to start our day. Together, we can examine song lyrics and poems to discover the mathematical patterns that help them flow. We can take brain breaks with a few rounds of freeze dance, allowing students the chance to get the wiggles out to the music and turn into student statues when the music stops. No matter the ages of children, no matter how cool they pretend to be, a little music goes a long way.

Students who long to be musicians need to understand that they shouldn't run away from math. In truth, if they pursue a musical path, they will



Source: [istock.com/FatCamera](https://www.istock.com/FatCamera)

be running toward it. They are destined to become pattern seekers and pattern makers, using mathematics to create music for everyone to enjoy. Helping students make connections between math and music is one way to dispel the myth that math is optional and dismantle the binary belief that tells us we must choose because we can't be mathy and musical. You can be in a rock band AND teach math! Just ask Vanessa Vakharia, rock star and math guru (Vakharia, 2024).

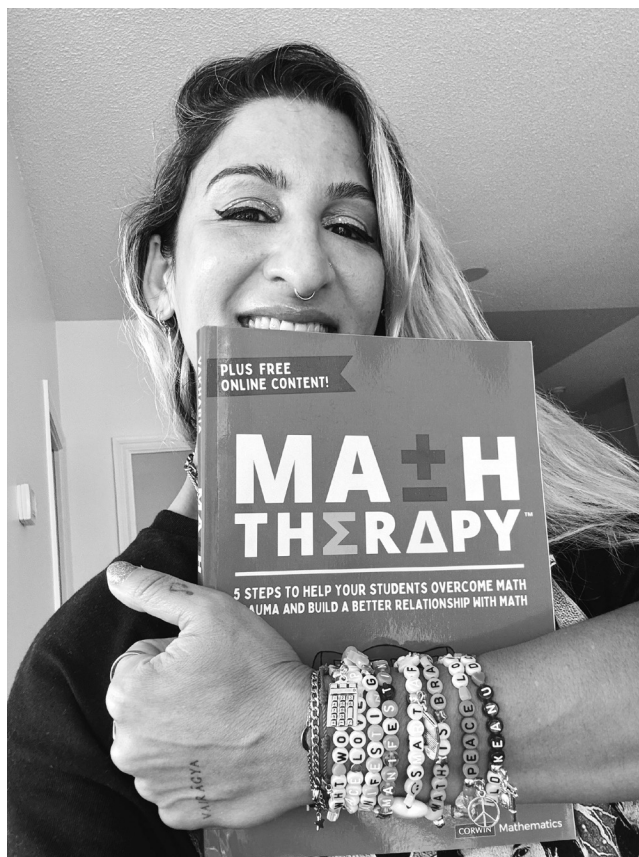
J.1 Vanessa Vakharia, lead singer and keytarist of Goodnight Sunrise and author of *Math Therapy*



Source: Allan Fournier

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Source: Courtesy of Vanessa Vakharia

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TIME TO REFLECT AND TAKE ACTION

As educators we have to acknowledge that math is not the problem; our attitudes and negative language contribute to math's bad reputation as being painful and out of reach for most. We need a new approach to teaching math in a new way if we want to rebrand mathematics as something everyone needs and can enjoy. For the next generation to be confident, competent readers, writers, and mathers, they will need to experience a new narrative that depicts the math community of our dreams written collectively by us.

1. What is a belief about mathematics that has been challenged by this chapter?
2. How will you adjust your language and mindset to disrupt the belief that math is optional?
3. Is there work that you need to do to model a growth mindset for your students?
4. How will you intentionally work to build a community of mathers?
5. How can music support you in your mathematical endeavors?



MATHFIRMATION

Use daily chants and affirmations to support developing math identities. Words are powerful, so use them to help students begin to believe they are mathers.

Say it loud, I'm a mather and I'm proud!

Chants and affirmations can instill positive beliefs and nurture positive math identities in classrooms. When working with third-grade students struggling to memorize their facts, I approached intervention from a different angle. We started and ended every session with positive affirmations. “I have the right to be here, and I was born to do math” and “I am happy. I am good” are two examples of our affirmations. We

chanted in a strong voice, a whisper, and in our minds, using hand motions and body language for emphasis. At the end of our time together, 10 intervention sessions, students wrote reflections about their experience. One student wrote, “I know now that I am good, and I am good at math.” Associating math struggles with not being good or smart is yet another reason why we need to change our language. Children attend to our words and actions and internalize beliefs based on their perceptions. If we want all students to view themselves as capable mathers, they need to hear us use affirming words to describe their progress.



TIP

Teach students Mathfirmations and encourage them to teach these to at least two other people. Then they can share in class how it felt to make someone else smile or feel proud of being a mather.