



REFLECTIONS

REFLECTIONS

Vol. LI No. 4

Winter 2006

DO YOU SUDOKU?

3		8					7	4
1		5		6			8	
	2	6		7	9			
9					2	3		
5	8		7		6		2	1
		4	1					5
			9	4		8	1	
	3			1		5		6
7	4					9		2

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About the Front Cover:

The sudoku is the latest craze in number puzzles. Originating in Japan, they have become very popular in the United Kingdom, Australia, and all over the world. Check out these Web sites and watch the magazine racks in stores for entire books of them.

President's Submission



by Dottie Whitlow
GCTM President

About this time of year, we teachers tend to get weary. We often wonder why we do what we do and begin to think our work is in vain. Even though we pour out our hearts and souls, our students don't appear to be learning. The dilemma is that the harder we teach, the less students seem to understand. Consequently, we do not see the progress we expected to see.

The winter days are short and the nights are long, made even longer by the endless stacks of papers waiting to be graded. Our family responsibilities pull us one way and duties as a teacher pull us another. With five months left in the school year, we ask ourselves, "How can we survive?"

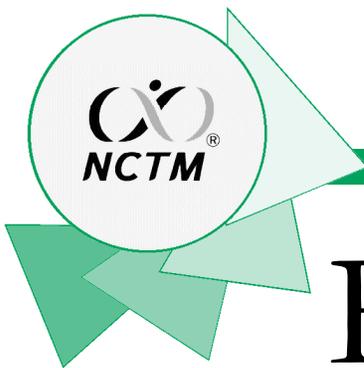
So how can we get through the rest of the year and still make a difference? The answer is that we have to have a plan. The secret to a successful teaching plan is to do something different. The Master Teacher series outlines several suggestions to give new life to your teaching, which we all need mid-year.

- **Rearrange your classroom.** Turn student desks and orientate your classroom in a new direction. Bring in a plant, put up a poster that celebrates mathematics or add a new piece of furniture to your teaching space. Surprise students by using a different wall for your overhead projector.
- To keep things fresh, **try a new teaching strategy**—even one new technique will catch your students off guard. A new, innovative approach will be a welcomed change for both for you and for your pupils.
- **Try looking at your students in a different light** and with a new outlook. A viewpoint from a fresh perspective might help you to better appreciate and understand your students. Empathize with your children. Remember how it was when you learned something new. Remember how it felt not to understand a concept the first time it was presented.
- **Say something positive** to your students every day collectively as a class. Try to speak to each student individually as they come in the door. Find a point of interest they have outside of your class and ask about it. Are they interested in sports, arts, farming, or volunteering? Ask how the progress they are making.
- **Find someone to help or mentor.** As you advise them, you may remember something that helped you at one time that you can implement again. If that's not possible, observe an older, more experienced teacher. Ask him/her for suggestions for your class or your situation.
- **Take at least one specific action to lift your spirits personally.** Do something for yourself. Mental health is as crucial to success as physical health.

After you have tried one or more of the suggestions above, then go do what you know how to do. Take it one day at a time. Don't think, "I have five months to go." Instead, think,

"I CAN DO THIS!"

With this resolve, be the best teacher possible. We at GCTM are here to help you. If you need us, you have only to email, and we would be happy to offer our support. Have a great second semester!



All-Time High in Math SAT Scores a Result of Greater Focus on Math in Schools

Reston, VA, August 30, 2005—The highest math scores ever on the SAT are another encouraging result of an increased focus on mathematics education in U. S. schools, the National Council of Teachers of Mathematics (NCTM) said today.

In response to today's release of 2005 SAT scores by the College Board, NCTM President Cathy Seeley said, "The recent increased focus on improving the mathematics education of our students continues to pay off. A focus on mathematics teaching and course-taking seems to be preparing more students for the future. Today we're seeing many students with the opportunity to take high-level courses who might not have been encouraged to do so in the past."

The average SAT math scores continued a strong upward trend, increasing from 518 in 2004 to 520 this year, 14 points above the mark of 10 years ago and an all-time high. Math scores for females rose by 3 points over last year, to 504, while scores for males rose by 1 point, to 538, over the same period. The College Board also reported that more high school students are taking demanding courses such as precalculus, calculus, and physics. Since 1995, there has been an 11 percent increase in the number of students enrolled in precalculus (37 to 48 percent) and a 5 percent increase in the number enrolled in calculus (22 to 27 percent).

"The trend of more students taking higher-level courses is encouraging," Seeley said. "The

Council has long been a proponent of more and better mathematics for all students. More than ever before, in today's world students need to take math every year of school, and they also need to take higher-level courses in high school. We still have a long way to go in terms of tapping the untapped potential in many classrooms, but these scores are one indication of the value of having more students pursuing a challenging curriculum."

Gaston Caperton, president of the College Board, said, "I am encouraged by the improvement demonstrated in math, a fundamental skill that students need to succeed in college and, later, in a highly competitive global marketplace." More students took the SAT this year than ever before, the fifteenth year in a row that the total number of test takers increased.

The National Council of Teachers of Mathematics was founded in 1920 and is a nonprofit, nonpartisan education association. With more than 100,000 members and more than 240 Affiliates located throughout the United States and Canada, NCTM is the world's largest organization dedicated to improving mathematics education for all students. The Council's Principles and Standards for School Mathematics provides guidelines for excellence in mathematics education.

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Contact: (703) 620-9840

Shannon Andrea, Communications Coordinator

Have YOU visited www.nctm.org lately?

Membership Article



by Susan Craig
Membership Director

As the second grading period ends this week, I find it hard to realize that one-third of this academic year has passed. This time of year brings time for reflection and thanksgiving, family and friends.

Since I just returned from my annual “retreat” at Rock Eagle with so many of you, it is appropriate to realize how many friends I have made through the years at our annual Georgia Mathematics Conference. Each year offers an opportunity to renew those acquaintances and to catch up—all while reinvigorating myself, and my mathematics teaching—and all because I am a member of GCTM. It is truly the best investment I have made in my professional life.

Since this time last year we have increased membership by 120 teachers, about a 7% increase. We have many new student members, ones we hope will be members for years to come and future leaders in GCTM. There are many teachers who have never been members. One teacher I met at Rock Eagle “a veteran teacher” had never heard of the conference before. A new department chairman brought

information to her and she says she will never miss GMC again.

There are also many other teachers who are members because they join as part of their conference registration, and they attend the conference only in alternate years. So there are many teachers for us to ask to make their biannual commitment into an annual membership. There are also many who just don’t know the benefits to be found in GCTM membership. I imagine that you know someone in your school fitting one of these descriptions. Please take the membership form from this issue or print one from www.gctm.org and give it to them. Ask them to mail it today. We have so much to offer mathematics teachers in our state. So get out there and encourage your colleagues. I’ll be thankful this season for all

these renewals and applications!

Thanks for your commitment to Georgia’s students and to GCTM! Happy Holidays!

