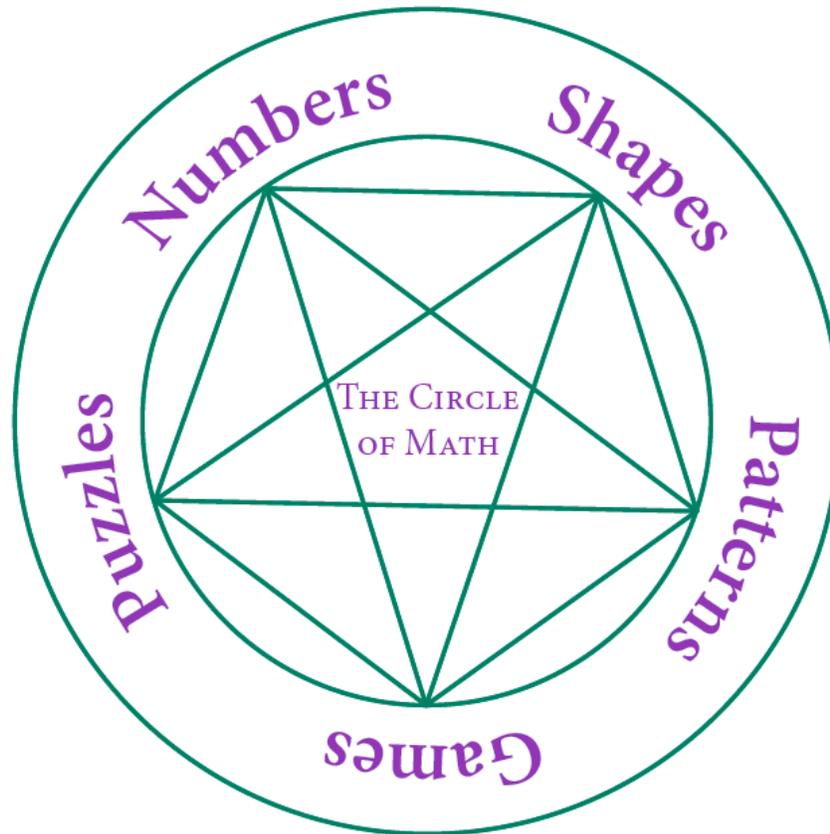


Yes, You CAN Love Teaching Math



The best way to learn mathematics is to follow the road which the human race originally followed: Do things, make things, notice things, arrange things—and only then, reason about things. Above all, do not try to hurry. Mathematics, as you can see, does not advance rapidly.

—W. W. SAWYER
Mathematician's Delight

There is no ulterior practical purpose here. I'm just playing. That's what math is: wondering, playing, amusing yourself with your imagination.

—PAUL LOCKHART
A Mathematician's Lament

Mathematics is mental play, the essence of creative problem solving. This is the truth we need to impart to our children, more important than fractions or decimals or even the times tables. Math is a game, playing with ideas.

—DENISE GASKINS
Let's Play Math: How Families Can Learn Math Together and Enjoy It

Prof. Trianglemans's Abbreviated List of Standards for Mathematical Practice

PTALSMP 1: Ask questions.

Ask why. Ask how. Ask whether your answer is right. Ask whether it makes sense. Ask what assumptions you have made, and whether an alternate set of assumptions might be warranted. Ask what if. Ask what if not.

PTALSMP 2: Play.

See what happens if you carry out the computation you have in mind, even if you are not sure it's the right one. See what happens if you do it the other way around. Try to think like someone else would think. Tweak and see what happens.

PTALSMP 3: Argue.

Say why you think you are right. Say why you might be wrong. Try to understand how someone else sees things, and say why you think their perspective may be valid. Do not accept what others say is so, but listen carefully to it so that you can decide whether it is.

PTALSMP 4: Connect.

Ask how this thing is like other things. Try your ideas out on a new problem. Ask whether and how these ideas apply to other situations. Look for similarities and differences. Seek out the boundaries and limitations of your techniques.

