

The M20 Vent Reflection

## Number 2

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# Sudoku: Questions, Variations and Research



Sudoku puzzles and their variants are linked to many mathematical problems involving combinatorics, Latin squares, magic squares, polyominoes, symmetries, computer algorithms, the rook problem, graph colorings, and permutation group theory. In her keynote address, Laura Taalman will explore variations of Sudoku and the many open problems and new results in this new field of recreational mathematics. Puzzle handouts will be available for all to enjoy!

Laura is an Associate Professor of Mathematics at James Madison University. She received her Ph.D in mathematics from Duke University, and her undergraduate degree from the University of Chicago. Her research includes singular algebraic geometry, knot theory, and the mathematics of puzzles. She is

the author of a textbook that combines calculus, pre-calculus, and algebra into one course, one of the organizers of the Shenandoah Undergraduate Mathematics and Statistics (SUMS) Conference at JMU, and a recipient of the MAA Trevor Evans award and the MAA Alder Award. As part of Brainfreeze Puzzles, she is an author of the puzzle book Color Sudoku.

## Middle School Session Proves Interesting...

Paul Warne's Middle School Session has the interesting title: "Sponge Bob and Patrick Help Show Why a Negative Times a Negative is a Positive!" or The Answer to the Question: "When will I ever use this?" He provides the following details of his presentation:

Problem-solving skills can be found atop everyone's list of desirable traits, whether it be NCTM standards or monster.com's job listings or parents of teen-agers. Instilling such skills in students is a major goal of the teaching profession, and problem-solving ability is something employers actively seek. Students themselves should embrace the development of these skills not simply for their appeal to employers but also as a critical tool for managing their own lives. When one peels away the layers of what it means to have effective problem-solving skills, we find at the core the need for proficiency in deductive reasoning. The foundation of deductive reasoning was laid by Aristotle, Thales, Pythagoras, and other Greek philosophers between 600-300 B.C., but how do we sow and cultivate this vital skill in our 21st century students, many of whom often find it difficult to perform a careful, deliberate, and logically-based progression of reasoning? I believe the answer is a broad and consistent exposure to mathematical proof. It is really only in mathematics where any kind of a clear, precise, axiomatic structure can be set as a foundation upon which to build, and here where a student can effectively grow their deductive reasoning skills. This is accomplished through the method of proof. In other disciplines, most problems are typically far too complex and "unruly" to be able to distill out a set of basic underlying properties from which to build indisputable arguments. Proof is both the heart and soul of mathematics and yet most students, when asked "What is mathematics?", rarely recognize this but instead tend to view mathematics as a set of manipulation skills that they either have or have not mastered. This type of thinking then lends itself directly to the dreaded question students most often ask throughout their young mathematical careers: "When will I ever use this?" ("Will this be on the test?" is a close second :(). When mathematics is viewed as developing and carrying out proper deductive reasoning skills, the "When will I ever use this?" question has a very simple answer: "Every day for the rest of your life." And when students can begin to view mathematics more as a means to understand the process of why things work the way they do instead of mainly as a series of manipulation techniques they need to memorize, that second question can often fade in popularity too. Typically, students claim that their first notable (and often unpleasant) exposure to proof arrives in high school Geometry.

What I would like to discuss in an open setting are some creative ways to emphasize proof and its relevance across the K-12 mathematical curriculum. As a starter for the discussion I will offer a proof, developed for middle school students and based on the axioms of the real number system, which indisputably argues that the product of two negative real numbers is a positive real number.

Paul was born and raised a “Buckeye” in northeastern Ohio. He graduated from Ashland College (in his hometown of Ashland, OH) with a B.A. in studio art and minors in mathematics and technical theater, and made his way to Middletown, CT to teach math at Xavier High School. After two years in the classroom, Paul moved to Virginia and over the next seven years earned a M.S. in mathematics from JMU and a Ph.D. in applied mathematics from UVA. He taught at The Webb School of Knoxville while his wife Debra (who also earned a Ph.D. in applied mathematics from UVA) began her career as an assistant professor of mathematics at the University of Tennessee. In 1996, he became an assistant professor of mathematics at Maryville College in Maryville, TN. From 2000 to present, Paul and Debra have been faculty members in the Department of Mathematics and Statistics at JMU, continuing to invest in the next generation of young mathematicians, and trying to keep up with their five daughters.

## **Other Sessions Feature Local Educators**

Doug Ameigh’s High School Session, *Sketchpad and Smartboards for Interactive Math Lessons* will show powerful ways to combine the use of Geometer’s Sketchpad with a Smartboard to investigate real-world problems in an interactive manner. This is Doug’s second year at Spotswood High School, having taught previously in Henrico County. He is a graduate of Clemson University.

Harvey Almarode will show K-5 teachers some of his many techniques for teaching math using the SmartBoard. Harvey teaches Elementary Math Methods classes now at JMU and was Augusta County’s Curriculum Supervisor for K-12 Mathematics and Instructional Technology for 17 years prior to coming to JMU. Before that he was a high school mathematics teacher at Stuarts Draft for 16 years.

## **PreK-8 Mathematics Specialists Program to be offered at James Madison University**

The M.Ed program will consist of 36 graduate credit hours offered over a three-year period. The application process will start in early Spring 2009. Drs. LouAnn Lovin and Ann Wallace will be visiting area schools in December 2008 to offer informational sessions for interested teachers. In the meantime, if you have questions, please contact LouAnn at [lovinla@jmu.edu](mailto:lovinla@jmu.edu).