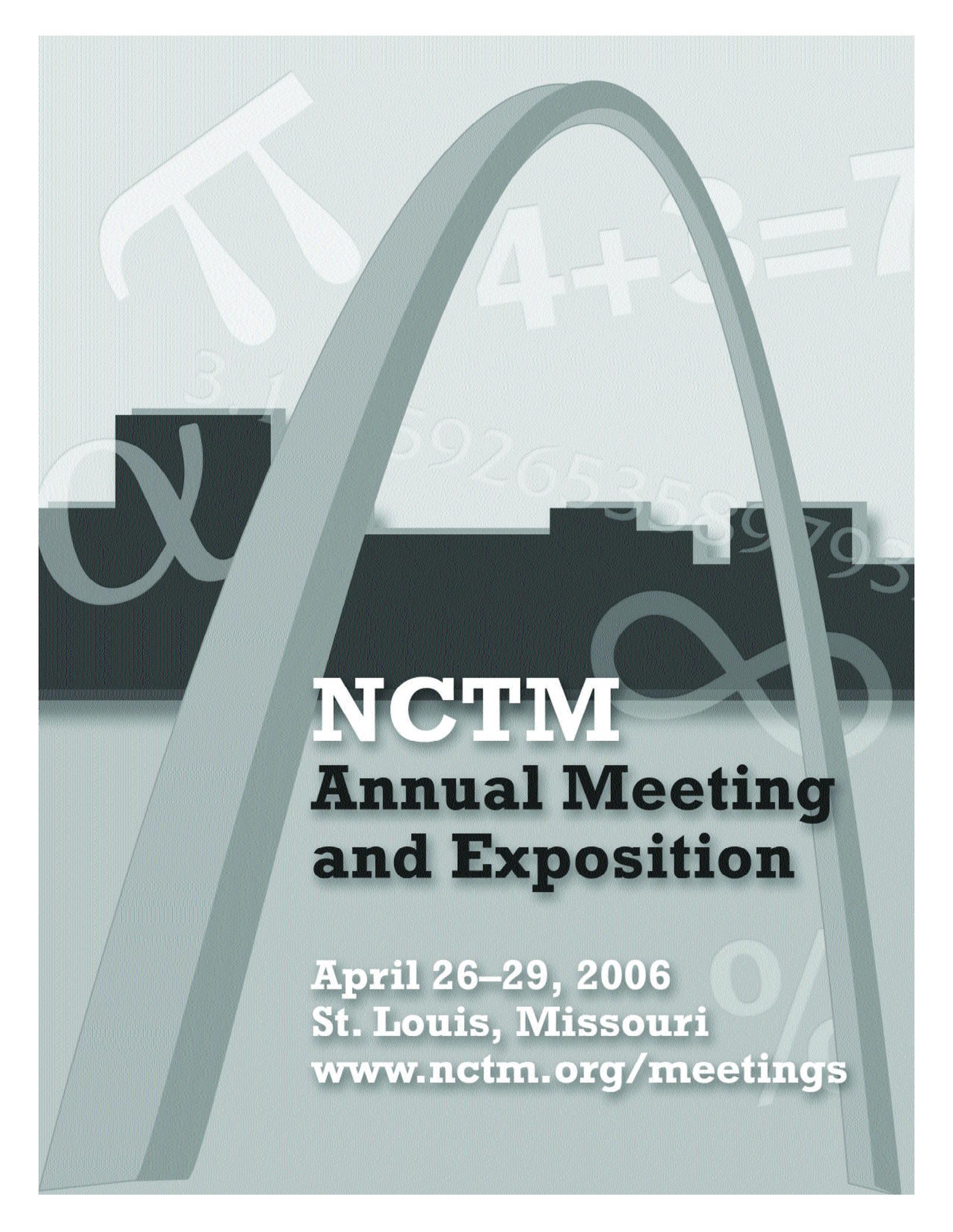
We have had several new life members in the last year or so. They are:

- Martha A. Allen
- Tracy E. Beard
- Carl Chenard
- Chuck Garner
- Gary LeMay
- Jean Linner
- Peggy Pool
- Barry E. Shealy
- Doug Wagner

Congratulations on your lifetime commitment to Mathematics Education in Georgia!

Membership Report November 2005

	2005	2006	2008	Life	Student	TOTAL
NW	63	26	0	24	44	157
NE	110	14	0	45	90	259
MetroW	161	42	0	81	28	312
MetroE	300	41	0	39	28	408
CW	127	47	0	71	26	271
CE	146	45	0	61	41	293
SW	103	30	1	42	1	177
SE	131	22	1	70	4	228
Out of State	4	2	0	14	0	20
TOTALS	1145	269	2	447	262	2125

The background features a large, stylized archway in shades of blue and grey. Behind the arch, there are various mathematical symbols and numbers in a light blue, semi-transparent font, including the Greek letter alpha, the number 3, the equation 4+3=7, the number 592653589, and the number 93. The overall design is clean and professional, emphasizing mathematics.

NCTM

Annual Meeting and Exposition

April 26–29, 2006
St. Louis, Missouri
www.nctm.org/meetings

Volunteer for a Committee for the 2006 NCTM Annual Conference & Exposition!

Are you READY? The 2006 NCTM Annual Conference and Exposition will be in St. Louis during April 26-29, 2006! YOUR HELP IS NEEDED!! In fact, we're going to need about 600-800 volunteers to host this great professional opportunity for folks from around the country and the world. Make plans to attend and arrange your schedule so that you can volunteer some time, energy, or expertise. You can choose to volunteer for several hours, a half day, or even a full day. And to identify you as a Volunteer VIP, you will receive a distinctive T-shirt made especially for volunteers. Share this invitation to volunteer with your colleagues as well as your professional mathematics friends in other states.

—Jane T. Barnard, Publicity Co-Chair, 2006 NCTM Annual Conference and Exposition

1-Fill out the online Volunteer Form at www.nctm.org/meetings/stlouis/volform.htm

2-Please identify the committee(s) on which you would like to serve.

- **Hospitality:** Staffs the Hospitality Desk during the Annual Meeting hours; offers attendees information on and directions to local services, sites, events, facility.
- **Meeting Rooms:** Checks meeting rooms between presentations; places "Session Full" signs outside of meeting rooms; clears meeting rooms after presentation.
- **Speaker Support:** Staffs the speaker check-in support desk and welcome speakers.
- **NCTM Bookstore:** Assists staff to unpack, sort, and display NCTM materials; supports staff in assisting Bookstore customers during exhibit hours; helps box the remaining materials at the end of the meeting.
- **Special Events:** Assists with special entertainment events.
- **Special Needs:** On-site assistance with individuals with special needs; assists with special needs equipment
- **Signs:** Arranges for presentation signs to be placed outside each meeting room and changes signs as needed.
- **Student Hosts:** Recruits and trains students to work as helpers at the Annual Meeting.
- **Technology:** Staffs and assists in the Cyber Café and/or computer workshop labs.
- **Student Exhibits:** Sets up and breaks down the exhibits. Assists students during exhibit hours.



NCTM Promotes Political Advocacy Through Affiliates

In 2003, the Board of Directors of the National Council of Teachers of Mathematics (NCTM) identified political advocacy as one of its key strategic directions for the future. The Council embarked on a plan to lay the groundwork for future success in advocacy, first conducting a stakeholders' audit of key external and internal audiences: news media, policymakers, third-party influencers (think tanks and policy organizations), NCTM leadership and members, and other related organizations. Recommendations based on the findings of the audit have guided the Council's actions over the past two years.

NCTM has taken the first steps toward building a culture of advocacy within its membership and toward more assertively contributing to the public policy process in ways that benefit teachers, mathematics education, and society. With a membership of nearly 100,000 members, the Council has a significant resource to draw upon for these efforts.

The NCTM Advocacy Toolkit was the first major step toward engaging individual members as advocates. The toolkit, which was introduced at the NCTM Annual Meeting in Philadelphia in 2004, brings together existing NCTM information and new communications materials to give individuals guidance in how to make a difference in the public policy process. The toolkit includes the following materials:

- **NCTM Legislative Platform:** Board-approved NCTM statements on broad issues, the foundation of NCTM government relations activities
- **NCTM Communications Guide:** Basic how-to information for individu-

als dealing with policymakers and news media

- **Congressional Directory:** Contact information and committee assignments for all members of Congress
- **Principles and Standards Executive Summary:** A concise summary of NCTM's Principles and Standards for School Mathematics)
- **Principles and Standards FAQs:** Answers to frequently asked questions about the Standards
- **NCTM Key Messages:** Concise statements on key issues
- **NCTM at a Glance:** Basic background information about NCTM
- **NCTM Position Statements**

NCTM Advocacy Toolkits are available to members upon request through NCTM headquarters or via the Web site at www.nctm.org/advocacy. There is no charge for the toolkits, although those who request one are asked to provide information that will be included in a database of advocates that will be used for future NCTM advocacy activity.

Contact Congress Via NCTM.org

The next phase of the advocacy effort was the integration of software within the NCTM Web site that allows visitors to contact members of Congress electronically. The Advocacy Web page can be found at

www.NCTM.org/advocacy. This Web page makes it simple for individuals to participate in the policymaking process and to actively support math education. In addition to providing a quick link to Congress, the page offers tools that help visitors stay informed about key federal legislation.

