GEORGIA COUNCIL of TEACHERS of MATHEMATICS
GCTM

REFLECTIONS

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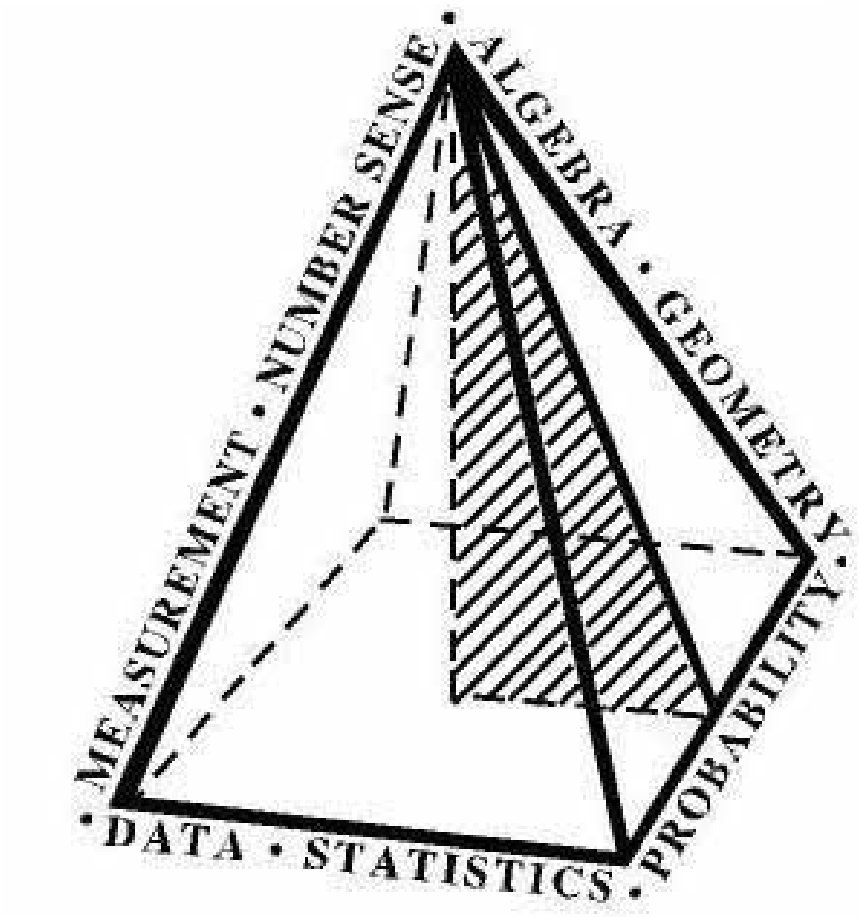

GPS At A Glance

Author Guidelines

Manuscript Format: Manuscripts are reviewed by members of the editorial review board in a blind review. For this reason, each manuscript should include a cover sheet containing: title of manuscript, author's name, position and email address. Identifying information should not appear elsewhere in the manuscript in order to ensure an impartial review.

Manuscripts should be double-spaced, with 1-inch margins on all sides, typed in 12-point font and follow the APA 5th Edition style guide. Manuscripts should be submitted in MS Word. If you have a picture or graphic in the text, please include the original picture(s) in a separate file.

Manuscript Submission: Manuscripts should be submitted to reflections@georgiasouthern.edu. Receipt of manuscripts will be acknowledged. Manuscripts are accepted for consideration with the understanding that they have not been published previously and are not being considered simultaneously for publication elsewhere. Additional inquiries should be sent to Gregory Chamblee, Editor, Georgia Southern University, Department of Teaching and Learning, PO Box 8134, Statesboro, GA 30460-8134; Phone: 912.681.5701; Fax: 912.681.0026; reflections@georgiasouthern.edu.

Manuscript Publication: When a manuscript is accepted for publication, the editor/journal reviewers may make suggestions or revisions in consultation with the principal author. However, because of publication deadlines the editor reserves the right to make minor revisions without seeking prior approval from the author. Release statements for all copyrighted materials must be received prior to publication. Upon publication, two complimentary copies of the issue are sent to the principal author.

REFLECTIONS

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ARTICLES

Spreading Positive Moments

by Barbara Ferguson
GCTM President
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I was just beginning to think that we were going to miss winter once again and then "here she comes!" As I have been recuperating and reflecting this week, just looking at the snow piled up on my deck, I decided **appreciation** would be the focus of this issue. At the GCTM planning retreat that is held every two years, Sandy Blount from the NE Georgia PRISM, and Peter Anderson from Troup County High School, led the program Friday and Saturday evening. Thanks to these two I was reminded of the message in the book *How Full Is Your Bucket: Positive Strategies for Work and Life.* As teachers we understand the importance of a simple "thanks" from one of our students. And when a parent says they think we have done a great job this year, we beam for several days! Sandy and Peter did a great job of getting the message across that those little "thank yous" are extremely important for everyone. Daniel Kahneman, Nobel-Prize-winning scientist has found that we "experience approximately 20,000 individual moments in a waking day." (p. 53) I know that each of these moments is important for all of us and hope we spread **positive moments** to those we meet in our daily life, in our classroom and in our home.

One of the ways that we can spread these positive moments is to donate to the **Georgia Mathematics Education Trust** (**GMET**) in honor of someone, in memory of a loved one, or just because mathematics education in Georgia is essential to all our students. They are the citizens of tomorrow! Also, the fall issue of *Reflections* emphasized the importance of sharing and learning with one another. It is essential that we remember to thank the colleague who "made me go to the workshop" or "shared that activity" or "helped with that problem student." Moments like these are crucial to our continued positive growth.

The snow is finally melting and it is the end of this short letter. However, I hope you will all remember to show **appreciation** in some way for all the positive moments in your life.

* *How Full Is Your Bucket: Positive Strategies for Work and Life* by Tom Rath and Donald O. Clifton.

The Georgia Council of Teachers of Mathematics has written and presented to Ms. Kathy Cox, Georgia State Superintendent of Schools, a letter of support for the Georgia Professional Standards (GPS) for K-12 Mathematics. The letter can be accessed from the GCTM homepage, www.gctm.org.

Did You Know?

by Becky King
GCTM Executive Director
bwking@comcast.net

On October 19, 2001 the Executive Committee of GCTM established the Georgia Mathematics Education Trust (GMET) as a non-profit educational trust to promote quality mathematics education in the state of Georgia. GMET is a separate organization from GCTM, but GCTM actively supports GMET and its goals.

GMET funds special projects that enhance the teaching and learning of mathematics. It also funds awards that recognize individuals who have made a significant contribution to mathematics education in Georgia. Grants for special projects are given to recipients at the annual Georgia Mathematics Conference each October. Learn more about applying for a grant on the GCTM website, www.gctm.org.

Be a supporter of GMET. Donations to the trust are tax-deductible and can be made (payable to GMET) via the following address:

Dan Fusch, Treasurer
2819 Peach Orchard Rd.
Augusta, GA 30806

Donations designated "in memoriam" or "in honor" will be recognized with a letter to the person or family on whose behalf the donation is made.

Learn More About Your Organization

www.gctm.org

* Grants and Award Information
* Membership Renewal
* Mathematics Competitions
* 2008 GMC Speaker Proposal Submission Process
* Summer Academy 2008
* Other

GCTM NEWS

Make It a GCTM Year!

by Susan Craig
GCTM Membership Director
secddc@aol.com

Happy 2008!

We at GCTM hope you have the best year possible and many wonderful teaching and learning experiences in the coming semester. Welcome to the many new members who joined us at the Georgia Mathematics Conference and those continuing your membership for another year. You will find your membership in GCTM to be an excellent professional association. For your information and as a reminder to our renewing members please note the following membership items:

- New and renewing members from the conference should have received membership cards. Your card should note your membership number and the expiration date for your membership.
- Each copy of *Reflections* has a mailing label which notes your expiration date and member number. Also note your mailing address and notify us of any needed corrections.
- If you move, please notify us of your new address. Bulk mailings are not always forwarded.
- We urge you to encourage your colleagues to renew their membership or to become a new member of GCTM. Each year we have many members who are not able to attend the conference and then become lapsed members.

