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Author Guidelines

Manuscript Format: Manuscripts are blind 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.
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**Making Mathematics FUN -- Dr. Rock's Math Mystery**  
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As I prepare to retire after forty-one years of teaching and to step down as your GCTM President, I can not help but reflect on the changes in mathematics education during my career. When I began my first year of teaching, I felt it was my job to contribute to the preparation of numerate adults, regardless of the age of my students. Also, like most mathematics teachers, I have a rather long history of thinking of mathematics as being synonymous with arithmetic for pre-high-school students. During the 1980s I began to change my thinking as various publications were presented. In 1986, the Mathematical Sciences Education Board urged us to change our thinking with this quote: “Every weekday, 25 million children study mathematics in our nation’s schools. Those at the younger end, some 15 million of them, will enter the adult world in the period 1995-2000. The 40 classroom minutes they spend on mathematics each day are largely devoted to mastery of the computational skills which would have been needed by a shopkeeper in the year 1940 — skills needed by virtually no one today. Almost no time is spent on estimation, probability, interest, histograms, spreadsheets, or real problem solving — things which will be commonplace in most of these young people’s later lives. While the 15 million of them sit there drilling away on those arithmetic or algebra exercises, their future options are bit-by-bit eroded.” I’ve kept this quotation because it reminds me if I do not continually grow as a mathematics teacher; I am harming my students by limiting their futures.

In the early days after the 1989 NCTM Standards, David Whitin wrote: “The Standards document is a theoretical statement about how people learn; it is based on a belief system that says, among other things, that learners construct their own knowledge, that learners grow by sharing and generating ideas with others and that learners gain new understandings by representing their ideas in different ways, such as through drawing, written narrative, or oral discourse.” This statement holds true for Principles and Standards for School Mathematics and gives us insight into how we can better teach a subject traditionally seen as difficult, boring, frustrating, and all those other “not warm-and-fuzzy” terms. In 1993, Marilyn Burns wrote: “Not too long ago, teachers saw the main goal of math instruction as helping children become proficient in paper-and-pencil computation. Today, mathematics instruction is less about teaching basic computation and more about helping students become flexible thinkers who are comfortable with all areas of mathematics and are able to apply mathematical ideas and skills to a range of problem-solving situations.” These quotes, among many others, had a tremendous effect on my teaching practices. As I changed my instructional strategies, I saw changes in my students. These changes were all positive and thus, I struggled forward.

Among other things, NCTM recommended the following instructional practices: “Actively involve students individually and in groups. Use appropriate technology. Use concrete materials. Be a facilitator of learning, not a dispenser of knowledge. Assess learning as an integral part of instruction.” However, “Do what students like” is not on the list. I think it is equally crucial that we engage students in meaningful, worthwhile tasks in the mathematics classroom. I do believe that these shifts in practices will positively affect students’ attitudes. Although changing attitudes about mathematics is important, that is not the primary reason for suggesting these shifts in classroom practices. We change our practices to improve our efforts to provide every student with “mathematical power.” Therefore, we must continually consider if tasks we ask students to undertake are indeed worthwhile. My point is that we need to reflect on every aspect of our lessons to ensure that the activities in which we engage students are worthwhile mathematical endeavors. Although I think it is crucial that we try to change attitudes towards mathematics, I think it is equally crucial that we engage students in meaningful tasks in the mathematics classroom. As we plan activities for our students, we should always make sure that we “do what makes sense.” Ask yourself, “Does it make sense mathematically?” “Does it make sense instructionally?” You will indeed be a better mathematics teacher if you do only what makes sense!

I have been fortunate in my career to see many excellent teachers that practice the above ideas. Teachers, parents, and students are now concerned about accountability and tests are often the driving factor in the mathematics classroom of today. However, I have seen everything from “new math” to “back to basics,” and the fact remains that really good teaching has staying power. Whatever the “fad” of the day, good teachers will always be described as effective,
motivating, caring, knowledgeable, demanding, and inspiring. So if you strive to be those things, then you will fit in with every fad. The students are the beneficiaries and will reap the rewards as more doors are open to them because of their love of mathematics. I will miss teaching when I retire but will continue to follow Georgia teachers and students as they implement the Georgia Performance Standards. I firmly believe that these standards are the key to better mathematics for all students!

Membership Report

by Susan Craig
Membership Director
secddc@aol.com

As I write this, the Masters are in our fair city of Augusta. There is lots of talk of integers- pars, birdies and bogies. All is green and the dogwood and azalea blossoms testify to the presence of spring. Surely GCTM members, also Masters in our field, can attest to the time of the year. We are surrounded by springtime CRCT, EOCT, and AP exams, fidgety students ready for a spring break, and our own spirits eager for the end-of-the-year tasks to be completed. The ending of an academic year is a blessing to educators. We have the opportunity to see completion for a class of students, to reflect on those things that were successful or not, and to plan for a new group – all with the resolution to continually improve our performance.

So spring into action and let us make similar resolutions
- to make GCTM even better and larger and to improve our own participation.
- to invite a new or veteran teacher to join us, testifying to them of the benefits of membership.
- to volunteer to serve as a leader in GCTM. Involving more members infuses us with new ideas and enthusiasm.
- keep GCTM informed of address changes. Returned mail is costly.
- contribute to GMET, GCTM’s education trust which offers grants and awards to GCTM members.

