

Keeping Your Gifted Child Challenged in Math

7 Tips to Ensure Your Child Loves Math

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Keeping Gifted Kids Challenged

A child that has an affinity for math can be a challenge for parents who are not trained to handle their child's unique needs. All too often, parents make the mistake of trying to push gifted students through math curricula too quickly which results in knowledge gaps and saps the fun out of doing mathematics.

Sadly, because of how math has been traditionally taught, most people believe that math is simply a collection of facts, definitions, and algorithms to be memorized. Those people then resort exclusively to worksheets and flash cards to "teach" students the basic skills. *However, these are lousy tools to use if your goal is to try to challenge your child because they are boring, repetitive, and no fun!*

Your goal should be to use mathematics as a TOOL to teach your child how to THINK, REASON, ANALYZE, MAKE CONJECTURES, FORMULATE NEW IDEAS and form their own EXPLANATIONS and PROOFS. These are the skills that the 21st century marketplace covets and the same skills that most students fail to develop adequately in school.

This book will teach you how to avoid common pitfalls and help you start on the journey to developing your gifted child's ability to think mathematically and develop a greater love of math.

Please contact me with any questions you may have. I'm here to help.



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Foster a Love of Math Using Games

As parents, we have been educated on the importance of reading to our young children every single day. Research shows that these experiences help children develop early literacy skills. The best part of a nightly reading time is that it is relaxing and fun for parents and kids.

Unfortunately, no one tells parents to do the same for math because getting a head start on numeracy skills has also been shown to pay long-term dividends.

Instead of finding ways to immerse kids in hands-on mathematical experiences, parents often get workbooks or flashcards and use them to make kids memorize “math facts”. This would be like trading in nightly “reading time”, for studying the dictionary. Your child would hate that! And yet, that’s exactly what we do to math — reduce it to repetitive drills. The good news is there is an analog to “reading time”, it’s “game time”.

Games are to Math as Books are to Reading

The first thing you should do as a proactive parent is to play games with your children as often as possible. This is as much true for pre-schoolers as it is for middle schoolers.

By playing games, you help children develop mathematical thinking skills naturally without turning math into a chore.

Games Provide Many Benefits

- They are fun for the whole family
- They are interactive and collaborative
- They take the pressure out of math and put it into meaningful context.
- They involve problem solving, critical thinking, and estimation, and arithmetic skills

Which Games are the Best?

Almost any game you can think of requires strategy, spatial reasoning, and/

or pattern recognition — all skills that are vital to excellence in mathematics.

Even a “word game” like Scrabble involves tons of mathematical thinking like where to place the tiles to maximize your score or placing tiles to prevent your opponent from high scores.

Five Games to Get You Started

1. SET (Ages 7+)

This game takes a few minutes to learn and enhances visual / spatial reasoning skills. Each player surveys the field of 12 cards looking for groups of 3 cards that are all the same or all different with respect to shape, color, number, and pattern. You can play a single-player [online version](#) to learn how the game works. [Full rules can be found here.](#)

2. Qwirkle (Ages 6+)

Qwirkle is like Scrabble, but with shapes and colors instead of letters. Players can build on each others lines with new tiles and the creative player can find clever ways to maximize their score. Qwirkle can be played with school age students.

As you play more, you and your child will discover new winning strategies.

3. Carcassonne (Ages 8+)

Carcassonne is a tile based game for 2 to 5 players. Players build a landscape by adding tiles to the board as the game goes on. After strategically placing a tile, players have several options for placing their “followers” on the board. This allows the game to be played with a diverse set of competing strategies, which makes the game a lot of fun.



4. Settlers of Catan (Ages 8+)

Settlers of Catan is the winner of several gaming awards and was called “the board game of our time” by The

Washington Post. Players try to build colonies as they acquire and trade resources. This is another game that allows for multiple competing strategies. A typical games lasts 60 to 90 minutes.

5. Forbidden Desert (Ages 8+)

Forbidden Desert is a cooperative game where each player takes the role of an adventurer with a unique skill that will aid the team. Players work together, using each other's unique skills to survive on an ever-shifting game board. The teamwork needed to play this game makes it a nice change from most competitive games.



Other Games We Recommend

- Chocolate Fix (Ages 7+) by Think Fun
- Solitaire Chess (Ages 7+) by Think Fun

- Hive (Ages 7+) by Gen42 Games
- Blokus by Mattel
- Zeus on the Loose (Ages 5-9) by Gamewright
- Duck Duck Bruce (Ages 4-7) by Gamewright

These games provide kids with great opportunities to develop their thinking and communication skills. Games present a wonderful and natural learning opportunity.