Please contact me any time by email or phone if I can assist you with membership issues. Make it a great year!

Dr. Sam McGaw of Thomson, GA is our newest life member! A longtime member of GCTM, Sam has made a commitment to lifetime affiliation to support mathematics teaching and learning in Georgia!

	NW	N E	MW	M E	CW	C E	SW	S E	Out of State	Totals
2008	194	190	142	255	150	138	228	165	6	1468
2009	1	4	8	3	4	5	2	4	0	31
2010	0	0	0	1	0	0	0	0	0	1
Life	37	46	84	44	73	67	44	67	14	476
Student	57	62	97	36	38	244	9	3	0	546
Total	289	302	331	339	265	454	283	239	20	2522

Mathcounts Competition

by Debbie Poss
Vice President for Competitions
deborah.poss@cobb.k12.org

Mathcounts© isn't the only opportunity for middle school students to enjoy math competition!

The GCTM Middle School Math Tournament will be held on Saturday, April 19, 2008 at Thompson Middle School in Centerville, GA. For more information, contact Peggy Pool at ppool@gctm.org.

For more information about this and other math tournaments in Georgia, check the GCTM website www.gctm.org and click on "Competitions".

Call for Manuscripts

Deadline for Spring 2008 Issue: March 31, 2008

Topics:

GPS implementation manuscripts are needed. For example, instructional strategies to teach GPS, GPS implementation issues, working with special populations in a GPS environment and sample student task solutions are some of the ideas of interest.

Teaching Tips Ideas:

Share with your fellow teachers a pearl of instruction or assessment wisdom you have used in your classroom. Topics include how to design and implement effective warm-ups, strategies for implementing journal writing, etc. Manuscripts published in this section are typically one page in length.

Dr. Rock's Math Mystery Solutions:

Submit student solutions to Dr. Rock's Math Mystery. A sample of solutions submitted will be published in the next issue.

GCTM History Quiz

by Becky King
GCTM Executive Director
bwking@comcast.net

_____ 1. 6th recipient of the Gladys M. Thomason Award

_____ 2. Initial membership dues

_____ 3. 1979

_____ 4. 1950

_____ 5. 1964

_____ 6. 1966

_____ 7. 1931

_____ 8. Attendance at the 1st GA Math Conference

_____ 9. 1972

_____ 10. 1977

_____ 11. 1958

_____ 12. Gladys Richardson

_____ 13. Initial Membership total

_____ 14. 1st recipient of the Gladys M. Thomason Award

_____ 15. 1976

_____ 16. Bess Patton

_____ 17. 1960

_____ 18. 29th NCTM Conference

_____ 19. 1978

_____ 20. Treasury total the day before the 1st GA Math Conference

A. 1st organized State meeting of math teachers

B. Establishment of GCTM

C. Mother of GCTM

D. 50 cents

E. 16

F. First GCTM Delegate

G. Male College Teacher

H. Gladys M. Thomason

I. 1st State Math Conference

J. $18.75

K. 110

L. First 3-day State Math Conference

M. Establishment of the 6 GCTM regions

N. First District Supervisor of Mathematics

O. Birth of GCSM

P. GCSM becomes affiliate of GCTM

Q. Establishment of the Gladys M. Thomason Award

R. First NCTM meeting in Georgia

S. First Black GCTM President

T. $2.00

U. 75

V. $105.20

W. 1st Annual GCTM Math Tournament

GCTM Regional Reports

GCTM NEWS

Central-West Region

Kenneth Jones

Happy New Year from your Central West representatives Kenneth and Peter. Please let us know if we can help you in promoting GCTM's vision of mathematics in your schools. There are many very talented mathematics teachers at all grade levels in the Central West Region. We encourage each of you to consider presenting at the 2008 Georgia Math Conference. Proposal forms will be available on the GCTM website in February. It is easy to think that what you are doing "is nothing special" and not think about sharing. Everyone of you has activities and strategies that you use in your classrooms that other teachers could benefit from. If you don't feel comfortable presenting a full hour-long session, get a group together to share ideas. We want the talent in the Central West Region to be showcased at the 2008 conference.

Peter Anderson

Mark you calendars for the Columbus Regional Mathematics Collaborative's Annual teacher workshop which will be held June 9-13 at the Elizabeth Bradley Turner Center for Continuing Education. More information about the workshop will be available soon on their website at http://crmc.colstate.edu. The Collaborative is also offering NCTM's E-Workshop Series this year. Attendance is free to area teachers. A schedule is available on the CRMC website. These online workshops provide opportunities for participants to interact on-line with national presenters. They work well when a small group gathers to participate together. All you need is a computer with Internet connections and a speaker phone. You might consider signing up at NCTM.org and hosting one at your school site.

Please contact Peter or Kenneth if you would like to help promote GCTM activities in your area.

GCTM Regional Reports

Metro-East Region

Leanne Luttrell

As you implement the new GPS, would you like to have the opportunity to share interesting ideas and tasks? At the regional caucus meeting in October, some people expressed an interest in discussing tasks with other GCTM members. We would like to form an ongoing community where we can share ideas throughout the year. If you are interested and available to meet on a Monday evening or a Saturday morning in March, please email me at MERep@gctm.org or LLuttrell@gctm.org. Please be sure to include whether you would prefer to meet on Monday or Saturday.

Do you know a GCTM member in the Metro East region who has received a recognition or award? Please email me at MERep@gctm.org or LLuttrell@gctm.org so these people can be recognized in the next issue of *Reflections*!

I look forward to hearing from you!

North-East Region

NE GA Regional Representatives: Sandy Blount, NE GA PRISM Kaycie Maddox, NE GA RESA

Here are some of the learning opportunities to support teachers in the NE GA area:

Professional Learning Communities for NE GA RESA schools:

- PRISM AP Statistics Learning Community; PRISM AP Calculus Learning Community – Contact: Sandy at sandyb@uga.edu
- RESA High School Mathematics Professional Learning Community; Connected Mathematics Program 2 Professional Learning Community – Contact: Kaycie at Kaycie.Maddox@negaresa.org

High School GPS DOE Training – *Contact Kaycie at* Kaycie.Maddox@negaresa.org

- *Training for Math 2 – May 28th – 30th, 2008 (Days 1, 2, 3) and Nov. 6th, 2008 (Day 4)*

UGA Mathematics Education Student Association (MESA) – Contact: Sandy at sandyb@uga.edu

Let us know how we can serve you! ~Sandy & Kaycie

GCTM Awards for 2008

by Ellice Martin
Vice President, Honors and Awards
epmartin@valdosta.edu

GCTM Awards for 2008
Nominations Due by June 15

Do you know a mathematics educator who deserves to be honored?

Go to Grants and Awards at www.gctm.org and follow the instructions.

Each year, GCTM sponsors five awards that are presented at the Georgia Math Conference at Rock Eagle in October:

Gladys M. Thomason Award for Distinguished Service

This award is given for distinguished service in the field of mathematics education at the local, regional, and state levels, where the service is significant, is beyond normal job requirements, and is primarily for the improvement of mathematics instruction.

Awards for Excellence in the Teaching of Mathematics

Three awards, one each for elementary, middle, and secondary levels, are given to excellent teachers who have strong content foundation in mathematics appropriate for their teaching level, show evidence of growth in the teaching of mathematics, and show evidence of professional involvement in GCTM and NCTM.

Teacher of Promise Award

GCTM recognizes one outstanding new teacher in the state each year who has no more than 3 years experience at the time of the nomination and who demonstrates qualities of excellence in the teaching of mathematics.

John Neff Award

This award is presented to a member of GCTM who demonstrates excellence as a full time post secondary educator and/or district supervisor. The recipient is someone who is an inspirer, a mentor, and an advocate of mathematics and mathematics education.

Dwight Love Award

This award is presented to a teacher in Georgia who models excellence in the profession and in life and gives much to others beyond the classroom as mentor, teacher, and leader. The awardee is a master teacher, professionally active, and promotes GCTM and its mission.