It also makes visitors aware of urgent legislative issues with Action Alerts. One click from the Action Alert box takes individuals to a sample letter that can be sent immediately as written or that can be revised and personalized. The Advocacy page makes it easy to take action. It provides contact information for members of Congress; offers general advice, including tips on how to telephone elected representatives; provides hyperlinks that connect to information about recent votes and current legislation; and provides easy access to national and local news media sources.

Members as Constituents

The NCTM leadership heard from its members that more political action was needed and expected from the Council. In its ongoing government relations work, NCTM works with other education organizations in Washington,

many of which have similar interests and priorities. The organizations that are most successful in their legislative efforts have one thing in common: They are effective at getting their members to act as constituents by writing, faxing, e-mailing or calling Congressional offices when the issue and the time are right. The Council's large membership is a great potential resource in the same way. The Advocacy Toolkit and advocacy page of the NCTM Web site enable individuals to support mathematics education and make their voices heard.

Increasing support and involvement of NCTM Affiliates is a next step in the Council's advocacy plans for the future. For the last two years, an advocacy strand has been part of the NCTM Affiliate Leaders Conferences. NCTM Director of Communications Ken Krehbiel has presented an overview of the Council's advocacy activities and plans, and attendees have participated in a role-playing activity and received NCTM Advocacy Toolkits. All attendees also received NCTM Advocacy Toolkits.

To learn more and to support the Council's advocacy on behalf of mathematics education, go to www.NCTM.org/advocacy.

Calling All Teachers—

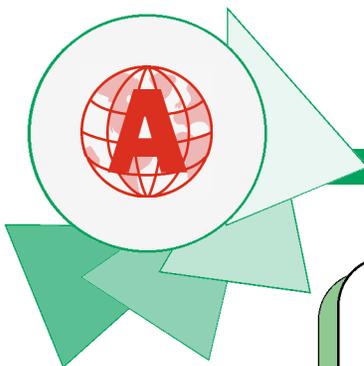
Send pictures of your student projects, bulletin boards, or activities, to be included in the next issue of *REFLECTIONS*.

Send to:
Cheryl Hughes at chughes@gctm.org

Check out the Awards offered by GCTM

You might be eligible for one, or you might want to nominate someone else. The deadlines are right around the corner.

www.gctm.org



TI, in association with NCTM, Partners with *NUMB3RS*, the Paramount Network Television Series for CBS, to Launch an Innovative Math Education Program

Texas Instruments and National Council of Teachers of Mathematics to Engage Students Using Math Concepts from Hit TV Series

Dallas and Los Angeles, September 2005—Texas Instruments (TI) will lead a math education initiative based on the hit series *NUMB3RS*. In partnership with CBS, and working in association with the National Council of Teachers of Mathematics (NCTM), TI has created an educational outreach program promoting the many uses of mathematics and supporting math teaching. The program begins with the first episode of the season, premiering Friday, Sept. 23 at 10:00–11:00 PM, ET/PT and 9:00 PM CT on CBS.

The program includes TI and NCTM-developed math education activities for teachers and students based on the *NUMB3RS* TV show. The activities will be based on the mathematics presented in each episode, and will be available at cbs.com/numb3rs.

NUMB3RS, which premiered on Jan. 23, 2005, focuses on FBI agent Don Eppes (Rob Morrow) who recruits his mathematical genius brother Charlie (David Krumholtz) to help the Bureau solve a wide range of challenging crimes in Los Angeles. Inspired by actual cases, the series depicts how police work and mathematics provide unexpected revelations and answers to the most perplexing criminal questions.

Math teachers began using

NUMB3RS content informally during the show's first season as a supplemental teaching tool to encourage their students to get more interested in math with positive results. This year the effort is being made official with financial and operational support from TI, in association with NCTM, so that the nation's math teachers in grades 9–12 will receive high quality, engaging activities that have been developed by classroom teachers and leading mathematicians for students at grade-appropriate levels.

"TI is proud to work with *NUMB3RS* and NCTM to promote student interest in mathematics," said Melendy Lovett, president, Educational & Productivity Solutions, Texas Instruments. "TI has long worked with math and science educators, and we view our *NUMB3RS* program as another way to help classroom teachers show students the real world relevancy of math."

"It is really gratifying to know that *NUMB3RS* can serve a purpose beyond pure entertainment. We are glad that TI and NCTM see the educational value in our show and we and the cast of *NUMB3RS* look forward to doing whatever we can to spread the word that 'Math is cool!'" stated *NUMB3RS* Executive Producers and co-Creators Cheryl Heuton and

Nicolas Falacci.

NCTM, the nation's largest and most respected association of mathematics teachers, will work with TI and *NUMB3RS* to create special classroom activities corresponding with the math used in each episode of *NUMB3RS*. Students will have the chance to more deeply explore the math derived directly from the concepts highlighted in each week's episode.

"We're proud to be working in association with TI and *NUMB3RS* to implement this exciting educational outreach program," said Cathy Seeley, NCTM president. "By emphasizing the real world applications of math, we hope to motivate students to go further and learn more challenging mathematics while raising their awareness of how 'we all use math every day.'"

TI will also be conducting sweepstakes, commencing in 2006 that will incorporate math questions in an "Open Book Quiz." Two students and one teacher will each win a trip for four to Hollywood to meet cast members of the show. The two winning students will also receive scholarships. The winning teacher will also win a walk-on part on *NUMB3RS*. Teachers can find additional program information and order a classroom start-up kit at cbs.com/numb3rs.

NEXT ISSUE

Deadline: Feb. 15, 2006

Topics:

- **Math in the summer for teachers and students**
- **Technology in the math classroom**

Job Opportunity

GCTM seeking a new editor for *REFLECTIONS*.

All interested parties please contact Cheryl Hughes at chughes@gctm.org.



VOLUNTEER NOW

to be part of the planning and operation of NCTM Annual Conference to be held in Atlanta, March 21 - 24, 2007

Contact Dottie Whitlow at dwhitlow@gctm.org to volunteer.

AI's Web sites

sitesforteachers.com/index.html

Links and descriptions of hundreds of educational sites on academic topics as well as lesson plans, clip art and other activities.

www.mathtv.org/MainMenu1.html

A new problem is given each week for middle school students, specifically Algebra, with video footage explaining a sample problem. Then the actual challenge problem is viewed, and students may solve it online or at their desks.

www.murderousmaths.co.uk

Puzzles, games and tricks, with book reviews by "Thag" the Mathematician, from the UK. They hope to have their publications "Americanized" soon, through Scholar Publishing.

www.fi.uu.nl/wisweb/en/presentatie_enMC.html

Applets to illustrate mathematical concepts

www.unclebobpuzzles.com

Puzzles, puzzles, and more puzzles! They will even deliver them to your email address monthly.

www.schoolhousetech.com/products/mathematics/overview.htm

A site for creating worksheets. You have to provide the material (text) and they provide the format.

www.geocities.com/cnowlen/Cathy/Math.htm

If you have Geometer's Sketchpad by Key Curriculum Press, this site provides you with sketches and proofs that are ready to use.



Writers' Guidelines

Submissions to *REFLECTIONS* should be sent electronically to Cheryl Hughes at chughes@gctm.org. Photos and handouts should be indicated in the initial email, but sent later after acceptance. Priority is given to those articles that concern the topics for the particular issue, but all inquiries are welcomed. Priority is also given to Georgia teachers, as we strive to highlight excellence in teaching in our state. Typical word count is less than 800 words, but all submissions will be considered.



Rock Eagle Awards

The Georgia Council of Teachers of Mathematics presented the following awards at the Georgia Math Conference, October 20-21, 2005.