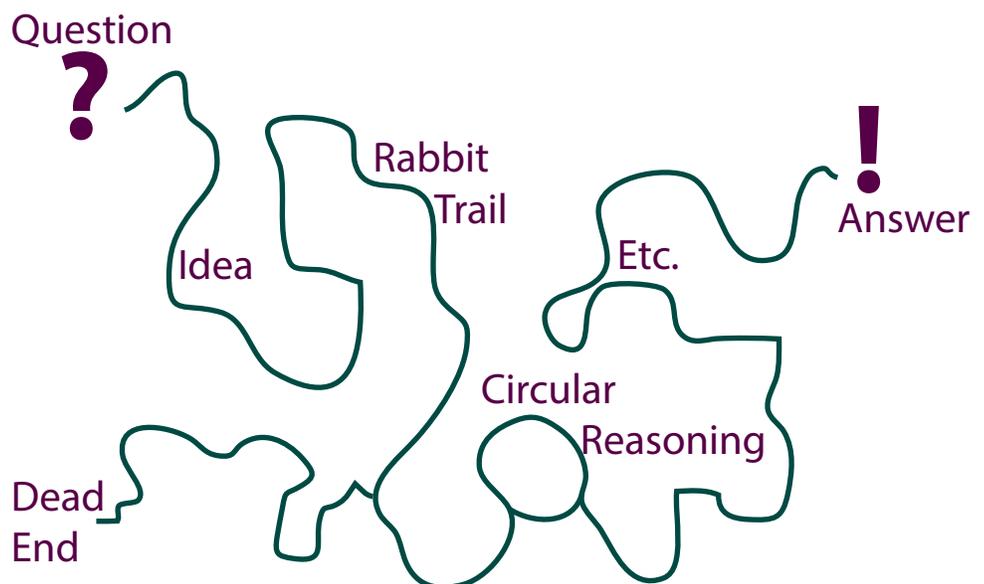
— CHRISTOPHER DANIELSON, christopherdanielson.wordpress.com

What Real Mathematical Thinking Looks Like

A rule or formula makes a quick bridge that bypasses the mess. And most people believe that's what it means to be good at math—to be able to move quickly from question to answer.

But that's not what math is all about. This MESS is the heart of math. The mess is where we build understanding. It's where we come to grips with what the problem really means.

We need to teach our children to be comfortable in the mess.



What ONE thing can you do this week to transform your child's experience of math?

Watch Annie Fetter's youtu.be/a-Fth6sOaRA.

Math Games You Can Play Anywhere

Nim

You need 10 or more “somethings” in a pile.

Each player in turn removes one or two from the pile. You have to take at least one—no passing.

Don't get stuck with the last one, or you lose!

Take turns going first.

If your kids get tired of this version, have them think of a way to tweak the rules.

One Won

One player says a number between 10 and 20.

Then the other player chooses to go first or second.

On your turn, you may subtract one from the current number. Or you may cut the number in half (ignoring any remainder).

If you get to one, you win!

Encourage kids to make their own game rules.

The Substitution Game

Start with any simple equation.

On your turn, change just one number.

Admire your joint creation.

$$3 + 4 = 7$$

$$3 + 4 = 14 \div 2$$

$$(\frac{1}{2} \times 6) + 4 = 14 \div 2$$

$$(\frac{1}{2} \times 6) + 4 = 14 \div (100 - 98)$$

etc.

Thought-Provoking Activities for All Ages

CLOTHESLINE MATH: This number line can help develop deep, flexible number sense—and build algebraic understanding, too.

clotheslinemath.com

DAILY TREASURE: Logical clues lead to hidden gold.

4chests.blogspot.com

ESTI-MYSTERIES: And several other number, shape, and logic puzzles by Steve Wyborney.

stevewyborney.com

ESTIMATION 180: “Building number sense one day at a time.” What number is too small? Too large? How do you know? How close can you guess the answer?

estimation180.com

FRACTION TALKS: Visual puzzles for discussing and building fluency with fractions and geometry.

fractiontalks.com

KENKEN FOR TEACHERS: A fantastic way to practice number skills. Subscribe for new puzzles every week.

kenkenpuzzle.com/teachers/classroom

MATH PICKLE: Challenging games and puzzles for K–12 students, many based on classic unsolved math problems.

mathpickle.com

NUMBERLESS WORD PROBLEMS: The website has samples for elementary students, but ignoring the numbers can be a great problem-solving strategy for any age.

bstockus.wordpress.com/numberless-word-problems

SET DAILY PUZZLE: A visual logic puzzle for all ages.

setgame.com/set/puzzle

SOLVE ME PUZZLES: I love the mobiles best, but the riddles and Sudoku-style grids are also fun.

solveme.edc.org

UNIVERSCALE: Compare and understand the relative size of the full range of known objects in our universe.

nikon.com/about/sp/universcale

VISUAL PATTERNS: Algebraic reasoning puzzles. Pick any design and try to find the pattern.

visualpatterns.org

WHICH ONE DOESN'T BELONG?: Thought-provoking puzzles will challenge math teachers and students alike.

wodb.ca

WOULD YOU RATHER? MATH: A decision-making challenge. “Asking students to choose their own path and justify it.”

wouldyourathermath.com

More Free Online Mathematical Play

The Internet overflows with math websites. Here are a few of my favorites. These links and more are available on my website (denisegaskins.com/internet-math-resources), where I will add new goodies as I find the time.