Bonus Tip: Start a Family Game Night

Family traditions are the glue that holds families together. Choose one night a week to play games. Turn off the TV, the phone and all other distractions and just have fun! Many games build number sense and mental math skills.

Play these games with your kids, I promise you'll love them!

Building Your Child's Perseverance

Stanford psychologist Dr. Carol Dweck has identified two mindsets, the **fixed mindset** and the **growth mindset**, that help explain why some people persevere and others don't. Her research on this topic is summarized in her excellent book, *Mindset*.

The Fixed Mindset

She states that a person with a fixed mindset believes that traits like intelligence or musical talent are fixed and cannot be changed. People with a fixed mindset would say that Tiger Woods had a "gift" for golf or that Michael Jordan had an innate talent for basketball or that Einstein was born a genius. Many of us tend to believe this at least a little.

Unfortunately, there is an insidious side to having a fixed mindset. If you believe talents are fixed, you tend to not work as hard to increase your own talent. Why bother practicing or studying when your

given talents are fixed and can't really be improved? In addition, people with fixed mindsets avoid risks for fear of failure. Worse, they take constructive criticism as judgment about their self-worth rather than hearing the message and working to improve.

Many gifted students suffer from a fixed mindset which prevents them from attempting difficult problems.

A student with a fixed mindset who gets a D on a math test thinks to himself, "I'm just not good at math." They don't try go back to see which problems were missed or reflect on how to study better next time.

The Growth Mindset

A person with a growth mindset believes that abilities and talents can be developed with hard work. **They see failures, not as a judgement on their talent or self-worth, but as opportunities to grow and improve.**

While they feel the sting of a failure, they can move on to figure out how to perform better the next time. And they accept most criticism as constructive.

A student with a growth mindset who gets a D on a math test, goes back to the teacher to find out what they misunderstood. They develop better study habits and seeks extra help until they achieve mastery of the concept.

The Power of Praise

These days, it seems that most parents, educators and coaches often deliver praise and rewards even for average results. Studies show the idea that everyone deserves a trophy or that we should continually praise our children to ensure they have self-worth are questionable at best.

It turns out that if we praise children for being “smart” or “gifted” or “naturally talented”, we are feeding them the idea that talent is innate and fixed. With a fixed mindset, a student has no where to

go when the challenges get tougher and so they often give up.

The good news is that anyone can change their mindset. Research shows that just knowing these two mindsets exist can help a person move toward the growth mindset framework. This is true even for children — it’s never too early to develop a growth mindset!

Praise Effort over Outcomes

When your child comes home with an A on a math test, try saying, “I can see how your studying paid off. Great work.” rather than “Wow! You’re so smart!”.

If your child didn’t put in much effort, but still got a good grade, try saying “Looks like that test was too easy for you. Maybe we can work on more challenging problems together.” This way you’re letting them know you value effort over talent. You are teaching them to value the process of learning as much as or even more than grades and that it’s OK to struggle with challenging ideas and problems.

Building a Routine

I spent months researching proven ways to build daily habits like studying math. Here's a summary of what I learned (primarily from BJ Fogg of Stanford University) and how you can apply it with your kids. I've tried it and it works!

1. Set the Bar Exceedingly Low

This may sound counter-intuitive at first, but creating a very low bar makes it easier to get started each day because the task won't seem too daunting. Here's an example: Suppose you want to develop a daily flossing habit because you believe it's a good practice for dental health. Make the goal to floss just one tooth every night.



Of course, once you start to floss that

one tooth, you may choose to do them all, but you don't have to. Who can't floss just one tooth every night?

2. Eliminate Excuses in Advance

Make a list of the most frequent excuses and defeat them in advance. For example, if you're trying to build a daily workout habit, your excuses might include: Not having a gym membership, not having clean workout clothes, and lack of motivation to workout alone.

Now find a solution for each one. Get a membership, get more workout gear and put it in your car at all times, then find someone to hold you accountable like a friend or personal trainer. You can do the same with a daily homework habit by having a notebook, pencil and eraser handy along with books and problems that you want to work on. If you want to weekly game night, pick a night and a game in advance and have everything ready to go when the time comes.