Thanks to the life members who have notified us of changes to their database information! Others, please do so soon!

Student members who will be changing addresses this spring, please notify us of your new contact information so you can continue to receive our mailings.

As always, send information and questions to Susan Craig at secddc@aol.com or call 706.733.4368.

Have a wonderful spring and summer!

Membership Report

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GCTM NEWS
2007 GCTM Award Winners

Georgia Mathematics Conference
October 2007

The Gladys M. Thomason Award
Barbara Ferguson
Professor of Mathematics and Mathematics Education
Kennesaw State University

Dwight Love Award
Peggy Pool
Teacher on Special Assignment
Georgia Department of Education

John Neff Award
Lynn Stallings
Professor of Mathematics and Mathematics Education
Kennesaw State University

Award for Excellence in Teaching Elementary Mathematics
Leslie Poythress
Gray Elementary School, Jones County Schools

Award for Excellence in Teaching Middle School Mathematics
Karen Lawrence
Dean Rusk Middle School, Cherokee County Schools
2007 GCTM Award Winners

Award for Excellence in Teaching Secondary Mathematics
Basil Lee
Benjamin Banneker High School, Fulton County Schools

Teacher of Promise Award
Alysia Dicks
Creekview High School, Cherokee County Schools

GCTM Friend of Mathematics Award
Ned Colley
Texas Instruments

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.
2007 GCTM Minigrants Award Winners

Three Measures: Making Geometric Solids for Measuring Growth of Plants
Shirley McDonald
Ringgold Middle School, Catoosa County Schools

2nd Grade Math Take Home Backpacks
Jennifer Lockwood
Centennial Place Elementary School, Atlanta Public Schools

Pi Day Celebration
Patia C. Rountree
Southeast Bulloch Middle School, Bulloch County Schools

Integrating Problem Solving into 8th Grade Mathematics
Carlene N. Basciano
C. T. Walker Traditional Magnet Elementary School, Evans, GA

Learn More About Your Organization

www.gctm.org

* Grants and Award Information
* Membership Renewal
* Mathematics Competitions
* 2008 GMC Speaker Proposal Submission Process
* Other
Call for GCTM MiniGrants and Special Projects Grants

Is there some mathematics activity or more detailed special project you would try if you just had the money? Apply to GCTM!

GCTM MiniGrants

- Each grant is for an amount up to $500. The number of grants will be determined by GCTM.

Applications are due by August 31. Applications will be reviewed in September. Winners will be notified by early October and recognized at the Georgia Math Conference at Rock Eagle at the GCTM business meeting. Proposals will be judged anonymously, and grants will be awarded in any amount up to $500.00.

- GO TO www.gctm.org FOR FULL INFORMATION AND REQUIREMENTS.

GCTM Special Project Funds

- Larger projects promoting improvement of mathematics teaching in Georgia, such as staff development, a conference, curriculum development, a research project, etc.
- Funding from $1,000 to $5,000
- GO TO www.gctm.org FOR FULL INFORMATION ABOUT REQUIREMENTS.
Plan Now!

Earn a PLU when you attend the Georgia Mathematics Conference at Rock Eagle in October.

Many teachers around the state have earned one Performance Learning Unit while attending the annual Georgia Mathematics Conference. If you will be attending this year’s conference for at least a day and a half, let 2008 be the year when you take advantage of this opportunity. You must be able to attend 10 hours of sessions; and, the Georgia Department of Education does not allow more than 8 hours to be earned in any one day.

The FIRST Step is done in your school system BEFORE you arrive at the Conference.

A Prior Approval Form will be on the GCTM website in August and September. Visit www.gctm.org to download the form. Fill it out and get the required signatures before you attend the conference.

Bring the form to the PLU desk in the registration area and receive information regarding the two steps required for completion of the unit. Step 2 is accomplished at the conference and step 3 is an on-the-job assessment back in your school system.

The deadline for submission of the on-the-job performance for the 2007 conference was December 31, 2007. Anyone having questions regarding this requirement should contact Becky King, Executive Director, GCTM at bwking@comcast.net.

Dr. Rock’s Math Mystery Correction

Editor’s Note: Here is the correct problem and solution to Dr. Rock’s Math Mystery Challenge Round from the Last Issue section. I thank the member for catching this publishing error.

Last Digit

What would the units digit be for 3 raised to the 9999th power?

Last Digit solution: 7

Explanation: (^ means raised to the power of)

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<table>
<thead>
<tr>
<th></th>
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<th></th>
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<tr>
<td>3^1 = 3</td>
<td>3^4 = 81</td>
<td>3^7 = 2,187</td>
</tr>
<tr>
<td>3^2 = 9</td>
<td>3^5 = 243</td>
<td>3^8 = 6,561</td>
</tr>
<tr>
<td>3^3 = 27</td>
<td>3^6 = 729</td>
<td>3^9 = 19,683</td>
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The last digits are repeating: 3, 9, 7, 1. Therefore, it must be one of these possibilities. Take the exponent and divide by 4. Divide 9999 by 4 which yields 2499 remainder 3. The remainder is the key. 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.
Beginning with this issue, *Reflections* will feature a report of our organization’s income and expenses for the most recently completed fiscal year. The Executive Committee felt that this information should be provided to our members on an annual basis. I invite you to review the report. I have made some notations on items that I thought needed a word or two of explanation. I think that you will be pleased at the breadth and scope of the activities that your Council undertakes on your behalf. If you’d like further explanation or have questions feel free to contact me at dfunsch@alleluiaschool.org.