Getting Math Team Going! Part One: How Do I Start?

by **Chuck Garner**
Rockdale Magnet School for Science & Technology
cgarner@rockdale.k12.ga.us

This is the first of a two-part article focused on establishing and running a Math Team. In the first part, we give some suggestions for building a Math Team at your school from the ground up. In the second part (next issue), we suggest relevant contests and tournaments along with tips on funding them.

Interest

The first thing to do is determine interest among the students. If you or other math teachers already post extra credit problems, challenge problems, or problems-of-the-day, then you have an existing way to measure interest. Students that complete those problems are generally the same students that would be interested in Math Team, particularly if the problems posted are less curricular-based and involve more problem solving. If no such postings exist, why not? These are excellent ways to spark interest in Math Team-type activities.

The next job to do is to determine your personal interest in Math Team. Are you interested in encouraging problem-solving and interest in mathematics in any student that may join Math Team, or are you interested in Math Team as an enrichment activity aimed solely at the mathematically gifted? Your answer to this question drives all other decisions concerning the establishment of a Math Team.

The author's answer is that Math Team is for everyone, and it is the sponsor's job to increase both mathematical interest and problem-solving ability in each student on Math Team. Math Team should be an inclusive activity, not an exclusive one. By limiting membership, the sponsor and students reinforce the perception that only a gifted few can enjoy math. This is not to say one cannot establish a successful Math Team in this manner; however, one works much harder to establish an enjoyable and meaningful Math Team.

Publicity

Should you choose to open Math Team up to everyone, then publicity is the next step. Flyers posted around the school is the traditional method of publicity (for which there is still some merit), but targeted appeals can be more effective. For instance, posters on the walls of each math classroom are more noticeable than in the hallways. A short 3-minute talk to each math class is probably the best way to spread the word. Such a talk also gives the students a chance to at least know who you are (if they don't already), and to allow them to ask questions. If you do not have time to go to each math classroom, then ask your colleagues for suggestions. They can certainly tell you which classes of theirs would be interested in hearing your short talk.

As part of any talk, poster, or flyer, be sure to include one or two sample problems. The problems used to publicize Math Team should be chosen carefully. If the problems are too difficult, they will turn students away; if the problems are too similar to classroom material, students will assume it is like another math class; if the problems are too easy, the brighter students will not be interested. The problems must be challenging to all, and accessible to all. Number theory and combinatorics are good topics from which to pull these sample introductory problems. Since these topics are not explored in the traditional high school curriculum, such a problem puts all students on as even a playing field as possible. The author has used the following problem in introductory materials.

A popular fast-food restaurant offers a deal called "5 for $5." Customers can choose any five items from the following eight: beef sandwich, ham sandwich, fries, cheese sticks, milkshake, soda, hashbrowns, and onion rings. The in-store poster that advertises this deal says "There are over 790 combinations!" Determine exactly how many combinations a customer can make, and demonstrate how you got your answer.

(The cleverer students quickly realized that if the answer was over 800, the ad would have indicated that there were "over 800 combinations.")

The First Meeting

In order to give as many students as possible the opportunity to join Math Team, you may consider holding more than one "first" meeting. The author has had success by offering up to four such meetings. Students are given the option of attending the "first" meeting at four different days and times. This gives busy students a chance to at least

see what Math Team is all about — usually every student can manage to fit one of these times into his or her schedule.

Regardless of how many first meetings you offer, a few important things should always happen at the first meeting.

1) Take names, math classes, phone numbers, and email addresses of students. This will make communication with them much easier for announcements and reminders.
2) Explain solutions to the introductory problems. Or better yet, get the students to explain the solutions.
3) Have more problems ready to hand out! These problems can come from a variety of sources (contests, tournaments, problem-solving books, etc.), but it is vital that you keep the momentum going by always giving out more problems.

Other information is very helpful, such as your contact information, a schedule of meetings, or a schedule of contest and tournament dates.

Varsity or JV?

If you are starting a middle school Math Team, you do not need to worry about splitting your team into appropriate divisions. However, for high school teams, you must consider how to handle the different JV and Varsity divisions.

The Junior Varsity division is for students that have not completed both Geometry and Algebra II. The Varsity division is for all other students. (How this split will be handled when the Georgia Performance Standards are fully introduced has not yet been determined.) Although JV students can challenge themselves and compete at the Varsity level, no Varsity student, under any circumstance, may compete at the JV level.

Hopefully you have enough interest so that your school can compete in Varsity and JV. If not, then focus your time on whichever division has the most members. If you have lots of interested students in both divisions, then you may consider having two separate meeting days for the two divisions. (This would also be a good time, if you haven't done so already, to bring in another sponsor. Then you, for example, can sponsor the Varsity team and the other person could sponsor the JV team.) You may also find it beneficial to simply combine JV and Varsity into one meeting. There are advantages to separating them and there are disadvantages.

Running separate JV and Varsity meetings certainly makes it easier on you to plan meetings. Additionally, since the skills needed in Varsity versus that in JV are different, you can focus on appropriate topics and strategies at each level. Having combined JV/Varsity meetings can lead to frustration at the JV level (they may not understand anything Varsity is doing) and inattentiveness at the Varsity level (they are bored because the JV students need so many explanations of things Varsity students already know). However, by combining meetings, you are giving students across grade levels to get to know one another. You also have the opportunity to allow the younger students to see what Varsity is like and to develop role models and leaders among the Varsity students. The author has run JV and Varsity meeting separately and combined, and feels that such a decision should be made to benefit the particular students involved.

Coming in part two: in which contests and tournaments do we participate, and how do we pay for all of it?

Call for Reviewers

The journal is in need of reviewers. If you have an interest in reviewing please send your name to reflections@georgiasouthern.edu.

Teaching Tips

by Dana Sparkman
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dsparkman@georgiasouthern.edu

Write All About It: Using Math Journals in the Mathematics Classroom

The Georgia Performance Standards (GPS) challenge teachers to actively engage their students in the development of advanced mathematical understanding. As the GPS have been implemented, teachers have begun to focus their instruction on the application of math skills and concepts as they use real-world, authentic problems to help students develop their critical thinking and reasoning abilities. Students develop these abilities through using and processing the language of mathematics. Teachers may provide opportunities for this type of mathematically-rich learning through using math journals as a part of their instruction.

In *Principles and Standards for School Mathematics* (2000), NCTM recommended that students communicate their mathematical thinking in a logical manner, and use the language of mathematics to express their thinking accurately and logically. Journals are an effective way for students to demonstrate their understanding of mathematics content while using the process standards of problem solving, reasoning and proof, communication, connections, and representation.

Teachers should consider two things before beginning to use math journals in their classroom: the 'what' and the 'how'. Teachers should determine what the students write about (through prompts) as well as how to manage the journal writing process during math instruction.

What do we write about?

Students may be reluctant to write about any content area, and they may not see the connection between writing and mathematics; therefore, teachers should use writing prompts to assist them. Writing about attitudes and feelings toward math and writing about familiar and advanced mathematical concepts are common prompts (Baxter, Woodward, Olson, & Robyns, 2002), and help teachers gain valuable insight into students' mathematical understanding. Students' responses to open-ended questions in particular, provide opportunities for teachers to see how students view complex math topics (Aspinwall & Aspinwall, 2003). Because of the increased emphasis on students reflecting on their own learning, journal prompts related to metacognition may also be useful. Samples of each type follow (some samples from Baxter, Woodward, Olson, & Robyns, 2002).

Writing about attitudes and feelings

- How do you feel about problem solving?
- Describe your best/worst math experience?
- When you have difficulty with a math problem, what do you do?

Writing about familiar mathematics ideas

- Explain ways that you use estimation in everyday life.
- What is the most important thing to understand about decimals?

Writing about advanced mathematics concepts

- A nonroutine problem that could be solved using different strategies is given. How did you solve the given problem. What false starts or dead ends did you experience?
- Students compare two different answers using different strategies to the same problem.