3. Tie the New Habit to a Developed One

If possible, tie the timing of the new habit to the timing of a daily habit that you are already successful with. In this way, you make it much easier to remember and much harder to avoid the new habit. Find a daily activity that your child does routinely after school like reading or watching a show and tie the new routine to that activity.

4. Track Their Progress (Don't Break the Chain)

Print a calendar and have your child simply mark an "X" every day that they complete the task. Encourage them to try and build a chain of X's as long as possible. The longer the chain gets, the more motivated they'll be to not "break the chain".



5. Use Rewards for Motivation

Turn the new habit development into a friendly competition with your child. They'll have a lot more motivation to keep going when their motivation wanes. Create some small rewards for doing the habit for 3, 5, 10 and 30 days in a row.

Bonus Tip: Keep It Short but Frequent

Short, frequent lessons are much better than longer, sporadic ones.

In a short lesson, your child's attention is less likely to wander, and you'll find that you can accomplish more. Keep the lessons upbeat and fast-paced and use teaching tools and activities that engage your child's natural interests as much as possible.

For most students, I recommend fifteen to twenty minutes of puzzles or games per day, five times a week.

Encourage Mental Math & Estimation

One of the best ways to build a child's working memory and computational skills is to challenge them to do math mentally.

The ability to do mental math is an overlooked, but extremely important life skill your child will use everyday for the rest of their lives.

Most kids are conditioned to doing arithmetic exclusively with pencil and paper. These kids are at a complete loss when asked to make mental computations. Don't let your child fall into this trap.

Benefit of Mental Math

Mental math has many benefits including increasing creativity, working memory, and improving number sense — the ability to intuitively understand numbers and reasonableness of answers.

At first, your child may find mental math frustrating, so start with simple computations to build confidence and then slowly increase the difficulty level to

encourage them to stretch their capabilities.

Many times, you can teach patterns that make mental computation much easier. For example, when adding 9 to a number, it is easier to think about adding 10 and taking away 1 since $9 = 10 - 1$. This allows the student to take a more difficult problem that often requires "carrying" or "regrouping" and turn it into two simple steps.

Use Estimation to Build Number Sense

Another great way to build number sense is to practice estimating. The ability to estimate quickly can help students find obvious computation errors and help them greatly improve test scores. Later, students will use estimation in real-life situations at home and at work.

Use the world around you to inspire estimation activities you can do together.

Estimation Examples

- In the car, estimate how far it is from home to your destination or make a reasonable guess at your average speed and then estimate how long it will take.
- At the gas station, estimate the cost of a fill up or how far you can expect to travel on one tank of gas.
- Watching basketball? Estimate your favorite player's shooting percentage.
- While eating out, you can try to estimate the final bill as well as the tax and tip.



To make things a little more fun, challenge your child to a contest to see who can get closer to the correct answer. Every once in a while, make an “off-the-wall” estimate and see if your child can explain if the estimate is reasonable or not. You’ll be teaching valuable skills in mental math, estimation, and checking for reasonable answers.

Bonus Tip: Provide landmarks, but not answers.

When students are struggling with a mental math computation, you can provide them with a “landmark” that may help them. For example, your child is stuck while trying to compute 19 times 5. You could reply with “I don’t know what 19 times 5 is, but I do know what 20 times 5 is. Then wait to see if your child can make the connection that 19 times 5 must be 5 less than 100 which is 95.

A child’s ability to make these kinds of connections is vital to higher level mathematical thinking.

Seek Math-Centric Opportunities

When your child shows an interest in music or sports, you sign them up for lessons or enroll them in a sports league. You should try to do the same with your mathematically precocious child.

Students who excel at math tend to enjoy activities like robotics, computer programming, video game design, and chess.

Robotics



Working with robotics is a wonderful way to see mathematics in action. One of the best robotics kits for kids is the LEGO Mindstorms EV3. The EV3 offers a wonderful hands-on experience for kids

from about 8 years old and up. The kit comes with several example designs and the flexibility to create an endless number of variations.

Through robotics students to develop numerous skills including:

- Design and construction
- Computer programming
- Problem solving
- Critical thinking

Even if you don't have robotics or engineering experience, a simple Google search will yield a large variety of resources to help you.

Computer Programming

Learning to program a computer is another activity in which kids can see the fruits of their labor while developing computational thinking skills.

I've found the best place to start is with a computer language for kids created at MIT called SCRATCH (scratch.mit.edu).

Another great resource is code.org. Start your child on the “Hour of Code” and let them take it from there. The web is rich with resources to teach kids and adults how to code.