## **Algebra I Add-On Endorsement Course to be offered at JMU**

The JMU Department of Mathematics and Statistics will offer "Virginia Algebra Project: Probability and Statistics", a course developed through the VDOE initiative "Mathematics and Science Partnership: Virginia Algebra Project." The course is designed for those teachers desiring the Algebra I Add-on endorsement. All materials are provided, and \$450 is allotted to each participant for tuition assistance. The math department has negotiated a tuition rate of \$600 through the JMU Outreach program. This is considerably lower than JMU’s usual graduate tuition. There must be at least 12 students enrolled in this course in order to offer it. November 15 is the deadline for the decision whether to offer the class. For more information contact Judy Kidd at [kiddjb@jmu.edu](mailto:kiddjb@jmu.edu).

# New State Superintendent of Public Instruction is Math Educator, JMU Graduate

Dr. Patricia I. Wright became Virginia's superintendent of public instruction on October 1, 2008, after being appointed to the position by Governor Timothy M. Kaine in July 2008. Prior to her appointment as the commonwealth's chief school officer, Dr. Wright served as chief deputy superintendent, acting superintendent, deputy superintendent, assistant superintendent for instruction, director of secondary instruction, associate director of secondary instruction and state mathematics specialist. She has 33 years of experience in the education field primarily in math education. Before coming to VDOE in 1985, Dr. Wright taught mathematics for 10 years at the secondary and middle school levels in Sussex County and Chesterfield County public schools. Dr. Wright received her doctorate in mathematics education from the University of Virginia, a master's degree in mathematics education from Virginia Commonwealth University and a bachelor's degree in mathematics from James Madison University. Dr. Wright is a native of Brunswick County and a product of Virginia's public school system.



## News from the Virginia Department of Education

- DOE releases **Number and Number Sense Module**. This module supports the 2001 Mathematics Standards of Learning and provides instructional activities correlated to the number sense strand of grades kindergarten through five Mathematics Standards of Learning. The purpose of the Module is to enhance elementary school teachers' content knowledge, and use of appropriate instructional strategies for teaching number and number sense concepts. The Number and Number Sense Mathematics Module is available at the following Virginia Department of Education Web site address:  
[http://www.doe.virginia.gov/VDOE/Instruction/Elem\\_M/number\\_sense.html](http://www.doe.virginia.gov/VDOE/Instruction/Elem_M/number_sense.html)
- "Double Testing" no longer allowed. SUPTS. MEMO 253, October 10, 2008, states "Please be advised that in cases where students in grades 3-8 have been double tested, only one test score, that of the accelerated content, will be counted in the calculation of Adequate Yearly Progress (AYP) and accreditation for the 2009-2010 school year based on tests taken in 2008-2009." Many school divisions have double tested 8<sup>th</sup> graders who take Algebra I in the past, also giving them the Grade 8 math test.
- Virginia Online Algebra Tutorial available again. The Virginia Department of Education is offering the Virginia Online Algebra I Tutorial again for 2008-09. The Algebra tutorial is designed to determine student academic needs through an online assessment and to tailor Web-based lessons to those needs. Upon completion of all recommended lessons, students will take a final online assessment. Students may review tutorial lessons and retake the final online assessment until they and their teachers are confident the student is prepared for the Algebra I assessment. Registration will remain open all year. The Virginia Online Algebra I Tutorial is available to students in grades 9 through 12 who have passed Algebra I (or Algebra I, Part 1, and Algebra I, Part 2; or have completed the algebra content in an integrated course series) but have failed the Algebra I Standards of Learning assessment. Teachers may also enroll high school students who are at risk of not passing the Algebra I Standards of Learning assessment. Individual students may be registered only once for each tutorial. Additional information can be found in SUPTS. MEMO NO. 236 dated September 19, 2008
- The Algebra, Functions, and Data Analysis Standards of Learning Enhanced Scope and Sequence is available in Word and PDF format on the Department of Education's Web site at <http://www.doe.virginia.gov/VDOE/EnhancedSandS/mathematics.shtml>. This resource is intended to help teachers align their classroom instruction with the Algebra, Functions, and Data Analysis Standards of Learning that were adopted by the Board of Education on June 28, 2007.



## Conferences Coming Up...

The 2009 NCTM conference: *Equity: All Means All* will be held in Washington, DC from April 22-25, 2009. The 2009 VCTM conference will be Friday, March 13 – Saturday, March 14 at the Virginia Beach Resort and Conference Center/ Don't forget that the VCTM conference will be at JMU on March 12-13, 2010!



## Great Middle School Problem Solving Website

NCTM sponsors a wonderful sight aimed at helping middle school students improve their problem solving ability. Check it out: <http://www.figurethis.org>



### 2008-2009 V<sup>2</sup>CTM Officers

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### V<sup>2</sup>CTM Fall 2008 Meeting Registration

Return this registration form to Joe Hill, Rockingham County Public Schools,  
100 Mount Clinton Pike, Harrisonburg VA 22802. Better yet, register on the web at  
<http://www.rockingham.k12.va.us/register>  
You may pay at the door on November 6.

Name \_\_\_\_\_

School \_\_\_\_\_

School Address \_\_\_\_\_

Home Address \_\_\_\_\_

Annual Membership & Dinner Fees ..... \$10.00

Student Membership & Dinner Fees ..... \$5.00

Enclosed \_\_\_\_\_

E-mail Address \_\_\_\_\_

# See you at Cub Run Elementary School on November 6!

V<sup>2</sup>CTM Reflection

Joe Hill, Editor

Rockingham County Public Schools

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Harrisonburg VA 22802

**PLEASE SHARE THIS NEWSLETTER WITH ALL MATHEMATICS TEACHERS,  
GRADES K-12**