Writing about metacognition

- What did I learn from today's class? What is still muddy?
- Today I was surprised about/I noticed that…
- Suppose your mother asks what you learned in math today. Summarize the information from today's lesson as you would tell it to her.
- How did today's lesson begin to answer the essential question? Where does today's work fit into the GPS standard you are learning about?

Math journal writing prompts can be incredibly varied in content. It could even be as simple as "write your answer to today's essential question."

How do I manage journal writing in math?

The literature is replete with suggestions about managing journal writing in math classes, given the high demands on teachers' instructional time. The first suggestion is to start small. Choose one class to start writing, and set aside ten minutes one day each week for them to respond to a journal writing prompt. Students could use a college "blue book" as their math journals (Baxter, Woodward, Olson, & Robyns, 2002). These take up little space, and elementary students would enjoy using college materials in their own class.

Although teachers might use math journals as an informal means of assessment, they should not typically be assigned a grade. However, math journals include works samples that allow teachers to monitor growth over time; they may also be used as a basis for conversations with parents about student learning. Teachers should not feel the need to read and respond to every journal entry by every student; viewing a small sample of journal responses can provide a wealth of information. Instead, encourage students to "turn and talk" – share their journal entry with a friend.

We can expect many things from journal writing. We can expect that students will be reluctant to write, and they are unlikely to be proficient in the beginning. However, potential results, including more positive feelings about mathematics, the increased ability to reason and communicate mathematically, and an enhanced aptitude for reflecting on their own thinking, far outweigh any difficulties encountered early on.

Resources for journal writing in mathematics

There are many resources available to help teachers begin to use journal writing in their mathematics classrooms. In addition to the resources found in the reference section, online sources offer much assistance with journal writing in mathematics. A collection of affective, attitudinal, content and process prompts as well as a journal entry assessment rubric may be found at www.geocities.com/kaferico/writemat.htm#C. Ideas for using and managing math journal writing in the classroom can be found at www2.ups.edu/community/tofu/lev1f/jourframe.htm and http://teacher.scholastic.com/products/instructor/Apr01_Burns&Silbey.htm.

References

Aspinwall, L., & Aspinwall, J. (2003). Investigating mathematical thinking using open writing prompts. *Mathematics Teaching in the Middle School, 8,* 350-353.

Baxter, J., Woodward, J., Olson, D., & Robyns, J. (2002). Blueprint for writing in middle school mathematics. *Mathematics Teaching in the Middle School, 8,* 52-56.

National Council of Teachers of Mathematics (2000). *Principles and Standards for School Mathematics.* Reston, VA: Author.

Call For Presidential Award for Excellence in Math Teaching Nominees

The Presidential Awards for Excellence in Mathematics and Science Teaching are the Nation's highest honors for teachers of mathematics and science. The Awards recognize highly qualified K-12 teachers for their contributions in the classroom and to their profession. Eligible teachers must have completed 5 years of teaching before beginning this year. If you know great teachers, nominate them to join this prestigious network of professionals. This year the award will recognize an outstanding Math teacher from Georgia working in grades K-6. The 2009 award will recognize an outstanding 7-12 Math teacher.

For more information about the award or to nominate someone, please go to www.paemst.org. Applications are due **May 1, 2008.** If you have any questions, contact Judy Chambers, Georgia's PAEMST State Math Coordinator at judychambers100@comcast.net .

Power Cards Reloaded

by Gina Gresham
University of Central Florida
ggresham@mail.ucf.edu

by MaryE Wilkinson
Lamar University
MaryE.Wilkinson@lamar.edu

Editor's Note: This article was published in Spring 2007 REFLECTIONS. It is being re-printed due to publishing problems.

Number tricks often stimulate students to think about the concepts they are learning and whet their appetites for further exploration. It is exciting to see students' desires to learn more about number tricks and watch them eagerly investigate "how" a number trick works. A pick-a-number trick that is fun and intriguing involves five cards on which carefully selected numbers appear. The challenger picks a number from the first 31 counting numbers and selects the card, or cards, on which the number appears, allowing the presenter immediately to know the selected number. This trick has been around for a long time. To announce the secret number, the presenter can add the power numbers, which are conveniently located in the top left corner of each card. We have "reloaded" the trick, making it even more fun and intriguing.

Why the trick works

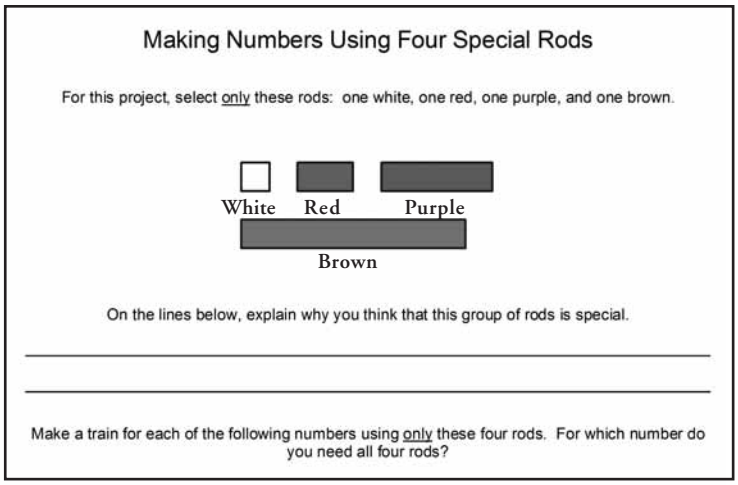
Since any natural number can be written as a sum of selected powers of two, this trick relies on base two numeration to determine the card or cards on which a number appears. On each card, a power of two appears in the top left corner and the other numbers on the card are those that require that power number in their sums. The five columns under "Base two numeration" in **Table A** *(See page 20)* relate directly to the five cards. A number will appear only on those cards for which a 1 appears in the card column. For example, 31 appears on each of the five cards, because $31_{ten} = 16+8+4+2+1 = 2^4 + 2^3 + 2^2 + 2^1 + 2^0 = 11111_{two}$, as shown in the last line of Table A. In contrast, 10 appears only the 8 card and the 2 card because $10 = 8 + 2 = 2^3 + 2^1$. In Table A, the tenth line shows that $10_{ten} = 1010_{two}$.

A concrete beginning

Figure 1 is a worksheet that uses Cuisenaire rods in lengths that represent powers of two. Children are first invited to notice that the red rod is twice as long as the white, the purple is twice as long as the red, and the brown is twice as long as the purple. Then they use these rods of lengths 1 cm, 2 cm, 4 cm, and 8 cm to make trains for all lengths from 1 cm to 15 cm. Finally, they are challenged to create a rod of length 16 cm so that the process may continue. It is unlikely that children will be able to make the leap from a concrete exercise such as this to the abstract concepts of the Power Cards. However, this is a stand-alone lesson that provides important foundational work to support later learning, whether or the teacher elects to continue to the Power Cards.

Preparing the "reloaded" cards

With the reloaded Power Cards, the extra fun is seeing the challenger's number revealed through a window as soon as the last card is selected. To create the set of Power Cards in **Figure 2**, start with a square pattern for each. Tag board, file folders, or lightweight cardboard is best for this because the shaded areas on **Cards 1, 2, 3, and 4** must be cut out, providing windows. The sixth pattern is for the back of **Card 5**. The alignment of the numbers on the sixth pattern and the placements of the Y (yes) and N (no) on each card are important. If enlarging the patterns using a photocopy machine is not possible or desired, a square grid will be helpful in aligning the numbers. Finally, when the sixth pattern is attached to the back of Card 5, the 16 must be in the top left corner.


Making Numbers Using Four Special Rods

For this project, select only these rods: one white, one red, one purple, and one brown.