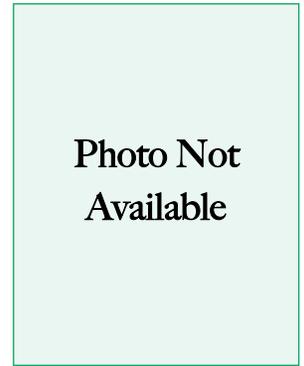
Gladys M. Thomason Award to
Christine Thomas
for her outstanding
contributions to
Mathematics
Education in Georgia



John Neff Award to
David Stone



2005 Friend of
Mathematics Award to
Paul Ohme

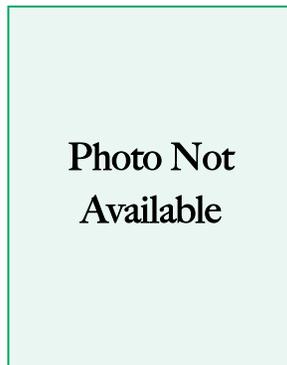


**Photo Not
Available**

Teacher of Promise
Award to
Heather Price
Oak Grove
Elementary School
Peachtree City,
Georgia



Dwight Love Award
to
Dennis Stewart



**Photo Not
Available**

GCTM High School
Math Teacher of the
Year Award to
Janet Davis
Starr's Mill High
School



GCTM Middle
School Math Teacher
of the Year Award to
Kolleen Metarko
South Forsyth
Middle School



GCTM Elementary
Math Teacher of the
Year Award to
Sharon Pinion
Sawnee Elementary

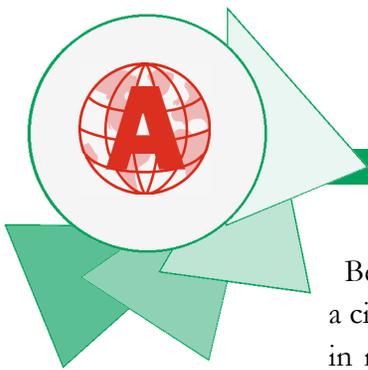
Rock Eagle Memories



People came from far and wide to present workshops this year at Rock Eagle. Some came from as far away as Peru! There were workshops for Kindergarten teachers and college professors, and everyone in between. There was a topic for everyone. On Saturday there was an actual Math Fair set up in one of the buildings, so teachers from all over Georgia could see one in progress.



Teachers and administrators listened to new ideas, tried their hand at making clinometers, created songs about math topics, and heard many new ideas. Participation was the key, and the ideas and information was there for the taking. Some even got PLUs by bringing a prior approval form and having their session form signed at each session.



Facts About Pi

Because pi (the ratio of the circumference of a circle to its diameter) is an important concept in mathematics and science, March 14 (from the date 3 - 14) has been proclaimed as a special “Pi Day.” Scientists have explored the concept of pi, an irrational number, beginning perhaps as far back as 4,000 years ago and continuing right up to the present. With the advent of the computer, pi has been calculated to more than 51 billion decimal places! Let your students create games about pi, research the history of pi, memorize pi to 50 places, or develop ways to understand pi. These can be in the form of group or individual projects, to be completed during class or to take home.

The symbol for pi was introduced by the English mathematician William Jones in 1706, who wrote: $3.14159 = \pi$

So for this special birthday year of the symbol “pi,” the sky is the limit on the possibilities for celebrating “Pi-Day.”

Here are just a few suggestions for making the day special:

- Celebrate pi day by having students create and display pi day cards, pi day poems, or pi day posters.
- Celebrate with food. The food connection is punningly obvious—students can share a pizza pie or apple pie but first must figure out the circumference and the diameter.
- Celebrate with problems about the area and circumference of circles. Use non-standard methods of measuring, then eat them in the end!

Web Resources

- **The Pi Pages:** <http://www.cecm.sfu.ca/pi/pi.html>
- **A History of Pi:** http://www-groups.dcs.st-and.ac.uk/~history/HistTopics/Pi_through_the_ages.html
- **Slices of Pi: Rounding Up Ideas for Celebrating Pi Day** by Larry Lesser
http://www.tenet.edu/tctm/downloads/TMT_Fall_04.pdf

Ready-to-Go Activities

- **Buffon’s Needle: An Analysis and Simulation:** <http://www.mste.uiuc.edu/reese/buffon/buffon.html>
- **Making a Pi Necklace:** http://mathforum.org/teachers/middle/activities/pi_day.html
- **Activities for Pi Mathematics:** <http://archive.ncsa.uiuc.edu/edu/RSE/RSEorange/Piactivities.html>
- **Pi Day Songs:** <http://www.winternet.com/~mchristi/piday.html>
- **Archimedes and the Computation of Pi:** <http://www.math.utah.edu/~alfeld/Archimedes/Archimedes.html>
- **Graphics for the Calculus Classroom: Archimedes’ Calculation of Pi:**
<http://www.ima.umn.edu/~arnold/graphics.html#archimedes>
- **The Pi Trivia Game:** <http://eveander.com/trivia/>
- **Famous Problems in the History of Mathematics: Finding the Value of Pi:**
<http://mathforum.org/isaac/problems/pi1.html>
- **Monte Carlo Estimation for Pi:** <http://polymer.bu.edu/java/java/montepi/MontePi.html>

The following page is an activity submitted by Laura Davis of Westside High School in Bibb County.

Worksheet

Name _____ Period _____ Score _____

PI DAY LAB 3.14.06

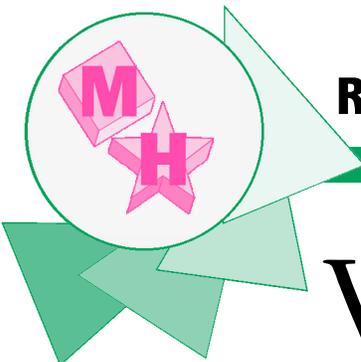
1. What is the definition of **pi**? _____

2. Round the decimal for the number **pi** to the millionth's place. _____
3. Write the Greek letter we use to represent **pi**. _____
4. When is **pi** used in geometry? _____
5. What is the definition of circumference? _____

6. Define diameter of a circle. _____

7. Write the equations of the formulas for the following.
 - a. circumference of a circle _____
 - b. area of a circle _____
 - c. volume of a cylinder _____
 - d. volume of a sphere _____
8. Measure 3 different sizes of cans. Record the circumference and the diameter. Then divide to get the quotient of the two measurements.

Can Number	Circumference	Diameter	Quotient (C/D)
a. _____	_____	_____	_____
b. _____	_____	_____	_____
c. _____	_____	_____	_____
9. On the back of this paper, write a paragraph about what you learned from this lab.



Reading π : A Book List for Middle & Upper Grades

by
Faith H. Wallace, Ph.D.
& Chris McSwain
Kennesaw State
University

With more emphasis on reading in the content areas, mathematics teachers have an opportunity to tap into the world of trade books that feature compelling details and exciting adventures centered around mathematical concepts. Trade books are books written and intended for general public use, and are not written specifically for school and academics (Harris & Hodges, 1995). That means that the author is generally passionate about the content and has a message for the reader. Trade books can be informational and present otherwise technical information in ways that grab the reader's attention. This can be achieved through captivating illustrations, little known details, and links to everyday life (Tunnell & Jacobs, 2000). Novels and short stories can provide a familiar context for presenting complex content, spark excitement for learning, and naturally introduce concepts, vocabulary, and abstract thought (Ducolon, 2000; Hunsader, 2004; Moyer, 2000; Murphy, 1999).

"The computation of pi is virtually the only topic from the most ancient stratum of mathematics that is still of serious interest to modern mathematical research."
—Len Berggren, Jonathan Borwein,
Peter Borwein, *Pi: A Source Book*

With Pi Day steadily approaching, we have compiled a list of resources that will help students understand the concept of Pi. This list contains informational trade books as well as a picture book and a screenplay, and in some cases just a chapter or two are actually devoted to Pi. All can help to expand student knowledge of the concept of Pi and build apprecia-

"Probably no symbol in mathematics has evoked as much mystery, romanticism, misconception and human interest as the number pi."
—William L. Schaaf, *Nature and History of Pi*

tion of the use of Pi within story development. We include an annotation of each selection, but we encourage you to read each text so that you can determine the appropriateness for your students. All titles are easily available through online book warehouses such as Amazon.com or BarnesandNoble.com and will make fantastic additions to any Pi Day celebration.