HOTEL INFINITY: A growing collection of videos that explore advanced math concepts through storytelling.

hotel-infinity.com

MATHS IS FUN: A mathematical smorgasbord of lessons, definitions, puzzles, and games.

mathsisfun.com

NRICH.MATHS.ORG: A wonderful source of math puzzles and activities for all ages, with a theme that changes each month. Hints available, and solutions for past problems.

rich.maths.org

TIM'S INTERACTIVE PUZZLE SOLUTION CENTER: A fun collection of "famous and other curious brain teasers" to solve online, some relatively easy and some quite challenging.

sakharov.net/puzzle

ALCUMUS: Art of Problem Solving's innovative online learning system adjusts to student performance to deliver appropriate problems and video lessons.

artofproblemsolving.com/alcumus

CUT THE KNOT INTERACTIVE: "Mathematics Miscellany and Puzzles," one of my all-time favorite sites.

cut-the-knot.org

DESMOS: An online graphing calculator with a growing collection of free activities.

desmos.com

DON COHEN'S MAP OF CALCULUS FOR YOUNG PEOPLE: Hands-on activities featuring advanced ideas.

mathman.biz/html/map.html

DON STEWARD'S MEDIAN: A wonderful variety of puzzles for middle and high school students.

donsteward.blogspot.com

MATH MUNCH: An archive of delicious math activities, projects, artwork, and games from around the Internet.

mathmunch.org

MATH TALKS: A collection of questions that spark thinking about math, with sample student answers and tips for the teacher.

mathtalks.net

DENISEGASKINS.COM: My "Let's Play Math!" blog of games, teaching tips, and resource pages.

denisegaskins.com

denisegaskins.com/tag/teaching

denisegaskins.com/my-favorite-math-games

EDUCATION UNBOXED: Videos by a homeschooling mom showing how to play with elementary math using Cuisenaire rods and other hands-on tools.

educationunboxed.com

ELEMENTS OF MATH: Steven Strogatz's blog post series from the New York Times.

stevenstrogatz.com/essays/tag/Elements+of+Math

EVER WONDER WHAT THEY'D NOTICE? (IF ONLY SOMEONE WOULD ASK): Annie Fetter's classic video about talking with kids.

youtu.be/a-Fth6sOaRA

HELPING A STRUGGLING MATH STUDENT: A homeschooler's 14-part blog series, full of activities and encouragement. Scroll down to the bottom to read posts in the order they were published.

angelicscalliwags.com/category/helping-a-struggling-maths-student

HOW TO THINK LIKE A SCHOOL MATH GENIUS: James Tanton's series of videos about five key principles for mathematical thinking.

jamestanton.com/?p=1097

LIVING MATH: Julie Brennan's amazing website features the most extensive lists of living math books anywhere, plus articles about math, book and resource reviews, and lesson plans.

livingmath.net

NATURAL MATH: "Make your own math." Plenty of ideas for sharing rich math experiences with your children.

naturalmath.com

NIX THE TRICKS: Explains how mnemonic tricks and shortcuts hinder student understanding. Learn which phrases to avoid and what to use in their place.

nixthetricks.com

TALKING MATH WITH YOUR KIDS: Christopher Danielson helps parents support their children's mathematical development.

talkingmathwithkids.com

UNCHOOLERS AND MATHEMATICS: A collection of stories about children learning math naturally.

sandraddodd.com/math

COLOR KEY:

FOR ALL AGES.

FOR OLDER STUDENTS.

TEACHER EDUCATION.

Math with Denise Gaskins

“Reading one of Gaskins’ books is like going to a really great teacher workshop—part philosophy, part practical ideas, and all excellent. She just oozes expertise and enthusiasm.”

—Amy at Hope Is the Word blog

“Let’s Play Math is the map and the guidebook I’ve been looking for. With it in my hand I can’t wait to take my children by the hand and head off to explore the wonderful world of maths.”