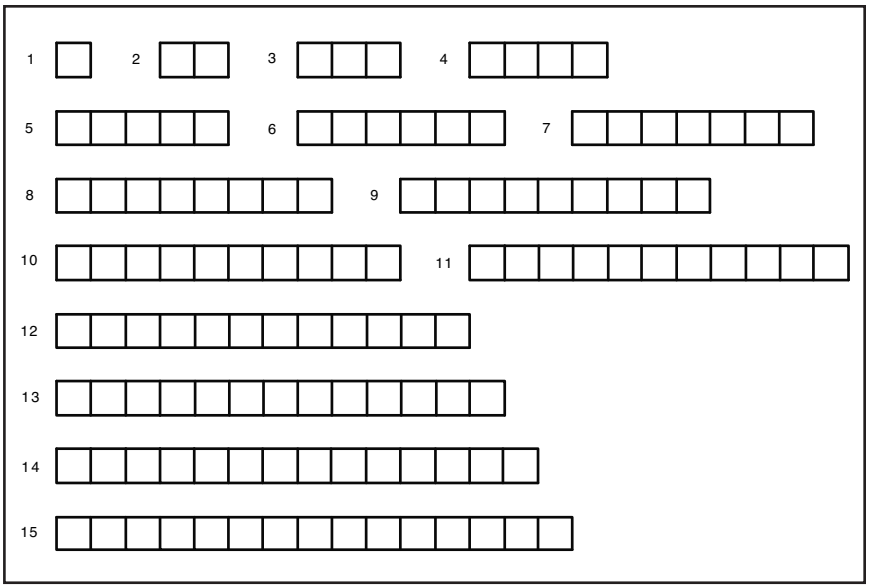
White Red Purple

Brown

On the lines below, explain why you think that this group of rods is special.

Make a train for each of the following numbers using only these four rods. For which number do you need all four rods?

Figure 1



Extension: To continue making trains for numbers, you will need to invent a new rod. How long will it be? What color will you pick for the new rod? Now what is the largest number you can make with your five rods?

Figure 1

Performing the trick

With the set of Power Cards in hand, the challenger is asked to pick a number from the first 31 counting numbers. The Power Cards are presented one by one; the first four cards can be presented in any order, but **Card 5** must be presented last so that a number on the back will show through the aligned windows of the other four cards. As each card is presented, the challenger is asked to say, "Yes," if the secret number is on the card and, "No," if it is not. If the answer is "Yes" the card is stacked — face up — with the Y at the top. If the answer is "No," the card is stacked, again, face up, so that the N is at the top. This process positions the windows to show only the appropriate number. When **Card 5** is placed, the stack is picked up, aligned if necessary, and held up to reveal the secret number through the windows.

Power Cards in fourth grade

The reloaded Power Cards were field tested with fourth graders, who were quite enthusiastic about the number trick. It was exciting to see their desire to engage in and investigate its various components. This mathematical investigation invoked problem solving and reasoning, required communication skills, and connected various mathematical concepts and principles.

The Power Cards were introduced as an enrichment activity during the last hour on a Friday afternoon by one of the authors, a regular visitor in the school. While the activity did not address a specific item in the fourth grade curriculum or page in the textbook, it did excite interest and participation in every student. It also added an interesting level of practice, applications, and connections with various points addressed in the curriculum past, present, and future. Additionally, during follow-up visits one week later and four months later, a significant level of retention was evident. The children liked the activity and they remembered the mathematics.

During the initial visit, the Power Cards were shown, and the challenge was presented. Every hand went up; every student wanted to challenge the Power Cards. The children used index cards and markers so each could share the selected number with the class, as shown in **Figure 3**.

Making Numbers Using Special Rods Key

On the lines below, explain why this group of rods is special.
Answers will vary, but should include the fact that the brown is twice as long as the purple, which is twice as long as the red, which is twice as long as the white. 8=2x4; 4=2x2; 2=2x1

Make a train for each of the following numbers using only these four rods. For which number do you need all four rods?
15 requires all four rods

1. 1 white
2. 1 red
3. 1 red + 1 white
4. 1 purple
5. 1 purple + 1 white
6. 1 purple + 1 red
7. 1 purple + 1 red + 1 white
8. 1 brown
9. 1 brown + 1 white
10. 1 brown + 1 red
11. 1 brown + 1 red + 1 white
12. 1 brown + 1 purple
13. 1 brown + 1 purple + 1 white
14. 1 brown + 1 purple + 1 red
15. 1 brown + 1 purple + 1 red + 1 white

To continue making trains for numbers, you will need to invent a new rod. How long will it be?
16 units

What color will you pick for the new rod?
Any color except brown, purple, red, or white

What is the largest number you can make with your five rods?
31 = 1 new color + 1 brown + 1 purple + 1 red + 1 white

Figure 1

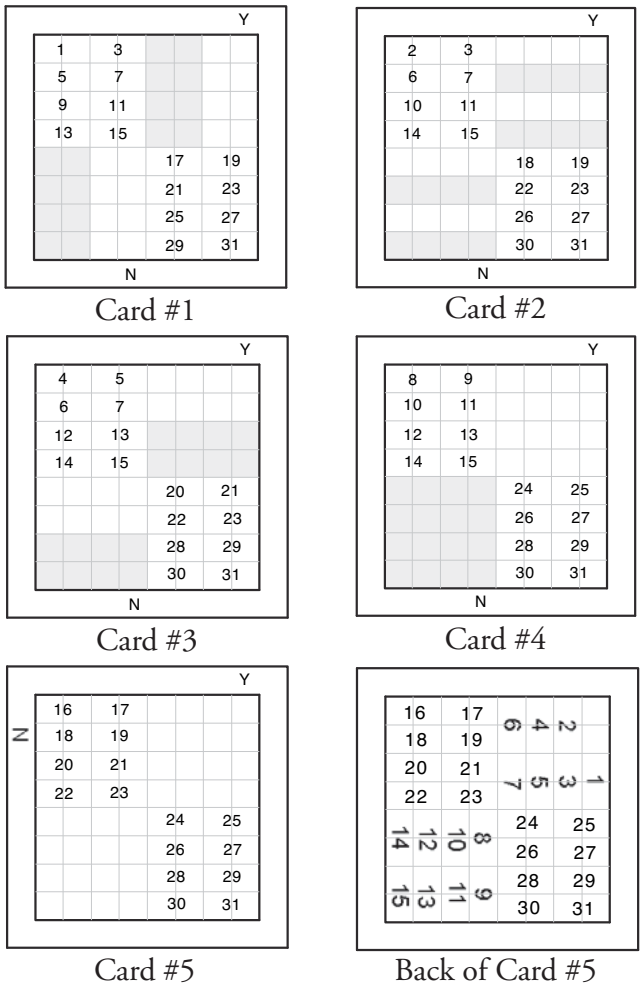


Figure 2

Since the children knew the selected number, they all helped as each card was shown with the question, "Is your number on this card?" Each time the trick was completed and a secret number was revealed, the children gasped. Magic had stepped into a fourth grade classroom.

After a few trials, a student remarked that only odd numbers appeared on the first card. Another student wondered if only even numbers appeared on the second card. It was acknowledged that a clue had been found, and the class was asked if they noticed more. Several children noticed that all cards except the first had both odd and even numbers. After a few more trials, the students noticed that 31 appeared on every card, then that no other number appeared on all cards.

After each child tried to stump the cards, they were put aside for a while and the students were asked if anyone could explain what the term "power" might mean. At first, some of the students were convinced that the power of the cards was magic. Then a student asked if the cards had something to do with adding and the class felt that they had found another clue. Each eager face showed interest and concentration as the children thought about the cards.

Attention was directed to a chart of powers of 2, which was completed as a whole class review of multiplication. The discussion of the powers of 2 extended a lesson on squaring numbers that occurred approximately eight class days before this visit. It was obvious that these students were comfortable with 2^2 and understood that it required two factors of 2. They stated that the line for 2^2 represented "2 squared," since the geometric model of a square had been used in their earlier lesson. When asked about the other lines, they suggested using more factors of 2. Some of the children felt that adding would work, suggesting that 1+1 = 2, 2+2 = 4, and 4+4 = 8. However, when asked to consider why 2^4 = 16, the concepts of factors, powers, and multiplication began to jell. They asked that the completed chart be left in the front for all to see. They expressed 2^3 = 2x2x2 = 8 as "2 in the power of 3", and 2^4 = 2x2x2x2, as "2 in the power of 4." While this is not standard notation, it certainly expressed the mathematics as they saw it. They asked about 2^0 and 2^1, accepting the values 2^0 = 1and 2^1 = 2 without question and started referring to these as "2 in the 0 power" and "2 in the 1st power," respectively. A more in-depth discussion of these two expressions was left for later. The completed Powers of Two chart is seen in **Figure 4**.