***Pi* by Darren Aronofsky**

Can the workings of the universe be tied to the digits in π ? In this screenplay, Max Cohen, a mathematical genius, has created Euclid, a fast and strong computer in his apartment. He believes that Euclid will help him identify certain mathematical patterns that will explain everything around us, including the workings of the universe. While being pursued by a Wall Street firm and the Kabbalah for different reasons, Max drives himself crazy trying to find the patterns within π . Is he able to find the answer he is seeking? Does he end up working for the Wall Street firm? Or does he help the Kabbalah? All this and more is the focus of this sophisticated and intriguing screenplay. This complex screenplay is suitable for very mature audiences only.

***The Joy of π* by David Blatner**

In a world filled with exceedingly advanced technology and a history of genius minds, are there limits to the knowledge humans can aspire to? Despite the persistence and bril-

liance of mankind, π has, thus far, proven to be unconquerable. Why has the study of π caused many people to dedicate their lives to journeying into its' depths? Is there any value in the uniqueness of the number? These questions any many more are addressed in *The Joy of π* . Blatner engages the reader by tracing the known history of this unique number. This is a fabulous reference for teachers to who have yet to search the depths of π . Carefully selected sections can augment any classroom instruction.

***Sir Cumference and the Dragon of Pi: A Math Adventure* by Cindy Neuschwander**

Who ever thought figuring out π could be a matter of life and death? What does π have to do with dragons and potions? Find out in this picture book as a young boy goes on a journey to figure out π in order to save the life of his father. This book would serve as a wonderful read aloud within any classroom studying the concept of π , and it can be used effectively in grade 3 and up.

***Math Talk: Mathematical Ideas in Poems for Two Voices* by Theoni Pappas**

What's better than a poem about mathematical concepts? An entire book of poetry devoted to mathematics! In this book, Pappas writes poems designed to be read aloud by two or three students. Two poems in the collection deal with the concept of π . These are great read-alouds and inspire dramatics.

***Fractals, Googols and Other Mathematical Tales* by Theoni Pappas**

Have you ever thought about the psychological effects of never knowing your exact value? In this short story, π is humorously personified. He suffers ridicule from other numbers as a result of their confidence in their position on

**“The mysterious and wonderful pi is reduced to a gargle that helps computing machines clear their throats.”
—Philip J. Davis, *The Lore of Large Numbers***

the number line. Don't fret π lovers! He builds his

indefinite self back up by telling of the adventures mathematicians have been through while studying him. This selection is a perfect reading assignment to introduce the concept.

***Math Stuff* by Theoni Pappas**

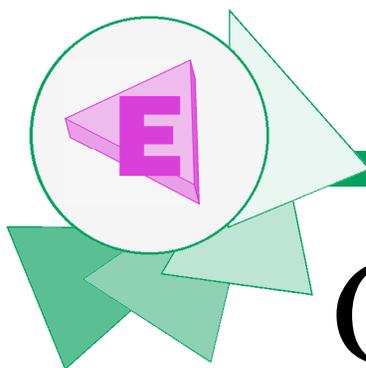
Is there any practical application to come out of the study of π ? How far has computing the digits of this infinitely long number gotten over the years? All of this is answered in this informational trade book written in an engaging manner. This is a great reference providing answers to the question commonly asked by students, “What does this have to do with me?”

**“Exploring pi is like exploring the universe.”
—David Chudnovsky**

**“It's like exploring underwater. You're in the mud and everything looks the same.”
—Gregory Chudnovsky**

*GCTM does not itself endorse or specifically recommend any of the above publications. All quotes taken from *The Joy of Pi*, by David Blatner.*

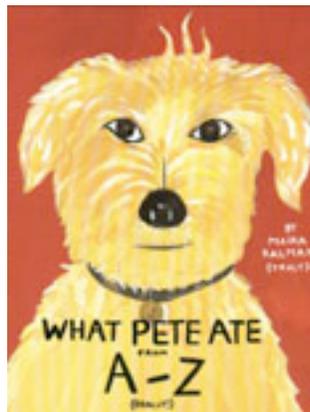
Measurement and Fraction Activities: Linking Children's Literature and Mathematics



by Dr. Barba Patton

Children's literature and mathematics are a favorable partnership for today's curriculum. Simply stated, children's picture books and students should be brought together to make learning more purposeful in all content areas, not just reading and language arts. Many textbooks become a dry collection of information packed with huge amounts of facts and details such that the content matter is unbearable and un-enjoyable for the learners. According to Richgels, Tomlinson, and Tunnell (1993), unflattering representations of incomprehensible textbooks overwhelm many of today's classrooms. Teaching and learning do not need to be this way. Options exist for teachers who are enthusiastic to use supplementary text materials. One type of supplementary material would be children's literature. Children's picture books provide students of all ages and reading levels with opportunities to interact with a human element that traditional textbooks just do not have (Ravitch and Finn, 1987). Children's literature is not meant to be the only solution to reading and learning, but it can be a source of truncated and meaningful text that is not academically insulting. Children's picture story books are a vehicle for mathematics as well as language skills to mature while students speak, listen, read and write in the mathematics classroom (Hellwig et al, 2000). This type of literature is teaching material for sparking children's interest in reading while providing the foundation for working within the various content areas.

According to Guiett (1999), students are browbeaten by the rules and regulations that mathematics levies upon them. However, this feeling of fright need not be cause for alarm because many possibilities exist for alleviating



this fear be it real or imagined by the students. One such possibility is the inclusion of children's literature into the mathematics content area. In order for students to connect the abstract concepts of math, they must be able to engage with this subject in the most natural of means; their personal lives (Whitin and Whitin, 1996). When mathematical concepts are included in useful, real-world situations, students can decode these mathematical concepts and experience a sense of success with those concepts (NCTM, 2000). Children's picture story books are the device to make this personal, real-life connection.

Book: *What Pete Ate From A-Z*

Author: Maira Klaman

Publisher: Puffin, New York

Summary:

What Pete Ate is an example of children's literature that is both educational and humorous. Pete is the author's dog, and the book describes the many adventures Pete had as he ate various valuable and sentimental belongings of his family. The illustrations fully support the text with bright colors and whimsical drawings.

Objectives:

The students will be able to divide groups of objects into groups to illustrate $\frac{1}{2}$, $\frac{1}{3}$, $\frac{2}{3}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{3}{5}$ and $\frac{4}{5}$.

The students will be able to measure objects with a standard and/or broken ruler

Pete ate parts of many things. One of the things that he could have eaten was his master's ruler. With this activity, the students will try to use their ruler after Pete ate a part of it.

Activity 1

One of the first activities is to measure Pete's bones (treats).

Often children only read the last number on a ruler and do not fully understand that they are trying to determine the number of units that the object covers. This activity just places the paper bones at random places on the floor chart and has the children determine the number of units it covers.

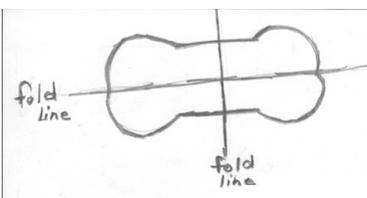


The floor chart is prepared by using the back a piece of vinyl wallpaper approximately 8' by 13'. Mark one foot intervals on the chart as 0, 1, 2, 3, ... using a permanent marker.

The paper dog bones were prepared by folding large pieces on paper in fourths and then cutting in the shape of a dog bone. One was about 2' and the other was about 3'.

Activity 2

Measuring leashes is fun and will provide practice in measuring for the children. For this



activity you will need several different leashes (or ones prepared from rib-

bon) if the real ones are not available and rulers. The children used both the broken and the standard ones successfully.

The broken rulers can be prepared by simply placing rulers on a copier, make a copy on heavy paper i.e. index paper, cut out then tear off the end. Be sure to make a number of rulers and have the children to use a different ruler for each task in order to become more proficient with the broken ruler.

Activity 3

Measuring the collar and tag can be a challenge for some children. Of course, collars range in size. Using either real collars or simple ones made with ribbon and buckles, let the children practice using their broken ruler as well as standard ones to gain more accuracy with the task.