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The Georgia Council of Teachers of Mathematics, Inc.
Budget vs. Actual
November 2006 through October 2007

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Net Ordinary Income 53,067.58 73,100.00

Net Income 53,067.58 73,100.00
Second Annual “Southwest Georgia Regional Mathfest”
A Great Success!

The second annual “Southwest Georgia Regional MathFest” took place February 29 at Sumter Elementary Math, Science, and Technology Academy in Americus, Georgia. Third, fourth, and fifth grade students from L.K. Moss Primary School and Marion County Middle School from Buena Vista (Marion County); Southwest Elementary School from Cordele (Crisp County); and Sarah Cobb Real World Academy and Sumter County Elementary Math, Science and Technology Academy from Americus (Sumter County), Georgia assembled to compete and participate in an awesome display of mathematical problem solving.

Though the competition was intense, every student represented themselves and their school in a manner that showed their dedication and commitment to being successful and to reach their maximum potential in the area of mathematics. Most of these students were chosen through a selection process at their schools that included solving math problems and the time was recorded to help determine representatives in case of a tie. When students are not competing, math games are set up to allow them to interact and further hone their skills.

During the “Opening Round” of competition at “MathFest”, students are given five tickets. The problems are based on the Georgia Performance Standards for the students’ respective grade levels. All problems have time restrictions. A few of the problems have restrictions stating only the first student completing the problem correctly will receive credit. On problems of this type, only one student will not lose a ticket. On regular problems when a student misses a problem, they lose one ticket. When they have lost all of their tickets, they have been eliminated. The tickets are double tickets, so each student has a ticket and a duplicate is kept. During the competition at various intervals, a drawing occurs where remaining students receive gifts and door prizes. As students are eliminated, they get to visit a prize table to choose three prizes just for participating. This allows every student to be rewarded for their efforts and have a positive experience for choosing to succeed. When the field has been narrowed to approximately twenty students, the “Final Round” begins.

During the “Final Round”, these students are taken to a separate location with their remaining tickets and given five additional tickets. Problems begin at the next grade level and will continue until students in the final ten have been ranked from first to tenth. The “Top Ten Finalists” receive medallions and trophies with their place and grade level.

Due to a potential conflict of using “MathFest” the name will be changed to “MathQuest” beginning next school year. The competition has proven to be a tremendous morale booster and motivator for students to succeed in mathematics and draws multiple volunteers and support (parents, teachers, paraprofessionals, custodians, businesses, etc.)! If you have questions or would like to begin “MathQuest” at your school, please feel free to contact me, Dr. John Walker, Sr.; 318 Paschal Street; Plains, GA 31780-5668; phone at 229-938-0640; or fax at 229-824-5817. I’ll be glad to assist you in anyway possible.
Mathfest Sample Problems

Third Grade
Problem: Tom and Mike went on a four day camping and hiking trip. The first day they hiked 14 miles. The second day, they hiked 11 miles. The third day, they hiked 16 miles, and the last day, they hiked 13 miles. How many total miles did they hike and how many miles did they average each day?

Fourth Grade
Problem: A Delta jet left Atlanta at 11:00 am with 168 people on board. The plane landed in Dallas, TX and 74 people got off and 63 people got on. The plane continued to Phoenix, AZ where 91 people got off and 103 people got on. The plane left Phoenix at 3:05 pm for Los Angeles, CA. At Los Angeles, 88 got off and 105 got on. The plane continued to Honolulu, HI and arrived at 1:10 am. How many people arrived on the plane in Honolulu?

Fifth Grade
Problem: $\frac{1}{6} + \frac{4}{5} - \frac{2}{3} = ?$

Solutions will appear in the next issue

Call for Manuscripts

Deadline for Fall 2008 Issue:
August 29, 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.
Cast your ballot for Mathematics by joining your colleagues across Georgia at the 2008 Annual Georgia Math Conference. “Voting” will take place October 15 – 17, 2008. Your polling location is the Rock Eagle 4-H Center outside Eatonton, GA. Our platform is intended to support teachers as they promote learning through student engagement. The program promises to offer ideas for the classroom where there is a balance of skill development, procedural fluency, concept understanding, and problem solving using appropriate technology.

In addition to more than — sessions provided by classroom teachers and math leaders, the program will include keynote addresses by Dr. Glenda Lappan, Dr. Marcia Tate, and State School Superintendent Kathy Cox. David Schwartz, noted author of children’s literature for mathematics, will head the list of featured speakers. To promote active learning and discourse in the classroom, the program will also feature John Zola leading workshops on Socratic Seminar and Scored Discussions and Teresa Barry guiding participants in understanding and using questioning strategies. Dr. Melodee Davis of the Georgia Department of Education Office of Assessment Services will be sharing results from the statewide testing programs as well as answering questions about test design.

New this year, the program will offer a set of Pre-Conference options from 3:00 – 5:00 on Wednesday, October 15. Experienced educators will provide a technology open house for conference goers interested in an introduction to using graphing calculators, Geometer's Sketchpad, or interactive white boards. During the same time period, seasoned teacher-leaders will coach participants as through tasks and will share tips for incorporating tasks in classroom instruction. There will tasks appropriate for each grade band: k-2, 3-5, 6-8, and 9-12. Unlike the sessions on Thursday and Friday, the Pre-Conference will be “drop-in” style. You are invited to come when you can, experiment with tasks and/or technology, ask questions, and leave when you are satisfied (or at 5pm whichever comes first).