Next, children wanted to know how the Powers of Two chart connected to the cards. The cards were lined up, in order, on the chalk tray. They found the power numbers in the top left corners immediately. Rather than dispelling the magic, this increased their interest and the whole class wanted the rest of the story.

The children did not seem surprised to learn that any natural number can be expressed as a sum of selected powers of two. The first 7 rows of the Secret of the Power Cards worksheet, as shown in **Figure 5,** were completed as a whole group exercise. When completed, this chart was much like **Table A** *(See page 20)*. It was surprising how quickly they understood that a 1 in a power column meant that the power

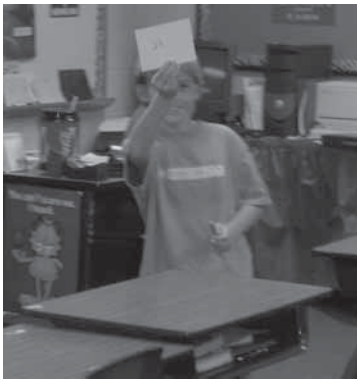


Figure 3

number associated with that column was needed, while a 0 or nothing meant that it was not needed. They pointed out patterns in the columns in which they wrote 1s on the chart and wondered aloud how those patterns were connected to the Power Cards.

The classroom fell totally silent for the first time as the children completed the arithmetic for the other rows on individual work sheets. Some students needed help, which they received from one another or the teacher; most of these just needed to be reminded that a power number could be used only once in a sum. After the individual work sheets were done, the remaining rows of the Secret of the Power Cards chart were filled in, as shown in **Figure 6**. There were a few mishaps, but the community in this classroom is supportive and students helped one another make corrections by referring to their completed worksheets and the chart. As row after row was completed, a student asked if she could fill in the row for 31; she remembered that this

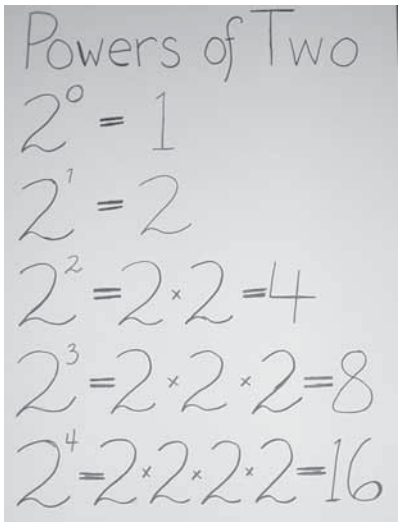


Figure 4

line would require a 1 in every power column since 31 appeared on every card.

The children seemed delighted as the lesson was wrapped up. They did not have the puzzle completed, but they had all the pieces and were confident they had solved the magic of the Power Cards. During a brief visit one week later, every student remembered why certain numbers appeared on particular cards and only a few had forgotten that 2^3 = 2x2x2 and 2^4=2x2x2x2. Even though they knew how the Power Cards worked, they still wanted to play – they were still intrigued.

The lesson was wrapped up during a final visit four months later. The fourth grade students did not have the puzzle completed, but they had all the pieces and were confident they had solved the magic of the Power Cards. The question, "What does 2^3 mean?" was written on the board. After a few false starts, all of the children settled on 2x2x2 = 8, which they still called "2 in the power of 3". When asked why, they explained that three factors of 2 are required for the product to be 8. Every hand went up when the question was changed to, "What does 3^3 mean?" The children were ready to deal with "3 in the power of 3," and,

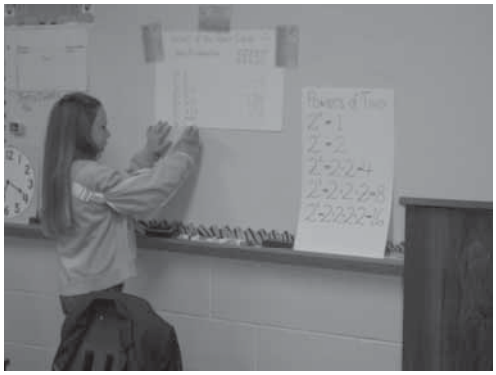


Figure 5

since it was a Friday afternoon, they were allowed to answer chorally, "27!" Finally, a list of five powers of three was written on the board, with only the last product indicated. The children were asked how 3^3 could be determined using the 81 in the last row. Many were initially confused, but a few were ready to explain that division "undoes" multiplication and that 81 should be divided by 3 to get one less factor. Pencil and paper were put to use and soon all hands were in the air. After 3x3x3 and 27 completed the 3^3 row, a student asked if he could complete the 3^2 row. At that very instant, several students began waving their hands in the air. They had jumped ahead and each wanted to explain that 3 divided by 3 is 1, leaving no factors of 3 and that 3^0 = 1. Again, several arms were waving as high as they could reach. Almost at once, all the students remembered the 2^0 = 1 they had used for the Power Cards. One by one, the students were permitted to explain various numbers "raised to the 0 power."

Finally, as the students felt confident they had solved many of the mysteries of the Power Cards, each wanted a personal set and a bit of practice in presenting the trick. What a wonderful way to let children be teachers, spreading the magic to others outside their classroom.

Figure 6

Cards:	#5	#4	#3	#2	#1
	2^4	2^3	2^2	2^1	2^0
	16	8	4	2	1

Base ten numeration	Base two numeration				
$1 = 2^0 = 1$					1
$2 = 2^1 = 2$				1	0
$3 = 2^1+2^0 = 2+1$				1	1
$4 = 2^2 = 4$			1	0	0
$5 = 2^2+2^0 = 4+1$			1	0	1
$6 = 2^2+2^1 = 2+4$			1	1	0
$7 = 2^2+2^1+2^0 = 4+2+1$			1	1	1
$8 = 2^3 = 8$		1	0	0	0
$9 = 2^3+2^0 = 8+1$		1	0	0	1
$10 = 2^3+2^1 = 8+2$		1	0	1	0
$11 = 2^3+2^1+2^0 = 8+2+1$		1	0	1	1
$12 = 2^3+2^2 = 8+4$		1	1	0	0
$13 = 2^3+2^2+2^0 = 8+4+1$		1	1	0	1
$14 = 2^3+2^2+2^1 = 8+4+2$		1	1	1	0
$15 = 2^3+2^2+2^1+2^0 = 8+4+2+1$		1	1	1	1
$16 = 2^4 = 16$	1	0	0	0	0
$17 = 2^4+2^0 = 16+1$	1	0	0	0	1
$18 = 2^4+2^1 = 16+2$	1	0	0	1	0
$19 = 2^4+2^1+2^0 = 16+2+1$	1	0	0	1	1
$20 = 2^4+2^2 = 16+4$	1	0	1	0	0
$21 = 2^4+2^2+2^0 = 16+4+1$	1	0	1	0	1
$22 = 2^4+2^2+2^1 = 16+4+2$	1	0	1	1	0
$23 = 2^4+2^2+2^1+2^0= 16+4+2+1$	1	0	1	1	1
$24=2^4+2^3 = 16+8$	1	1	0	0	0
$25 = 2^4+2^3+2^0 = 16+8+1$	1	1	0	0	1
$26 = 2^4+2^3+2^1 = 16+8+2$	1	1	0	1	0
$27 = 2^4+2^3+2^1+2^0 = 16+8+2+1$	1	1	0	1	1
$28 = 2^4+2^3+2^2 = 16+8+4$	1	1	1	0	0
$29 = 2^4+2^3+2^2+2^0 = 16+8+4+1$	1	1	1	0	1
$30 = 2^4+2^3+2^2+2^1 = 16+8+4+2$	1	1	1	1	0
$31 = 2^4+2^3+2^2+2^1+2^0 = 16+8+4+2+1$	1	1	1	1	1

Table A

by **Judy Chambers**
Retired
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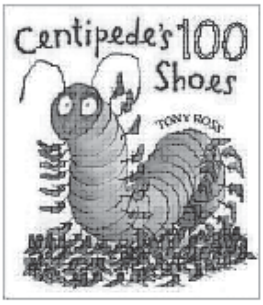
Judy's Book Shelf

Books That Make Good Math Even Better

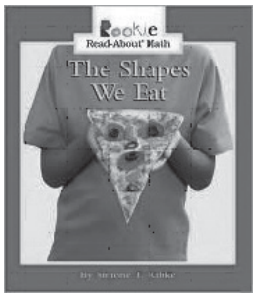
So many books, which ones should I use? I've scoured the shelves and found some that I think are worth checking out. I hope you agree. Using literature and informational texts to enrich your math lessons adds a lot to your lessons. Whether you use the book to introduce a new concept, enhance the lesson or demonstrate how a concept applies to real life, books give you all those options plus many more. Students can relate to story situations and often find the story makes the concept easier to relate to than just a text lesson. Here are a few books you may want to check out.

