

COOL MATH: LOVING MATH WITH YOUR OLDER CHILD

A MENTOR MOM © CLASS

by Jennifer Georgia

Prepared for the 2010 LDSEHE Education Conference in Buena Vista, Virginia

Teaching Tips

“Sometimes we are, unknowingly, looking at our world in a fuzzy manner. Mathematical thinking allows us to see our world in a sharper way, where details that were once hidden now come into focus, and the beauty and structure and nuance really shine through.” Edward Burger, *The Joy of Thinking and the Beauty and Power of Classical Mathematical Ideas*

“In mathematics a certain surprising thing happens again and again. A person poses a simple question, a question so simple that it seems no useful result can come from answering it. And yet it turns out that the answer opens the door to all kinds of interesting developments, and gives great power to the person who understands it.” W.W. Sawyer, *What is Calculus About?*

“The (enormously important) domain of arithmetic should not be the whole of elementary school mathematics. An eclectic collection of topics drawn from recreational math and elsewhere can provide a rich source of contexts for worthwhile early explorations.” Henri Piccioto, *Employing Children's Natural Powers to Build Algebraic Reasoning in the Context of Elementary Mathematics*

“Mathematics, like music, needs to be expressed in *physical actions* and *human interactions* before its symbols can evoke the silent patterns of mathematical ideas (like musical notes), simultaneous relationships (like harmonies) and expositions or proofs (like melodies).” Richard Skemp, *The Psychology of Learning Mathematics*

*Take control of your child’s math program, and customize it to his needs. If it is presenting a concept that he already knows, or if it’s very simple, use the Montessori three part lesson to present it to him, have him parrot it back to you, then have him apply it to another situation. Then go on to the next lesson, or spend the time doing non-traditional math instead. Boycott boring math work – do something challenging instead!

*Don’t say “What is THE answer?” Say “How can you simplify this?”

*Quite often explanations cause more confusion than they eliminate. Usually what is wanted is more hands-on time with the problem, by the learner. If he’s not getting stressed by the problem, let him continue to work on it.

*If he is working himself into a state of “math anxiety,” intervene, but don’t just tell him the answer. Redirect him to his manipulatives, have him substitute simple numbers for the complex ones, or, through directed questioning (the Socratic method), lead him down the path toward the solution.

*Let your child see you challenging yourself with interesting math problems. Explore together the wild world of math and logic: tessellations and mosaics, probability, infinite series, the Fibonacci series, irrational numbers (π , square root of 2), the golden rectangle, volume to surface area

ratios of cubes, ancient and modern puzzles of all types.

*Reserve for the child the moment of discovery!

Book Resources (a list of math literature is available on Melissa Orton's handout for her *Math for Smarty Pants* class)

First, a very thought-provoking, paradigm-shifting article: *A Mathematician's Lament* by Paul Lockhart (online). Even if you disagree with him on some points, your attitude toward math will never be the same after you read this. (Excuse his French – he's very upset about the state of mathematics education in America today.)

The Joy of Mathematics and *More Joy of Mathematics: Exploring Mathematics All Around You*, by Theoni Pappas. We love everything she's written, and these are full of interesting ideas.

Mathematics: a Human Endeavor – a book for those who think they don't like the subject, by Harold Jacobs. Our favorite fun math book, many sections applicable to kids as young as 8.

Calculus By and For Young People, by Don Cohen. Age 7 and up, get the workbook

Proofs Without Words: Exercises in Visual Thinking, by Roger B. Nelson

What is Calculus About?, by W.W.. Sawyer

The Joy of Pi, by David Blatner

Martin Gardner's books

"Puzzles Old & New", by Slocum and Botermans

Math and logic games and manipulatives

ThinkFun games: Tip Over, Rush Hour, Top This, and City Crossing

Blockus, Chess, Set, Equate, Sudoku, Mighty Mind, Mind Benders, Tic Tac Twice,

Algebra Gear by Henri Piccioto, "Weigh To Learn Math" set

Video programs

The Story of One, PBS, starring Terry Jones of Monty Python fame, tells the story of the development of our number system (preview - brief native nudity)

The Elegant Universe – a fascinating view on new theories emerging about other dimensions and the essence of matter and energy – watch online at PBS.org

The Joy of Math, The Great Courses video series, 24 half-hour lectures taught by Professor Arthur T. Benjamin – available in many libraries (high school level and up)

The Joy of Thinking and the Beauty and Power of Classical Mathematical Ideas, The Great Courses video series, by Professors Edward Burger and Michael Starbird

The Standard Deviants is another video series that we've used to introduce a subject or review it. Wide range of topics on a variety of levels, available at many libraries. Silly but very engaging!

Cool Math Web Sites

artofproblemsolving.com

cut-the-knot.org

gwydir.demon.co.uk/jo/index

joyofpi.com

mathman.biz (web site for *Calculus By and For Young People*, with sample problems)

mathworld.wolfram.com (a HUGE web site – check out the "Recreational Math" tab)

Teaching Math Web Sites

mathedpage.org

mathforum.org/t2t/

Jennifer Georgia and her husband Paul have been homeschooling their children since birth, and their oldest is now a junior in college.

www.georgiatimes.blogspot.com