If you plan to get acquainted with Geometer's Sketchpad, please bring a laptop computer. If you plan to work on a task, you might want to bring a colleague to serve as your partner.

Teresa Barry

Teresa Barry is a middle/junior high school educator in Columbia, MO where she has taught for 23 years. She has earned National Board Certification in Early Adolescent Mathematics and has been recognized as the Outstanding Middle/Junior High Educator of the Year by the Missouri Council of Teachers of Mathematics.

Teresa has had the opportunity to teach students using both traditional, single course curricula as well as two of the NSF funded, reform curricula: Connected Mathematics (CMP) and Core Plus. These teaching experiences have provided a platform for continuous learning and collaboration which she values, second only to teaching.

Glenda Lappan

Glenda Lappan is a University Distinguished Professor in the Division of Science and Mathematics Education at Michigan State University. Her research and development interests are in the connected areas of students’ learning of mathematics and mathematics teachers’ professional growth and change at the middle and secondary levels. She is also a co-author of the Connected Mathematics Project and Co-director for the Center for the Study of Mathematics Curriculum (CSMC).

Professor Lappan has been committed to the professional development of mathematics teachers for over two decades, playing a prominent role in the initiation and oversight of the many workshops and summer programs conducted by the Michigan State University Mathematics Education Group. She has taken her philosophical ideas on curriculum and standards
Decision 2008: Mathematics – the Winning Ticket

right into the classroom and has, through her innovative workshops, coached hundreds of precollege mathematics teachers and school administrators to rediscover their own and their students’ mathematical abilities.

The foundation of Lappan’s international research reputation was established with her writings on the theoretical and practical problems of teaching and learning mathematics during the important transition years of the “middle grades”. In 1986 Professor Lappan was selected to direct the grades 5-8 portion of the National Council of Teachers of Mathematics (NCTM) Curriculum and Evaluation Standards for School Mathematics. She chaired the project, which resulted in the publication in 1991 of the Professional Standards for the Teaching of Mathematics.

Marcia Tate

Marcia L. Tate is the former Executive Director of Professional Development for the DeKalb County School System, Decatur, Georgia. During her 30-year career with the district, she has been a classroom teacher, reading specialist, language arts coordinator, and staff development director. She received the 2001 Distinguished Staff Developer Award for the State of Georgia and her department was chosen to receive the Exemplary Program Award for the state.

Marcia is currently an educational consultant and has taught over 125,000 administrators, teachers, parents, and business and community leaders throughout the world. She is a member of the Corwin Press Speaker’s Bureau and the author of the following three best-sellers: (1) Worksheets Don’t Grow Dendrites: 20 Instructional Strategies that Engage the Brain, (2) Sit & Get Won’t Grow Dendrites: 20 Professional Learning Strategies that Engage the Adult Brain, and (3) Reading and Language Arts Worksheets Don’t Grow Dendrites: 20 Literacy Strategies that Engage the Brain. Participants in her workshops refer to them as the best ones they have ever experienced since Marcia uses the 20 strategies outlined in her books to actively engage her audiences.

John Zola

John Zola spent 31 years as a high school social studies teacher; most recently at New Vista High School, a “break the mold” public high school in Boulder, Colorado. There, he developed a wide variety of courses and implemented Socratic seminars on a regular basis. John also served as a Senior Instructor in the School of Education at the University of Colorado where he taught the secondary general and Social Studies methods course. He also was the Director of School and University Partnerships where he directed an innovative program that focused on new teacher induction.

Throughout his career, John has developed interactive teaching materials that have been implemented across the secondary curriculum and has trained colleagues in active learning strategies and Socratic seminars. He has presented workshops that help teachers make the voice and work of students central in the classroom. Many of these workshops were presented in countries of the former Soviet Union where they helped to promote the skills and dispositions needed in the new democracies. John currently conducts in-service trainings on civic education and teaching strategies in a variety of locations around the United States, Central Europe, and Asia.
It is hard to believe Rock Eagle 2007 has come and gone and we are now getting ready for Rock Eagle 2008. Rock Eagle 2007 was a tremendous success! The new format was welcomed by all. Speakers presented on everything from assessment ideas that document student learning in multiple ways to Georgia Performance Standards instruction strategies. Lots of technology use was seen by presenters and participants alike (even when not in sessions). Everyone took advantage of all the great exhibits that focused on teaching the Georgia curriculum. Many participants took advantage of the PLU opportunity at the conference. We look forward to seeing everyone in 2008. Thanks to the membership for making the conference such a great success. Here is a look back at the conference.
GCTM Regional Reports

North-East Region

Greetings from your Northeast Georgia Reps! We hope that you have had a wonderful year and will enjoy a restful summer.

Summer Workshop on Statistics: We especially invite you to a two–day workshop for high school teachers that will focus on the mathematical content of the data analysis strand from Math 1. Chris Franklin and Gary Kader were two of the authors of the Guidelines for Assessment and Instruction in Statistics Education (GAISE) Report given to teachers by the DOE. This is an excellent opportunity to study statistics with the experts! It will be held on July 28-29, 2008 from 8:30 AM until 4:00 PM. Check the NE GA RESA website www.negaresa.org for registration information.