Tony Ross has written a great book entitled Centipede's ***100 Shoes,*** ©2002, Henry Holt and Company that your students will adore.



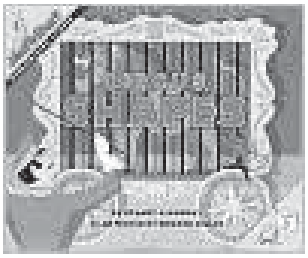
The story is about a centipede that's walking along, not paying attention to what he's doing and hurts his toe. When he gets home his Mom tries to figure out which toe he hurt and then she takes him to get 100 shoes. The story continues with dilemma after dilemma as he gets his shoes. The story offers great opportunities for counting by ones, twos and fives. This would be a good book to accompany the GPS unit on bigger numbers.

Now, if you are working on a shape unit, here re some suggestions that will fit in nicely. The irst one is ***The Shapes We Eat,*** by Simone T. ibke. ©2004, Scholastic, Inc. This Rookie Read About Math uses photographs throughout so students will see foods that they eat and recognize the shapes of them. The book includes pronunciation guides and a picture glossary of eight shapes (rectangle, circle, triangle, oval, pentagon, square, hexagon and octagon). Each shape is described by attributes and then the students are challenged to name other foods that same shape. Ms. Ribke has done a great job with this non-fiction reader.



Another great book is ***The Greedy Triangle*** by Marilyn Burns and illustrated by Gordon Silveria. ©1994, Scholastic, Inc. This fictional story is about a triangle that decides he wants a new shape. So he goes to the local "shape-shifter". Being fickle, he changes shapes several times and ends up confused and returns to his original shape. The illustrations for this book are wonderful. They are bright, humorous, and a little off-beat but bring a lot to the story. After the story, there are two pages with great follow up activities that extend the learning. This book is excellent for introducing shapes in a delightful story that every child will enjoy.

Another story about shapes is ***Circus Shapes*** ©1998 by Stuart J. Murphy and published by Harper Collins. Mr. Murphy uses shapes to illustrate this story about circus characters. The text is straightforward making it very accessible for learning. Again, a great way to introduce shapes to young students.

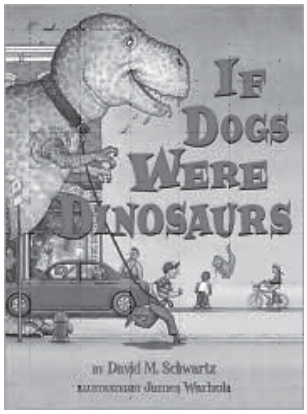


GRL	DRA	EI
G	12	11

There are so many math fiction and non fiction books out there that enhance your measurement units that I could spend a whole year reviewing them. For this column, I've chosen a few that I think are really good. The first one is from ETA/Cuisenaire. ***How Long Is a Dog's Tail?*** By Jill Bever and Sheilah Currie. ©2004. This easy reader story uses non-standard measure to determine the various measures of a dog. The book uses

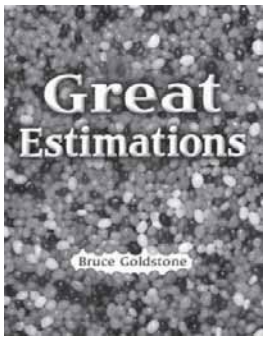
measurement terms such as long, longer, short, shorter, big and bigger. The illustrations are well done helping young students see just what is happening in the story. This would be a good story for students to act out, either with stuffed animals or live ones.

For older students David Schwartz has a wonderful story about size comparison. If your dog were the size of a dinosaur, his dinner would fill your bedroom! If the moon were the size of a marble, earth would fit in your hands! If your submarine sandwich was as big as its name, the pickle would be as big as a life raft! ***If Dogs Were Dinosaurs*** by David M. Schwartz and illustrated by James Warhola©2005 Scholastic Press makes a zany adventure of proportion and ratio. This book offers older students a great chance to develop their own outrageous examples. The illustrations are just as outstanding as the story and will leave students laughing out loud throughout this book. This is a must-read!



Mole Bakes Bread by Carolyn Green and illustrated by Kathleen McCord ©2003 and published by Sundance Publishing Company looks at measurement in cooking. Mole has baked a loaf of bread but since he didn't follow the recipe correctly, the loaf was overflowing the oven. His friend Owl comes by and offers to help. This story is humorous but points out the need to measure accurately when using a recipe. This book is part of a Twin Text set with one fiction and one non-fiction book. The illustrations add more humor to the story. This is a good lead-in to a cooking lesson using measuring cups and liquid measures and capacities.

Nat Gabriel has a cute story about area entitled ***Sam's Sneaky Squares.*** ©2002 and illustrated by Ron Fritz. Published by The Kane Press. Sam has a lawn mowing service. He's discovered that it takes longer to mow Mr. Hill's lawn than it does to mow Mrs. Green's lawn. Sam knows that Mr. ***Great Estimations*** by Bruce Goldstone©2006, Henry Holt and Co. **How many jelly beans are on this book's cover? Don't count—estimate!** If someone handed you a big bowl of jelly beans, how would you figure out how many there are? You could count them, one by one—or you could estimate. This book talks about grouping by 10's, 100's or 1000's. Great pictures, a real eye-catcher. Check it out!



Answers to GCTM History Matching Quiz

1. G	8. K	15. P
2. D	9. Q	16. C
3. L	10. W	17. N
4. B	11. I	18. F
5. R	12. S	19. M
6. O	13. E	20. J
7. A	14. H	

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A Geometry Garden

To beautify an entryway to a school, and to focus attention on geometry in the real world, a geometry garden is a project definitely worth considering. It can be used as a culminating activity after the study of geometric shapes, the Pythagorean Theorem, linear measurement, area, and volume. As presented here, this activity is appropriate for Grade 8 in the Georgia Mathematics Curriculum standards. Specifically: *M8G1. Students will understand and use the Pythagorean theorem. M8P1. Students will solve problems (using appropriate technology).*

Communication and some mathematical connections are also involved. Suggestions for adapting the activity for lower grades are found at the end of the article along with a record sheet for teachers to use if they want to make an octagonal garden.

In the classroom, before beginning the project, have students determine the amount of the various materials needed to build the garden. This will vary depending on the size of the garden you choose to make. Students can use what they know about geometry to compute the amounts. The following materials are suggested: eight-foot landscaping timbers, small metal stakes, weed blocker cloth, or black plastic, mulch, and plants.

Below is a regular octagonal garden with four-foot sides (see **Figure 1**).

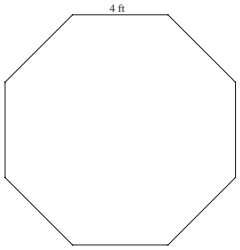


Figure 1 Regular octagon with four-foot sides

An illustration of the computations needed and the table students can fill in (see **Figure 2**) with the amount of each item needed is below.