Activity 4

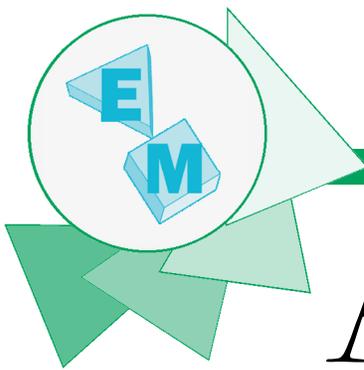


The children were able to measure the length of each piece of cheese snack to the nearest $\frac{1}{4}$ inch.

Activity 5

For a different approach to fractions, the students were able to count the number of cheese snack pieces in a bag and then divide them into two groups to determine what is one half.

CONTINUED ON PG. 26



by Tad Wanabe
Penn State University

Geometry by Tad

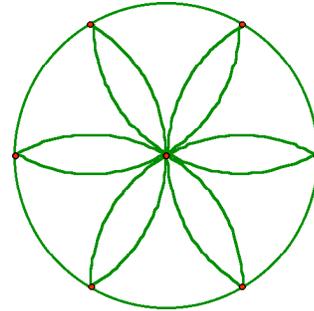
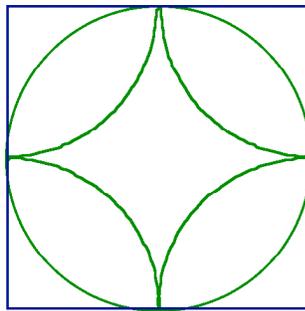
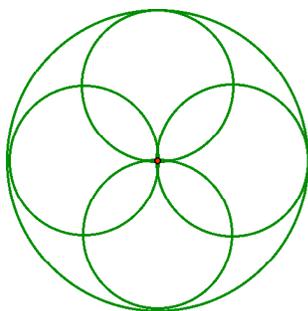
As the new Georgia Performance Standards were introduced, elementary school geometry was recognized as one area where additional attentions are needed. It is in this area that teachers need to deepen their understandings of both content and pedagogy. Furthermore, additional materials may be needed to supplement the existing curricular materials to help students meet the new standards.

As the GCTM members are well aware, the new GPS were modeled after the Japanese national standards. One features of the Japanese standards in the area of elementary school geometry is the emphasis on students actually constructing geometric figures as a way to study geometry. Here “construction” is not about the traditional high school (unmarked) ruler and compass construction, rather, the emphasis is students actually constructing geometric figures by folding papers, drawing with rulers, compass and other instruments, working with concrete materials, and otherwise physically manipulating geometric figures. Thus, Japanese textbooks include familiar activities such as making colorful designs using colored triangular tiles or colored sticks of various lengths. Activities such as tangram puzzles, tessellation with regular polygons and cutting out “snowflakes” from folded papers are also commonly seen. However, Japanese textbooks also include some activities that are not commonly seen in the U.S. textbooks. Here are three such examples.

Making Designs with Compass

Materials: compass, grid papers, colored pencils/markers

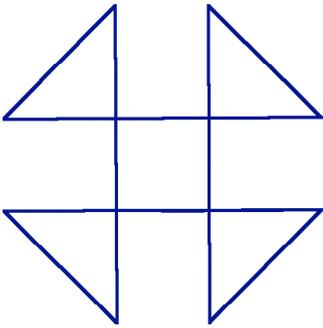
Directions: Using a compass, draw the designs shown below. Encourage students to think about where they have placed the needle (i.e., the centers of the circles). Once students complete the designs, you can encourage them to make other designs. Students may want to color the completed designs.



Making Designs with a Ruler and a Protractor

Materials: plain papers, ruler, protractor

Directions: First draw a 4 cm segment, OA. Then, draw a 2cm segment at Point A forming 45 degree angle. Now draw a 4 cm segment forming 45 degree at the end point of the second



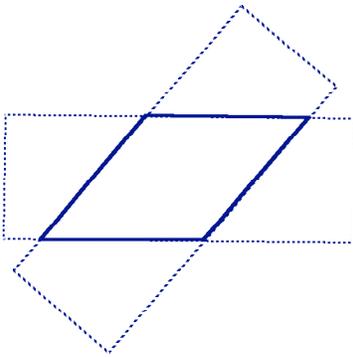
segment. Draw another 2 cm segment at the end point of this new segment. Repeat this process to see what design you get. Figure below shows what the end result looks like.

Extension: You can use explore what happens to the design if you change the lengths of the segments or the angle measurements. For example, will the combination, 3cm - 36° - 6cm - 36° work?

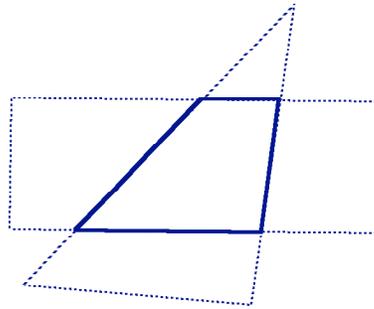
Making Quadrilaterals by Overlapping Quadrilaterals and/or Triangles

Materials: 'stencils' with rectangles and triangles of various types and shapes

Directions: Have students draw different quadrilaterals by overlapping two stencils. Sort the quadrilaterals, paying attention to what stencils were used to draw each quadrilateral. Here are two possible quadrilaterals:



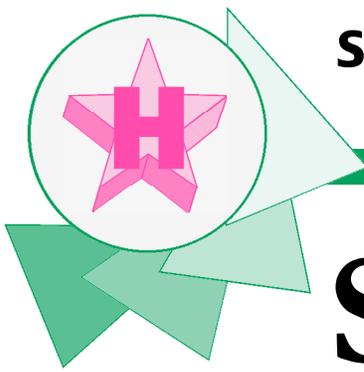
Overlapping two congruent rectangles, you can draw a rhombus.



Overlapping a rectangle and a triangle, you can draw a trapezoid

No activity automatically leads to students' understanding, and these activities are not exceptions. Although these activities might be interesting to us, we must carefully analyze what specific mathematical understandings might be developed through these activities and what prior knowledge may be necessary for such an understanding. Furthermore, teachers may want to carefully think about what tools they might provide to their students. None of the Japanese elementary mathematics textbooks I have seen incorporate dynamic geometry software. These activities can be adopted into such an environment, but before we do so, we should carefully analyze what we gain/lose by having students engage in these (and other) activities in such an environment. Textbooks can only provide some suggestions. How lessons actually happen depends on teachers.

So You've Decided to Sponsor the Math Team... Now What?



by Dr. Chuck Garner
Rockdale Magnet
School
Conyers, GA

SEPT. 27, 2005—So, you've decided to sponsor the Math Team. Or maybe your principal asked you to Sponsor the Math Team. Or possibly some students approached you about a Math Team, and you agreed. Regardless how it happened, you are now the Math Team Sponsor! Now What?

What's Available

The first thing you need to know is that the Math Team “season” is as long as you wish it to be. The first contest is in September, with the last tournament in April. This can be a year-round job, if you so choose. You may sign-up for as many contests and tournaments as you and your students can handle; the more you do, the better your team will become.

There are two types of competitions: contests (done at your school—you send in the results) and tournaments (not done at your school—you travel to another site).

Contests are a good way to involve many students at relatively little cost and effort, and provide a good introduction to many types of problemsolving. Recommended contests for your Math Team include the following.

Math League A series of six six-question timed tests given at four-week intervals throughout the year, this contest gives students a challenge and keeps them coming back! www.mathleague.com

Mandelbrot A challenging series of four seven-question timed tests, with a times team-round component of proof-based questions, this provides an excellent way to build mathematical problem-solving in a team environment. www.mandelbrot.org

AMC The American Mathematics Competition is the premier one-time

event for Math Teams across the country. This 25-question timed test is offered in three levels, one for middle school (AMC8), one for 9th and 10th graders (AMC10), and one for 11th and 12th (AMC12). The AMC is the first step to the American Invitational Mathematics Exam, and from there on to the United States Mathematics Olympiad. www.unl.edu/amc

Tournaments, although more expensive due to travel, are much more fun! At tournaments, your students get to meet hundreds of other teenagers that are also interested in mathematics. If your school has an student environment such that liking math is not “cool,” a tournament can be a great place for students to realize that they are not alone in liking math, and that even math can be “cool.”