Rock Eagle Presentations: We encourage you to use the slower pace of the summer to plan a presentation for the GCTM Annual Conference at Rock Eagle on Oct. 15-17, 2008. Several of the teachers in our region have described presenting at the 2007 conference as a peak experience from this past year. Many of you have already implemented the new Georgia Performance Standards and have lessons, activities, and wisdom to share.

Professional Learning Communities: There are three learning communities to be offered in the Athens/Watkinsville area to high school teachers in 2008-2009 that we would like to bring to your attention. If interested in an AP Calculus or AP Statistics Learning Community, please contact Sandy at sandyb@uga.edu. If interested in the Math 1 Learning Community, please contact Kaycie at kaycie.maddox@negaresa.org. Please contact us with any needs or requests. We look forward to serving you. Sandy & Kaycie

South-East Region

As with all of the regions across the state our Southeast Georgia region is busy preparing for the implementation of the Georgia Performance Standards in the high school. Math I teachers are busy collaborating, sharing ideas and concerns. In February, PRISM brought Janet Davis to Georgia Southern University to discuss these concerns. Area teachers, 8 – 16, left feeling much relieved. Janet provided information, evidence of success, and her personal experience with the roll-out of Math 1. Teachers left feeling that they had a person contact at the Department of Education who knew and cared about their concerns.

Networking is what GCTM is all about. Together we can be more effective and efficient than any one teacher, one school, or one system alone. We need you to spread the word about the benefits of membership in the Georgia Council of Teachers of Mathematics. Those of us that have been members for awhile understand the valuable support we have received from experienced educators who are willing to share and encourage those that are just getting started.

As southeast region representative I have been making contacts with schools and asking for help. These contacts are willing to help pass along information, in their systems, from GCTM. If you are interested in becoming a contact person in your area please send me an email at vmixon@gctm.org or vickimixon@yahoo.com and I will get back to you.

Sandy Blount

Vicki Mixon
Getting Math Team Going!
Part Two: It’s Started --
Now What?

This is the second of a two-part article focused on establishing and running a Math Team. In the first part, we gave some suggestions for building a Math Team at your school from the ground up. In the second part, we suggest contests, tournaments, and other avenues of problem-solving along with tips on funding them.

Funding

Once you have completed that first meeting and given the interested students some problems to sharpen their skills, then comes the fun part: money!

Nearly every contest and tournament requires a registration fee. With a small, beginning Math Team, you and parents may drive the students to the tournaments, but as your Math Team grows larger, that option becomes more unfeasible — and buses require money! So where do the funds come from?

One quick answer is dues. Charging the students money to join may seem like a great idea. However, one must think carefully about such an idea, especially for a new Math Team. Without the benefit of tangible goods, it is difficult for a parent or student to fork over some cash just to join, on the promise of all the great stuff that lies ahead.

If dues are not sufficient, go to your administrator. Many schools have academic accounts, general fund accounts, or other such “discretionary” accounts that can be used for some registration fees.

Fundraisers are useful. Aside from the traditional bake sale, dunking booths, and car washes, there are other math-related ideas. One such idea is to offer a tutoring service. The members of the Math Team gather after school or on the weekends at specified times, and assist any student who walks in the door. Charge, say, $5 to $10 per 30 minute tutoring session. Students who need the extra help can get it from those who are pretty good at math, and at competitive prices. Another idea is to sponsor a math tournament at your school. This is a great way to involve your students on the other end of a tournament. This activity is lots of work, but is very rewarding for the students, and can be very rewarding financially!

There are many grants available for mathematics activities. Goody’s, Georgia Power, Intel, Raytheon, and many other corporations offer grants that range from $500 to $10,000. As long as you are willing to fill out the paperwork and write the essays, this is an easy (if unpredictable) way to raise funds. The author’s Math Team received $3,000 in grants last year.

More and more businesses are realizing that the mathematically educated graduate results in a desirable employee. These businesses, when asked, are willing to make donations to support mathematics activities. Through only four local business and industries, the author’s Math Team has received nearly $800 in donations this year.

Finally, do not be afraid to pay for some things yourself. When the author began a Math Team from scratch over a decade ago, there was no money at the school, and there was an unsympathetic administration. However, the author considered it important to give the students a powerful mathematical experience and lay the groundwork for the future. All registration and transportation costs for the first two years of the Math Team existence were paid for out-of-pocket. The initial expense proved worthy since this Math Team has grown to be successful and very enjoyable.

Contests

“Contests” are defined as timed math tests done at your school, whose results or answer papers are mailed in for scoring. There are dozens of contests out there, and it is difficult to choose which ones would be appropriate for a new Math Team. Below are some suggestions for contests that every Math Team should try to do.

1) The American Math Competition (AMC). Offered in three levels (The AMC8 for middle school, the AMC10 for 9th and 10th grades, and the AMC12 for 9th through 12th grades), this is by far the most prestigious contest in the nation. Over 300,000 high school students in the U.S. participate in the AMC10/AMC12 each year. If you lack the time or funds to do lots of contests, be sure to participate in this one. The registration fees are not cheap, but it is worth the money. Visit http://www.unl.edu/amc for much more info.

2) The Georgia Math League. The high school version of this state-wide contest comprises six rounds of six question tests, with the rounds spaced a month apart beginning in
October and ending in March. More Georgia high schools participate in the Math League than any other contest of its type. The middle school Math League consists of a once a year test similar to the AMC8. Both middle and high school versions are well worth the time and money. Visit http://www.mathleague.com for more info.