Search For Opportunities

Search your community for opportunities like a Math Olympiads Team, Chess Club, Robotics team, and Computer Programming workshop. Often these are offered at the local Science and Industry Museum or as summer camps at the community center. If you're lucky, they can be offered at school as well.

Math Plus Academy offers all of these programs year-round. We are on a mission to inspire kids to do great things and what better way to do that than through amazing, fun enrichment classes

Let Your Child's Curiosity Be Your Guide

"I have no special talents. I am just passionately curious." — Albert Einstein

Did you know that an average 4 year-old asks 65 questions per day? By age 8 that number drops to 32 questions per day and by age 40 we ask just 6 questions per day.

Children are born with insatiable curiosity, but through school and life natural curiosity fades. It doesn't have to be this way. Allow your child's curiosity to flourish by encouraging them to investigate the answers to some of their questions.

The Best Way to Answer "Why?" Questions

First, realize that it is NOT your responsibility to answer all of your child's questions. Your role is to facilitate your child's ability to answer their questions on their own.

I've found the best answer to "Why ...?" is "Why do you think?". This allows for you to have a productive conversation where you can learn much more about what your child already knows as well as what concepts they are missing.

A Personal Story

My eight year old son asks a LOT of questions. He's very observant and highly inquisitive.

On a Saturday afternoon in late autumn, our family went to a popular local shopping mall. When we arrived it was cold and rainy so I decided to seek shelter in a covered parking garage. The garage had an electronic sign that indicated how many spaces were open. My son noticed the sign and asked, "Dad, how do they know how many spots are empty?".

ME: "How do YOU think they know how many spots are available?"

THE BOY: (after a brief pause) "They must have a camera over every spot, then they can count the open spots."

ME: "I don't see cameras over every spot, do you? Plus, I would imagine that a camera over every spot would be quite expensive. Can you think of another way?"

THE BOY: (another brief pause) "Maybe they have a person at the end of every row that counts the empty spaces in that row."

ME: "I don't see anyone watching the spots like that and how would they communicate when something changed. Any other ideas?"



He was stuck, temporarily out of inspiration. So, I waited and then gave him a gentle hint.

ME: "How many entrances and exits does the garage have?"

THE BOY: "There's only one way in and one way out."

ME: "Hmmm... interesting... I wonder if the garage starts out empty early in the morning."

At this point, he had his "AHA" moment. I know because he literally stopped in his tracks and looked up at me smiling ear to ear.

THE BOY: "I got it! They just count the cars going in and out! When a car goes in, that's one less space and when one comes out, that's one more space."

ME: "That makes sense, I bet that's how they do it!"

If I hadn't been so excited at his epiphany, I would have tried to extend this even further with "Can you imagine

other situations where you could know what's inside by counting what goes in and what comes out?"

Benefits of Having Kids Answer Their Own Questions

The biggest benefit of this strategy is it gets a child to accept the "discomfort" of not knowing the answer and teaches them to persevere in the face of "not knowing" with the confidence that if they keep trying, they will find a solution. Too many students lack the ability to manage this "discomfort" and tend to beg for an answer or just give up.

Over time, this strategy will also teach your child how to investigate questions on their own and it will enhance their creativity. Most of the great discoveries in history are the result of passionately curious people asking a new question and seeking out the answer.

Next time your child asks one of those "How does it work" type questions, try answering with "How / Why do you think?" and see what happens.

Bonus Tip: Use Your Child's Interests to Your Advantage.

- If your child enjoys reading, find mysteries and other books that include math or puzzles.
- If your child likes art or animation, look for books or videos that can connect art to architecture or computer animation to geometry.
- If your child likes to play Minecraft or LEGOs, encourage them to build a scale model of your home or any other building of interest.
- If your child enjoys cooking, then following recipes is ripe for conversations about measurement, unit conversions, and proportions.

The amazing thing about math is that you can pursue it's study just for fun or you can focus on it's practical application in almost every facet of human existence

The Surprising Benefits of Puzzling

Why Do People Enjoy Puzzles?

Neuroscientist Daniel Bor, a research fellow at the University of Sussex in England, believes it's because we take great pleasure in pattern-finding. In his book, "The Ravenous Brain", he asserts that human brains are "ravenous" for new innovative solutions to problems.

Puzzles are compelling because they offer a complete problem-solving experience, from defining the goal to determining the characteristics of the given information, and finally the solution.