Tournaments usually consist of two rounds: a timed written test and a speed round called ciphering. The tests range anywhere from an hour to two hours in length and from 25 to 50 questions—usually multiple-choice. The ciphering round usually consists of series of questions, given one-at-a-time, that each student must solve in under two minutes (the number of questions and the time limits vary). Some tournaments also offer a team ciphering round, where groups of four students must work quickly to solve a problem. Recommended tournaments for your Math Team include the following.

UGA This tournament, held in October in Athens, offers a 90-minute, 25-question multiple-choice test, and both an individual and team ciphering round. www.math.uga.edu/mathmeet.html

Mercer Held in November on the Macon campus, this tournament offers a 90-minute, 45-question multiple-choice test and an individual ciphering round.

[www.mercer.edu/math/math contest/contest.htm](http://www.mercer.edu/math/math%20contest/contest.htm)

Georgia Southwestern This is the first tournament established in the state (31 years ago), and still one of the best! Held in Americus in February, GSW gives students a 90-minute, 40-question multiple-choice test and a ciphering round in which students work in pairs.

www.gsw.edu/~math/mathtourn.html

Armstrong Atlantic Students work a 40-question, 60-minute multiple-choice test at the Savannah campus in February, along with a team ciphering round. www.math.armstrong.edu/tournaments

Other universities and high schools throughout the state hold tournaments. This includes the Junior Varsity State Mathematics Tournament, for 10th graders and younger, hosted by Woodward Academy. The GCTM sponsors the Middle School State Mathematics Tournament and the invitation-only Varsity State Mathematics Tournament. Check the GCTM website for more details.

Getting Students Involved

How do you attract students to a Math Team? Many people suggest bulletin board displays, announcements over the school's P.A. system, or a newsletter. Those are all great suggestions, and may work for your school, but what I

found works for me is a short 5-minute presentation in each math class at my school. Although time-consuming, this approach has advantages: the students know who I am, they can ask me questions, and I can show them a quick problem-solving strategy to give them a idea of what Math Team is like.

Okay—How do you keep them once you've got them? Start with the basic staple of life: food! Offer cookies, cokes, chips, fruit, water, and other goodies to attract them to the meetings. I gradually phase-out food offerings over the year so that the ones who only attend meetings for food eventually drop off.

Offer incentives to keep the students coming back. Tophies and books are common prizes for high scoring students, but there are more options: Math Team t-shirts, Math Team pencils, and a recognition ceremony at the end of the year are excellent options. Offer the chance for someone to earn the leadership title of "Math Team Captain." My school allows the students to earn a Math Team letter for their letter jackets, and we have Math Team recognition included as part of our school's end-of-the-year awards ceremony.

But the best way to keep students coming back is to make it fun! Challenge them, teach them, and laugh with them. If the students see that you are interested in this as much as they are, and that you find it fun, they will respond positively to that. (That's pretty good advice for the classroom, too!)

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Georgia Mathematics Education Trust

Authentic Assessment: A Powerful Motivator in the Mathematics Classroom



by

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III, Ed.D.*

*Mercer University
Tift College of
Education, Atlanta*

Motivating mathematics students is not always easy. Many components of school culture may affect motivational levels of students; these components include dispositions displayed by the teacher and fellow students, the adopted curriculum, teaching methodologies, and the physical environments of classrooms. Perhaps, though, one of the greatest influences upon student motivation is assessment. The manners in which teachers choose to assess their students' achievement levels and performance abilities cannot help but shape how students approach mathematics learning. If students are fearful of or anxious about assessment procedures in the mathematics classroom, they may fail to reach their potential abilities. Because we want the best for our students, it is crucial that we reflect on how mathematics students are assessed.

Assessment is one of the six Principles for School Mathematics embraced by the National Council of Teachers of Mathematics (2000). The keenest teachers are constantly assessing their students' understanding and achieve-

ment, in informal and formal ways, through the use of a variety of assessment strategies. They observe their students carefully, ask meaningful questions to stimulate critical thinking, and design a variety of formative and summative assessments that provide useful information regarding students' progress and understanding. Paper and pencil assessments have stood the test of time, particularly in mathematics, but by incorporating many types of assessment into our teaching, we appeal to different learning styles and intelligences.

Standardized Testing

Standardized testing is a reality that we all must face. Although standardized tests have been used for decades, many people have expressed displeasure with such assessments. A variety of reasons account for the disapproval, including the question of how well standardized tests provide information related to holistic student growth and achievement levels. There are factors of mathematics achievement that may not be able to be measured in a strict testing atmosphere, particularly when those being tested are

made to feel that their performance



is of extreme importance to their future accomplishments. Indeed, testing situations often raise anxiety levels in students. Additionally, because many standardized assessment instruments contain test items that ask for discrete details, often in a multiple choice format, students are forced into linear thinking patterns. Standardized testing situations may hinder students' demonstration of critical thinking abilities, and relevance to life outside of school is often lacking (Schoenfeld, 2002).

Authentic Forms of Assessment

Fortunately, standardized tests represent but one of many opportunities to assess student achievement in mathematics. Many mathematics teachers, having decided to explore and implement creative methods of assessing student learning and performance, are finding that authentic forms of assessment can lead to desirable results.

Through authentic assessment, students perform real-world tasks in order to demonstrate meaningful application of essential knowledge and skills. Mathematics teachers who use authentic assessment methods find that there are crucial differences between the nature of traditional testing procedures and the nature of authentic assessments. When students are allowed to demonstrate or explain what they know and what they are able to do in manners that interest them and pique their curiosity, their motivation levels tend to increase. Authentic assessment procedures stimulate students' interpretation skills, creativity levels, meaningful reflection, and oral and written communication. Not only do students find enjoyable opportunities to highlight their abilities, but teachers are allowed to assess students' mathematical competence levels using their own reflective processes and professional judgment, rather than simply marking objective test items correct or incorrect (Burke, 1999).

One special benefit of the use of authentic assessments is the resulting flexibility

granted to teachers. When teachers decide to explore authentic assessment procedures, they are presented with a wide variety of assessment opportunities from which to choose. In fact, the number of assessment options available is only limited by teachers' own imaginative thinking. The National Council of Teachers of Mathematics advocates the use of a rich variety of assessment types in



multiple learning situations, in various group configurations, and at many different time periods within the school year.

Once a mathematics teacher becomes enthused about authentic assessment, he or she should find that increased professional knowledge leads to more fruitful student assessment. Teachers have a responsibility to remain abreast of the latest research and practical developments in the fields of curriculum, instruction, and assessment. In addition to expanding their

levels of professional knowledge, teachers should embrace the idea that students' cultural backgrounds will affect the assessment measures to which they most readily respond. Certainly, the very nature of authentic assessments leads to easy understanding of why many mathematics teachers have become personally determined to use assessment procedures that are most useful to their students, most readily highlight students' strengths, and reveal possible areas in which growth may be needed (Popham, 2005).

Representative Types of Authentic Assessment

While there are many types of authentic assessment that are used successfully in mathematics classrooms, some are used extensively. These include teacher observation, portfolio assessment, and performance assessment.

Teacher Observation

Mathematics teachers are able to gain a tremendous amount of information about students' strengths, weaknesses, and developmental levels through focused and meaningful observation. As stu-

dents complete assignments, make choices among activities, and interact with other students, they not only perform the actions involved in the task at hand, but they also reveal rich aspects of their personalities and cognition levels. Teacher observation should never be underestimated as an assessment procedure.

Even informal observation of students is valuable, but teacher observation is perhaps most effective when accompanied by systematic documentation of what teachers have seen and heard. Reflecting human nature, teachers are more likely to remember events accurately if they are recorded in written form. Checklists and anecdotal evidence are

two effective methods of documenting observations. In addition to facilitating the remembrance of details of happenings, written documentation also allows teachers to revisit mathematics classroom activities and reflect upon the possible meanings of student

actions, behaviors, and responses.