3) Atlantic-Pacific Math League. This is another contest comprising six rounds of six questions each. Slightly easier than Math League, this could be a great contest for beginning high school Math Teams, or to challenge the best middle school Math Teams. Visit http://www.atpacmath.com for more.

4) Mandelbrot. This is a five round, seven question contest that is slightly harder than Math League. The problems, however, are very well-written. Each contest has at least one problem the students find just fascinating. There is also a Mandelbrot Team contest, designed for groups of four students to work together. This is a three round contest. The registration fees are a little easier on the wallet than the others, so check out http://web.mandelbrot.org/index.html for more.

Tournaments

Tournaments are a vital part of a Math Team. It is through the tournaments that students can be exposed to other mathematically-minded students in a positive way. It can be frustrating to be one of a small group in a school that likes math. At a tournament, that frustration is eased with the knowledge that there are lots of people who like math. Tournaments are fun, exciting, and mathematically rewarding.

Tournaments can be classified into two categories: curricular tournaments and problem-solving tournaments. This is a broad categorization, with lots of overlap, but they accurately describe the focus of most tournaments. By curricular is meant that the problems are mostly similar to what one may find in a textbook or on a classroom test, only a bit more difficult. For example, the following is a good example of a “curricular” question.

What is the period of the function f(x)=sin(x/2)cos(x/3)?

Although not a particularly interesting or exciting question, it certainly does test the students’ knowledge. By problem-solving is meant that the problems may bear no relation to anything specifically learned in a math class, but can be figured out, usually in multiple ways. The problem-solving focused tournaments provide deep mathematical understanding and problem-solving ability to shine. An example of such a problem is below.

How many times during a 24-hour day do the hour and minute hands of a clock form a right angle?

This problem is understood by all, but only some will get the answer. Those that do get the right answer possess independent, on-the-fly, problem-solving skill. By contrast, if a student forgets or has never learned what the term period means in the problem above, the problem is virtually unanswerable.

The two types of tournaments are discussed so that you have some understanding that tournaments are different. You should not expect the same students to do well at every tournament, since the tournaments focus on different aspects of mathematics. You should sign up your students for tournaments that play to their strengths. Of course, this is not to say that a “curricular” tournament has no problem-solving questions; simply that problem-solving is not the focus of such a tournament.

For high schools, two of the best “curricular” tournaments are the Mercer University and Georgia Southwestern State University tournaments. The best “problem-solving” tournament for high schools is by far the University of Georgia tournament. For middle schools, the best tournament of any kind is MathCounts. For a list, with contact info, of all tournaments in the state, visit http://www.gctm.org/math_competitions.htm. For MathCounts, visit http://www.mathcounts.org.

Good Luck!

Running a Math Team is very hard work. There is lots of time spent copying practice problems, teaching, facilitating, and organizing. But running a Math Team can be extremely fun and rewarding! This author finds it incredible that there are math teachers that are not interested in running a Math Team. Those teachers are missing out on getting to know the best bunch of mathematically-talented students at their school!

Now, get that Math Team going!
Solving A Locus Problem Via Generalisation

Dr. De Villers is on sabbatical from University of KwaZulu-Natal, South Africa
Visiting Professor, Dept. of Mathematics & Statistics, Kennesaw State University

“It is quite natural to consider specialization as a powerful problem solving strategy: one hopes that an insight gained by looking at a special case will be helpful in solving the problem in general, or that some technique which conquers a special case can be transferred to the general situation. But it may seem odd to consider generalization - the opposite of specialization - as a useful problem solving strategy, too. It turns out, however, that many particular problems are easier to solve when cast in a more general form.” - Wolfgang Schwarz (2005)

During my geometry classes I consistently try to make conjecturing a regular feature and encourage my students to come up with their own. I also regularly make a point of showing students how I go about creating and solving new problems myself. Activities like these certainly seem to help informing students about how new mathematical knowledge is created and discovered. For example, examining any given problem can inspire many new problems simply by trying out numerous changes that could lead to new investigations. One such possible change is to consider a generalization of the problem. This contrasts with the problem solving strategy often emphasised in mathematics education at various levels, namely, to consider special cases of a problem. Not only are the special cases usually more easy to solve, but often allows one to identify a pattern or give some clue towards a general solution or proof. Less frequently utilised appears to be the opposite problem solving strategy, namely, to consider a more general case than the given problem. Contrary to what one might expect, the general case is sometimes easier (or at least just as easy) to solve than the special case as Polya (1954) discusses with several examples. Other examples from high school to undergraduate level mathematics are discussed in De Villiers & Garner (In press).

The purpose of this article is to illustrate this technique with the following problem from Klamkin (1988, p.5), which should be easily accessible even to undergraduate students. It came to my attention via Nunokawa (in press (a) & (b)). “If A and B are fixed points on a given circle and XY is a variable diameter of the same circle, determine the locus of

Instead of going straight ahead trying to solve the problem directly, I first asked myself whether the problem points on a given circle and XY is a move-able chord of fixed length of the same circle, then the locus of the point of intersection of lines AX and BY is a circle. (It’s assumed here that AB and XY are not equal in length, in which case AX and BY will be parallel and only meet at infinity).”