Materials	Amount Needed
eight-foot landscaping timbers	
small metal stakes	
weed blocker cloth, or black pastic	
mulch	
plants	

Figure 2 Materials Chart

In our example, the number of landscaping timbers needed is four since we are building a regular octagonal garden with four-foot sides. They will be cut in half before use. Two small metal stakes are used to brace the ends of the timbers that form the sides of the octagon. We need 16 small metal stakes in order to place two at each end of the landscaping timbers. The area of the geometric shape must be computed in order to find the amount of weed blocker cloth. There are various methods that your students might use, but we elected to cut the octagon into four rectangles, four isosceles right triangles and a square as shown in **Figure 3.**

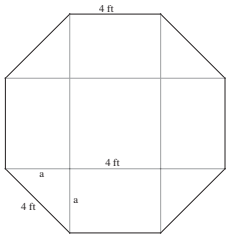


Figure 3 Diagram of geometric shapes used to find area

Since we chose to make the sides of the octagon four feet, the legs of the triangles can be computed using the Pythagorean Theorem as shown below:

$$a^2 + a^2 = 4^2$$
$$2a^2 = 16$$
$$a^2 = 8$$
$$a = \sqrt{8}$$
$$a \approx 2.83$$

So, we have four rectangles that measure 2.83 ft by 4 ft; four isosceles triangles with height and base measuring 2.83 ft; and one square measuring 4 ft by 4 ft since the sides of the square are the same as the longer sides of the rectangles and the sides of the octagon (see **Figure 4**).

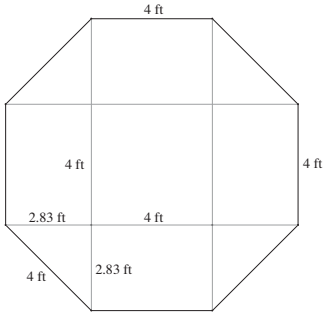


Figure 4 Diagram of geometric shapes with measurements

The areas of the individual shapes, rounded to two decimal places are:

Rectangle:
$$A = L \times W$$
$$A = (2.83)(4)$$
$$A = 11.32\,ft^2$$

Isosceles right triangle:
$$A = \frac{1}{2}bh$$
$$A = (.5)(2.83)(2.83)$$
$$A = 4.00\,ft^2$$

Square:
$$A = s^2$$
$$A = (4)^2$$
$$A = 16\,ft^2$$

To compute the area of the octagon, add together the areas of four rectangles, four isosceles triangles, and one square.

Octagon:
$$A = 4(11.32) + 4(4) + 16$$
$$A = 77.28\,ft^2$$

This means we need at least 77.28 ft^2 of weed blocker cloth.

If we make the mulch two inches deep, we can compute the volume of the mulch by using:

$$Volume = depth \times area$$
$$V = \left(\frac{2}{12}\right) \times (77.28)$$
$$V = 12.88\,ft^3$$

We need at least 12.88 ft^3 of mulch. The depth of the mulch could be any number of inches you want, but we chose two inches because that is typical in many gardens. A catalog or sales paper from a local garden center can be used to choose plants for the garden. Low-growing grasses or other green plants that keep their color throughout the year might work well around the outside of your garden. Then, perennials that bloom at varying times can be planted in the center. For our octagonal garden, the amount of each item needed is shown in **Figure 5.**

Materials	Amount Needed
eight-foot landscaping timbers	4 timbers
small metal stakes	32
weed blocker cloth, or black pastic	at least 77.28 ft^2
mulch	at least 12.88 ft^3
plants	as voted on by the class

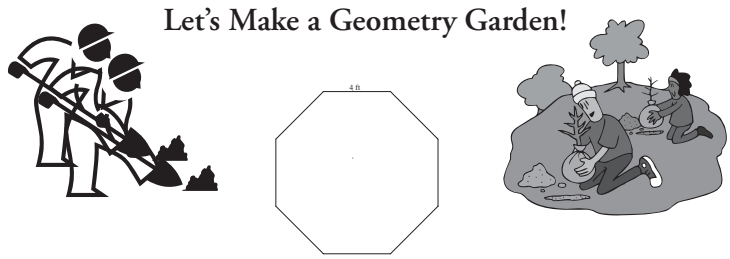
Figure 5 Amount of material needed for octagonal garden

The completed geometry garden can serve as a springboard for a variety of geometry activities. The following can serve as extension or alternate activities:

- Use another geometric shape for the garden. A triangular or rectangular garden could be used to simplify the activity with a focus on area and perimeter for lower grades.
- Add a circle or another geometric shape in the center of your garden to extend the mathematics to the area and circumference of a circle.
- Compute the cost of the materials and plants for your garden by adding an extra "Cost" column to your table (see Figures 2 and 5).
- Use a dynamic geometry software package to do scale drawings (Geometer's Sketchpad™or Cabri Geometry™.

Locate your garden in a prominent place near your school's main entrance. It can be an inviting and peaceful area to welcome students, parents, and visitors to your school as well as an opportunity to show the mathematics skills and knowledge of your students.

Let's Make a Geometry Garden!



We will make an octagonal garden with four foot sides.

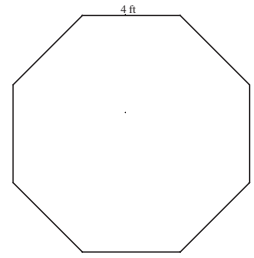
You will need to compute the amount needed of each item in the chart below:

Materials	Amount Needed	Cost
eight-foot landscaping timbers		
small metal stakes		
weed blocker cloth, or black pastic		
mulch		
plants		

Show your work for each item:

1. eight-foot landscaping timbers
2. small metal stakes
3. weed blocker cloth, or black plastic
4. mulch
5. plants

Include how you find the area of the octagon (for the weed blocker cloth or black plastic). This diagram can be used to illustrate your work:



You will need to contact or visit a local garden store to fill in the "Cost" column in the table.

Making Mathematics FUN
Dr. Rock's Math Mystery

by David Rock
Columbus State University
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Elementary Brain Teaser

From Last Issue

The Frog in the Pond.
There is a circular pond that is 300 feet in diameter. Dead in the center of the pond is a frong on a lily pad. If the average frog can leap two feet and there are plenty of appropriate spaced lily pads in the pond on which to jump, exactly how many leaps will it take the frog to get completely out of the pond? Give it a try! By the way, the answer is not 150 leaps and it is not 75 leaps either! Pass this along to your family and friends. Someone will unlock the key for you!

Frog in the Pond Solution: None.

Explanation: The frog is dead! Read the problem carefully.....dead int he center.

New One!

The Letter Mania

Based on the following two groups of letters:

Group 1: A, E, F, H

Group 2: B, C, D, G

Place each letter from the following letters in its appropriate group: I, J, K, L

Challenge Round

From Last Issue

Last Digit
What would the units digit be for 3 raised to the 999th power?

Last Digit Solution: 7.

Explanation: (^ means raised to the power of)

3^1 = 3	3^4 = 81	3^7 = 2187
3^2 = 9	3^5 = 243	3^8 = 6561
3^3 = 27	3^6 = 729	3^8 = 19683

The last digits are repeating: 3, 9, 7, 1. Therefore, it must be one of these possibilities. Divide 9999 by 4 which yields 2499 remainder 3. The remainder is the key. Take the exponent and divide by 4. The units digit is 1, if the remainder is 0. The units digit is 3, if the remainder is 1. The units digit is 9 if the remainder is 2. The units digit is 7 if the remainder is 3.

New One!

The Castle.
A Princess is in love with a dashing knight, unfortunately, the King prefers another suitor for his daughter. The King has locked her in the castle tower. The castle is square with a moat that is 10 yards wide. The knight is attempting to cross the moat, but only has two 9.75 yard planks, and no way to fasten them together. How can the brave knight, bridge the moat? Swimming in the alligator infested moat is not an option.

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Get Out Your Calendars, Day Planners, and PDAs

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Annual Conference	Summer Academy	Annual Conference
Salt Lake City, Utah	Thomson Middle School Centerville, Georgia	Rock Eagle, Georgia
April 9-12, 2008	June 18-20, 2008	October 15-17, 2008

REFLECTIONS

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