Portfolio Assessment

A number of mathematics teachers are finding value in the use of student portfolios, which are collections of student work samples that highlight growth in mathematics understanding and achievement levels. Often, a portfolio, designed to “tell a story” about a student, consists of a box, binder, or crate that contains a variety of samples of student performance that have been produced in numerous contexts across time. Students are often allowed to decorate their portfolio containers according to their own tastes and interests and are generally allowed some choice with regard to what will be placed in portfolios. Among items that might be included in mathematics portfolios are student-produced explanations of mathematical problem solving, critical thinking applications, projects that integrate mathematics with other subjects, reflective journals, audiotapes, videotapes, DVDs, representations of mathematical models, photographs of students using manipulatives, CDs contain-

ing spreadsheets and other technology applications, and artwork of various types. Such eclectic collections of student work can be extremely helpful to mathematics teachers in recognizing student achievement, cognitive development, and social growth over time.

While standardized tests may reveal how students perform when presented with linear questions within constraints of time and place, portfolio assessment can help to reveal how students perform when they are unrestrained. Naturally, students need materials, encouragement, support, and sufficient time if they are to create documents and other works that reveal important information about themselves as students. In addition to requiring individual portfolios, some mathematics teachers build classroom portfolios that focus not only on individual students but also on the class as a whole. Classroom portfolios might include some of the same types of artifacts contained in individual portfolios as well as collaborative efforts that reveal the effectiveness of the group dynamics within the class. Other items that might enhance



classroom portfolios include videotapes/DVD's of classroom activities or dramatic productions, brainstorming activities, photographs, class-produced books, and scrapbooks of memorabilia. It is hoped that when students know that their contributions to individual and classroom portfolios are going to be important parts of collections, they are motivated to put forth their best efforts in completing such contributions. Just like anyone else, mathematics students enjoy knowing that their efforts are valued.

Performance Assessment

A major goal of mathematics education should be to provide students with skills that will be useful to them throughout their lives. In order to assess students' abilities, many mathematics teachers have striven to implement performance assessment. Performance assessment incorporates active involvement on the part of the student. Rather than passively completing items on a multiple choice or true/false test,



students who are engaging in performance assessment are given the opportunity to demonstrate achievement by actually “doing something.”

Examples of what students may be asked to do include participating in a mathematical experiment, describing a mathematical process, using technology to represent a mathematical model, and demonstrating the solution of a mathematics problem with manipulatives. Performance assessment allows students to highlight their talents and the activities they enjoy, while giving teachers the opportunity to assess learners in meaningful contexts.

Optimal Use of Authentic Assessment

In order for authentic assessment procedures to be most beneficial and motivational to teachers and students, they must be used thoughtfully and appropriately. Rather than employing the exclusive use of one type of authentic assessment, teachers should ensure that they include a variety of types of assessment in their classroom activities. While

some students respond well to certain forms of assessment, others may not. A diversity of assessments adds richness to the learning environment and allows the teacher to observe students in multiple contexts over time.

Certainly, if authentic assessments are well planned and are used in creative manners, they can empower students to pursue knowledge according to their own desires and interests. When students are assessed in multiple ways across authentic contexts and throughout wide spans of time, they begin to recognize patterns in their mathematical abilities. Such awareness of personal talents and skills helps students to use their areas of expertise in thoughtful and fruitful manners.

Authentic Assessment as a Motivator for Teachers and Students

Authentic forms of assessment can be motivating to mathematics teachers in that they allow for many different representations of their students' achievements. Teachers should find the classroom a more exciting place for themselves and for their students when they encourage students

to demonstrate their achievements in meaningful contexts. Furthermore, teachers who make consistent use of authentic assessments are unlikely to experience the tedium that often accompanies grading seemingly endless stacks of papers. It stands to reason that teachers are probably better at teaching when they are enjoying the processes of instruction and assessment. Authentic assessment can add to such enjoyment.

Authentic assessment also serves to be very motivating to students, who feel empowered and successful when they are able to demonstrate what they have learned in manners that are comfortable, enriching, and engaging for

them. Mathematics students have a desire to know that their contributions are appreciated and valued. Learners want to feel capable, creative, resourceful, and successful. Authentic forms of assessment can make it easier for mathematics teachers to foster such feelings. Perhaps the most important advantage of authentic assessment is that it facilitates placing the focus on students' strengths and talents, rather than their weaknesses--and there is precious little in education that could be more motivational than emphasizing the positive!



Children's Literature CONTINUED FROM PG. 17

They were also able to determine $\frac{1}{4}$ and $\frac{3}{4}$ of a bag as well as $\frac{1}{3}$, $\frac{2}{3}$ and $\frac{1}{5}$, $\frac{2}{5}$, $\frac{3}{5}$ and $\frac{4}{5}$. Of course, it was not possible for introducing factors and divisors.



References:

Guiett, D. (1999). *From alphabet to zebras: Using children's literature in the Mathematics classroom*. Ohio Media Spectrum, 51, 32-36.

Klages, C., Patton, B., & Nagel, A. (2005) *Gone to the Dogs* presentation presented at the Hawaii International

Conference on Education, Jan 6, 2005, Honolulu, HA.

Patton, Klages and Nagel, (in press). *Measuring Penny. Texas Mathematics Teacher*.

Ravitch, D., & Finn, C.E. (1987). *What do our 17-year-olds know?: A report on the first national assessment of history and literature*. New York: Harper and Row.

Richgel, D.J., Tomlinson, C. & Tunnell, M.O. (1993). *Comparison of elementary students' history textbooks and trade books*. Journal of Educational Research, 86,161-171.

Whitin, D.J. and Whitin, P.E. (1996). *Fostering metaphorical thinking through Children's literature*. In P.C. Elliott (Ed.), *Communication in mathematics: K-12 and beyond*, 1996 yearbook of the National Council of Teachers of Mathematics (pp.60-65). Reston, VA: National Council of Teachers of Mathematics.

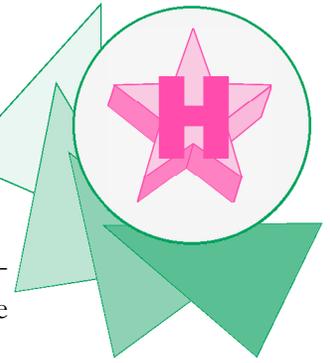
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Why Do These Work?



Dr. Delores Anderson
Piedmont College

In the previous issue (Fall 2005), it was implied that the author, Mr. E. J. Wilson, didn't understand why his summation works. He advises he understands his summation, and wanted to share it with us. Being a lay person, he simply needed help with the correct mathematical notation.

The following response was submitted by:
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The sum of the integers between 2 integers, p. 18

Since $F > 0$ and $L > 0$, then F and L are counting numbers.

$$\begin{aligned}\text{Sum} &= (L^2 - F^2 + F + L) / 2 \\ &= (L^2 + L - F^2 + F) / 2 \\ &= [L(L+1) - F(F-1)] / 2 \\ &= (L(L+1)) / 2 - (F(F-1)) / 2\end{aligned}$$

When the famous German mathematician, Carl Friedrich Gauss, was eleven years old, his teacher challenged the class to add the first 100 counting numbers. It did not take young Carl long to find the pattern and present the answer to his teacher $1 + 2 + \dots + 99 + 100 = 5050$. In general, the sum of the first n counting numbers is $(n(n+1)) / 2$.

So, $(L(L+1)) / 2$ is the sum of the counting numbers from 1 to L .

Let $n = F - 1$. Then, $[(F - 1)((F - 1) + 1)] / 2 = ((F - 1)F) / 2$, which is the sum of the counting numbers from 1 to $F - 1$.

Subtracting the sum of the counting numbers from 1 to $(F - 1)$ from the sum of the counting numbers from 1 to L leaves the sum of the counting numbers from F to L , which is $(L(L+1)) / 2 - (F(F-1)) / 2$.



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