In proving this generalization, I came up with the following proof using similarity, and which is distinctly different from those in Klamkin (1988, p.50) and Nunokawa (in press (a) & (b)). Though not claiming that it is “easier” or “simpler” than the original proofs, I personally found it more explanatory of why the result is true in the special as well as in the general case.

Proof
Given chord XY of fixed length, rotate it along the circle to an arbitrary position X’Y’ as shown in Figure 1. Since chords YY’ and XX’ are equal, ∠YAY’ = ∠XAX’. But ∠XAX’ = ∠QAX as they are directly opposite angles. Hence, ∠YAY’ = ∠QAX and by respective addition of these angles to, ∠YAQ it follows that. However, since ∠AY’B = ∠AYB on chord AB, it follows that triangles QAY and Q’AY’ are
similar. Hence, the corresponding angles at Q and Q’ are equal, and therefore lie on the same circular arc on fixed chord AB.

It is now left to the reader to verify that triangles QAY and Q’AY’ are still similar in the position shown in Figure 2. Thus, the corresponding exterior angles at Q and Q’ are equal, therefore also lying on a circular arc on fixed chord AB.

Since chords XY and X’Y’ are equal, \( \angle XAY = \angle X’AY’ \) in both Figure 1 and 2, triangle QAY in Figure 1 is similar to triangle QAY’ in Figure 2 (\( \angle AYB \) also remains constant on fixed AB in both figures). Thus, \( \angle AQB \) in Figure 1 is supplementary to \( \angle AQB \) in Figure 2, showing that the two circular arcs from the figures lie on the same circle.

**Notes**

1. It might also be a good challenge for students to try and solve this problem using coordinate geometry.

2. A Dynamic Geometry (Sketchpad 4) sketch in zipped format (Winzip) of the geometry results discussed here can be downloaded directly from: http://mysite.mweb.co.za/residents/profmd/circlelocus.zip

(If not in possession of a copy of Sketchpad 4, these sketches can be viewed with a free demo version of Sketchpad 4 that can be downloaded from: http://www.keypress.com/x17670.xml)

**References**


Schwarz, W. Problem Solving by Generalization. Paper delivered at the Joint Meeting of AMS, DMV, and ÖMG, June 16-19, 2005, Johannes Gutenberg University, Mainz, Germany.
What’s Smaller Than a Pygmy Shrew by Robert W. Wells. (1995). This is a great book if you are studying size. Pygmy shrews are very small, as mammals go. But very large compared to other things, such as ladybugs or protozoa. The pictures in the book are great and your students will love them. They can see the comparisons and sizes of the items in the book. This book will be a very good choice if your class is working on comparing sizes in either Math or Science. This book will also serve as a springboard for students to write their own comparisons.

Another book on sizes, but going the other direction is Wells’ Is A Blue Whale The Biggest Thing There Is? (1993). A Blue Whale does seem to be very big, compared to our size, but students will see that it may not be that big when compared to other things. This is a good book for size comparisons, again, whether for science or math. Why not take the students outside and let them measure off the length of a blue whale and then let them compare things to it. How many students are as long as a blue whale? Would it matter whether you compared first graders or fifth graders and why. Let them generate other things to compare. If space is available draw a blue whale to scale on the sidewalk.

A great counting/addition/multiplication book that you may want to add to your classroom collection is Each Orange Had 8 Slices by Paul Giganti, Jr. and illustrated by Donald Crews. 1992. The pictures are bright and colorful and the text is very predictable and easy for students to follow. This is another book that works well for students to write their own page for the book. Have students write their page, using the format established by Giganti and then compile them into a class book for students to read and illustrate. This is a great way for students to illustrate simple multiplication facts using repeated addition. Just make sure they keep the numbers simple. Students love to “out-do” each other and some will try to do something like “I saw 15 dogs and each dog had 47 fleas on it. Now that sounds easy until they start to illustrate it and have to show the repeated addition of multiplication fact. I always insisted on single digit stories, especially when beginning.

ETA offers a series of WorldScapes books that demonstrate how math can be used in many environments. In Rainforest Math, by Claire Owen, (2005), students learn about the rainforest and how math is important there. The pictures are wonderful and the range of material it covers is great. The story includes information about the rainforest, animals in the rainforest, and some wacky problems for the students to solve. This book is part of a series of seven titles. The book is also available in Spanish. It’s a fun read with lots of comparisons.

Not all math literature involves cute stories of bears, pigs, or other fictional characters. Some books offer great math connections through non-fiction. A good non-fiction book on fractions is David Adler’s Fraction Fun. (1996). Nancy Tobin illustrated this book with bright and fanciful pictures. It’s enough to make even your most reluctant learner interested in fractions. It covers ages in fractional parts, such as being 4 " 1/2. The book illustrates the terms, numerator and denominator. The students get an opportunity to “create” a pizza on a paper plate and illustrate it. Then they compare eighths of the pizza and what each part represents. Another section of the book discusses fractions in terms of weight. Eleven pennies weigh an ounce so one penny weighs……….. There’s a lot more awaiting students in this book but it all keeps them actively involved and looking at fractions in more ways than just dividing an apple into two or four pieces.
Another non-fiction math book of a different nature is *Polar Bear Math Learning About Fractions from Klondike and Snow*, written by Ann Whitehead Nagda and Cindy Bickel. (2004). This book is a real story of baby polar bears born at the Denver Zoo. The story traces their growth and talks about how fractions play a role. The book contains photographs at birth and until they are full grown. Not only can you discover different ways fractions enter into the study of their development but it's a very interesting story. The students are always fascinated with zoo animals such as polar bears and they will love the story and hopefully learn something about fractions in the process. Nagda has done several books *Chimp Math: Learning about Telling Time,* and *Tiger Math* which teaches about graphing. Check your library for all of these.