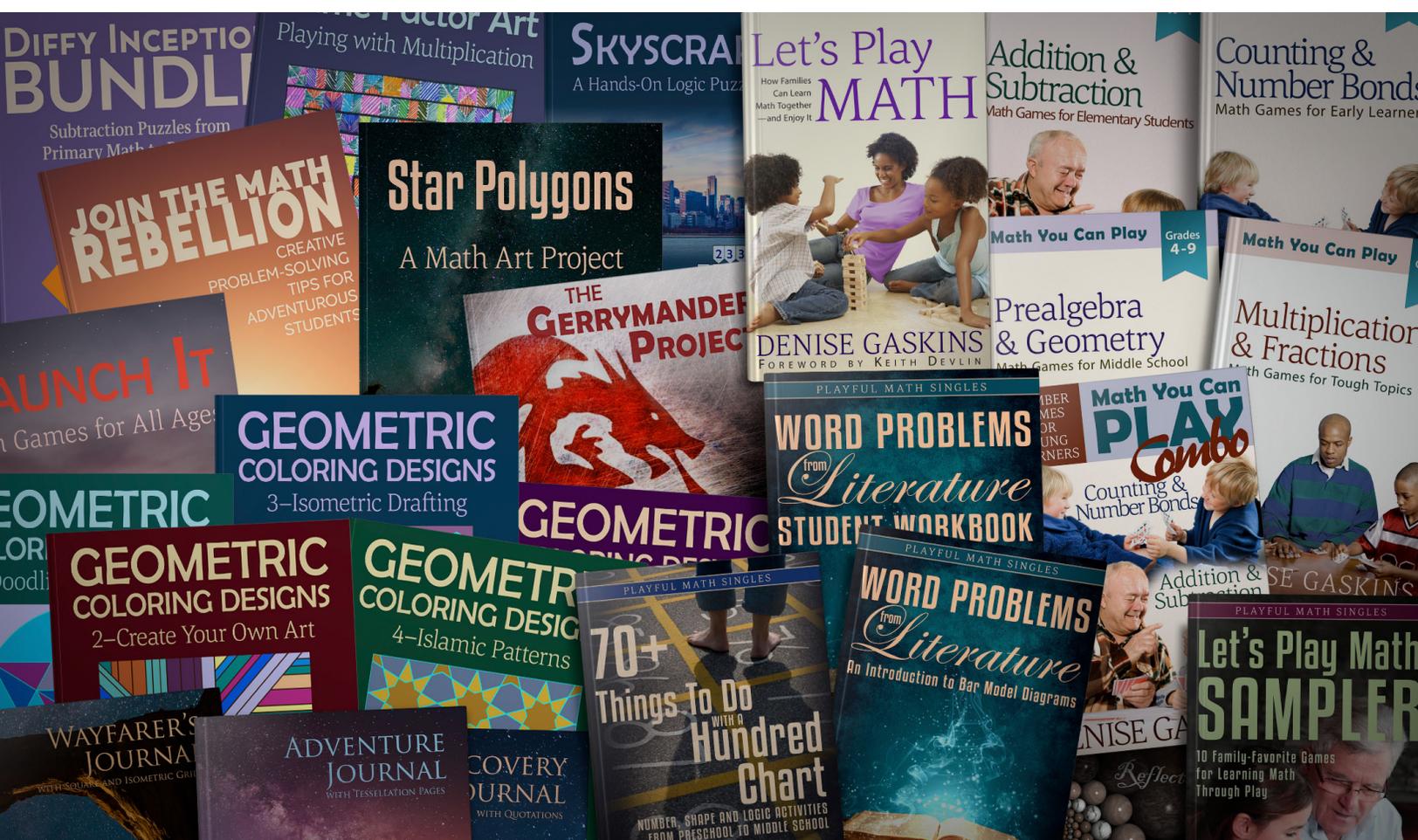
—Lucinda Leo, Navigating by Joy blog



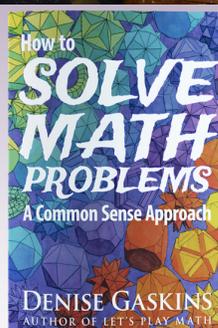
Wouldn't it be wonderful if math were something your kids wanted to do?

Denise's playful math books can help.

tabletopacademy.net/playful-math-books



Or get a [free copy of Denise's 24-page problem-solving booklet](#) when you sign up for her newsletter mailing list. Plus you'll be among the first to hear about new books, revisions, and sales or other promotions.



**A 4-Step Method
for Making Sense
of Math Problems**

TabletopAcademy.net/Subscribe