The Benefits of Puzzling

Puzzles Enhance Creativity

Good puzzles require the solver to look at the problem in multiple ways and from different perspectives. As a natural consequence, the puzzle solver asks more questions and taps into their imagination to find novel pathways.

Puzzles Build Perseverance

Many novice puzzlers give up. They will say to themselves "I have tried everything I can think of, this puzzle is impossible." However, with puzzles, you have the opportunity to conquer the impossible. What impossible really means in the puzzle context is that you simply haven't figured out how to get to the solution *yet*. This is a great lesson that children can learn by playing with puzzles.

Puzzles are Fun and Rewarding

Many people find puzzles relaxing. Puzzles provide you with a sense of accomplishment which releases dopamine in the brain, furthering your sense of happiness. The "Aha!" that happens when a person goes through a major shift in perception to achieve a solution to a problem (puzzle) becomes just as satisfying as an ice cream cone.

Puzzles Develop Critical Thinking

The steps it takes to complete a puzzle incorporate elements of sequencing, planning, logic, strategy and problem solving. These skills require the work of your prefrontal cortex located in the frontal lobe.

The best puzzles are addictive just like a well-designed video game. As soon as you finish one, you want to reach for another.

Try this puzzle for fun (It's a challenging one!)

The members of a math team contributed a total of \$2.89 for refreshments for their weekly practice. Each member contributed the same amount and paid for his or her share with exactly four coins. How many pennies were contributed by all of the members combined?

Ready to do some puzzles with your child?

Here are three great sources for a variety of interesting puzzles.

- krazydad.com
- puzzles.com
- [New York Times Numberplay blog](#)

Looking for More Problem Solving Opportunities?

At Math Plus Academy, we are constantly seeking out the best puzzles for kids. Unique puzzles that will help students build mathematical thinking skills and offer just the right level of challenge.

Added Benefits of Our Problem Based Programs

- We help encourage students to persevere.
- We ask questions that spark their creativity.
- We teach kids how to organize their thinking so that can be more productive and efficient problem solvers.
- Students work together to develop solutions and build teamwork skills
- We review every solution to make sure children retain the key insights.

Conclusion: Take a Broader View

As a parent, it's natural to want your child to excel and to try and advance them through math curriculum as quickly as possible to keep them challenged.

However, there is another way.

Take a Broader View of Mathematics

If you believe that math is just a collection of concepts, algorithms, and arithmetic, then you will miss out on all its beauty and elegance. The pursuit of mathematics through problem solving will help your child develop important thinking skills they will need to be successful in the 21st century.

Mathematics is one of the best fields in which one can develop the ability to **THINK, REASON, CREATE, ANALYZE, ASK MEANINGFUL QUESTIONS, FORMULATE IDEAS and SOLVE PROBLEMS.**

If you create a culture in your home that allows for your children to explore on

their own and make mistakes without being judged, then you will have created the ideal space for them to develop mathematical thinking skills.

In the process, you should see your child's curiosity, perseverance, and problem solving skills grow by leaps and bounds.

Enjoy the journey with your child!

Dr. Raj Shah



Resources

Books for Kids

Grapes of Math - Gregory Tang
Math Appeal - Gregory Tang
Math Curse by Jon Scieszka
How Much is a Million - David M Schwartz
Spaghetti and Meatballs for All - Marilyn Burns
The Greedy Triangle - Marilyn Burns
Sir Cumference and the First Round Table - Cindy Neuschwander
Chasing Vermeer - Blue Baillett

Books for Parents

Mindset - Dr. Carol Dweck
The Mathematician's Lament - Paul Lockhart
So Good They Can't Ignore You - Cal Newport

Problem Solving & Puzzle Books

Becoming a Problem Solving Genius - Ed Zaccaro
Thinking Mathematically - J. Mason
Creative Problem Solving - George Lenchner
My Best Mathematical and Logic Puzzles - Martin Gardner

Puzzle Websites

puzzles.com - variety of logic puzzles
nrich.maths.org - games, lessons, ...
mathpickle.com - math explorations
krazydad.com - Japanese logic puzzles

Games

Visual / Spatial

SET
Swish
Shape by Shape
Blokus

Strategy

Carcassonne
Settler's of Catan
Qwirkle
Hive

Logic

Chocolate Fix
Rush Hour
Solitaire Chess

Arithmetic / Memory

Zeus on the Loose
Duck, Duck, Bruce
Rat-a-tat-cat