Do you like to bring in a little food to spice up your math lessons? My students used to love using food as the manipulative and then "eating" their lesson. It can get expensive but occasionally it's fun. There are loads of cute "food" math books out there using everything from Cheerios to chocolate and covering most every math topic out there. If you are not familiar with any of these, you need to check them out. Students will remember a math lesson that tasted good.

From Simple Shapes to Geometry (2005) by Jerry Pallotta is an example of one such food book. The book begins by discussing simple two-dimensional shapes and continues on covering terms such as vertex, angle, perpendicular, parallel, circumference, radius, diameter, and more. Each term is illustrated, defined, explained, and students can then illustrate using their Twizzler strings. Once the book starts to deal with three dimensional shapes, the use of Twizzlers becomes limited. By then its time to eat the manipulatives.

Another Geometry based story can be found in the book, *What's Your Angle, Pythagoras?* By Julie Ellis and illustrated by Phyllis Hornung. (2004) The story is set in ancient Greece and is about a very curious young boy named Pythagoras. Now Pythagoras is always looking and asking questions. Some considered him pesky. But Pythagoras went to sea with his merchant father to learn about sailing. In Alexandria he meets a builder who teaches him about using a knotted rope to construct right angles so bases can be level and columns can stand straight. Now what does this have to do with the Pythagorean Theorem…you’ll have to read the book with your students to find out. The story is good and the lesson is good. It will hopefully help students retain the meaning of the Pythagorean Theorem in math class.

With an ever increasing emphasis on content area reading and vocabulary, I thought I would share two books I am acquainted with that will offer teachers some solid suggestions for integrating the math and language arts. Shell Education has just published a book entitled *Reading Strategies for Mathematics.* 2008. This book offers graphic organizers, and activities to use during your math class. The book works with primary grades through high school. There are variations in the activities so they can be used with any grade level. It also includes a section on developing vocabulary in mathematics. If vocabulary skills are weak, mathematical understanding is usually weak as well. According to the table of contents the books also covers strategies such as activating prior knowledge, questioning, summarizing, and using visual representations. There are graphic organizers, suggested activities for differentiation and a CD-ROM with all the needed reproducibles. Shell has a companion book entitled, *Writing Strategies for Mathematics,* (2008), that is equally good. Instead of the focus being reading though, this book deals with writing. Loads of good ideas for writing in math class. These may be books you’d like to check out for your classroom.
Remember that by using math literature, you are giving students an opportunity to see the math in a different setting other than their math book. Books also help broaden their math vocabulary which is critical, especially as they are being tested for accountability.

I hope you have found something new to try with your students. Let me know if you can't find any of these books and I will send you sources. My e-mail is at the top of the column and I will always respond. If you need ideas for a topic, let me know that too and I'll see what I can do to help you out.

SciTrain

Working toward inclusive science and math classrooms for all students!

What is SciTrain?
SciTrain is a research project to train high-school math and science teachers to create a more effective learning environment for students with disabilities. SciTrain collects information on the needs of teachers working with students with ADHD, vision, and hearing difficulties and provides instruction on the most necessary accommodations. SciTrain also offers an extensive Publications Database with articles on math and science accommodations in the classroom, and an Accommodations Database of assistive technology for the classroom.

Free Online Training for Mathematics and Science Teachers!
SciTrain offers free, online Math and Science training courses. This series of courses trains teachers to make their classrooms universal and accessible to students with and without disabilities - providing an improved learning environment for ALL students!

Science and Math for All

Accessible Science Course for Teachers
catea.org/scitrain/science/modules/index.php
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To learn more, please visit:
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Making Mathematics FUN
Dr. Rock’s Math Mystery

by David Rock
Columbus State University
rock_david@colstate.edu

Elementary Brain Teaser

From Last Issue

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

Letter Mania Solution:

Group 1 letters are all straight segments while Group 2 letters contain curves. So, I, K, and L go into Group 1 while J goes into Group 2.

New One!

Circles and Squares

Start with a square piece of paper. Draw the largest circle possible inside the square, cut it out and discard the trimmings. Draw the largest square possible inside the circle, cut the square out and discard the trimmings. What fraction of the original square piece of paper has been cut off and thrown away?

Challenge Round

From Last Issue

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.

The Castle Solution:

Place one board diagonally across the corner of the moat. Place the second board from the midpoint of the first board to the corner of the castle.

New One!

How Big Is A Million?

What is the sum of all the digits needed to write each counting number from 0 through 1,000,000? For example, the sum of all the digits needed to write each counting number from 18 through 23 would be:

1+8+1+9+2+0+2+1+2+2+2+3=33.
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<td>Washington, DC</td>
</tr>
<tr>
<td>October 15-17, 2008</td>
<td>October 30-31, 2008</td>
<td>April 22-25, 2009</td>
</tr>
</tbody>
</table>

DATES TO REMEMBER

Get Out Your Calendars, Day Planners, and PDAs

REFLECTIONS

is an official publication of the Georgia Council of Teachers of Mathematics

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