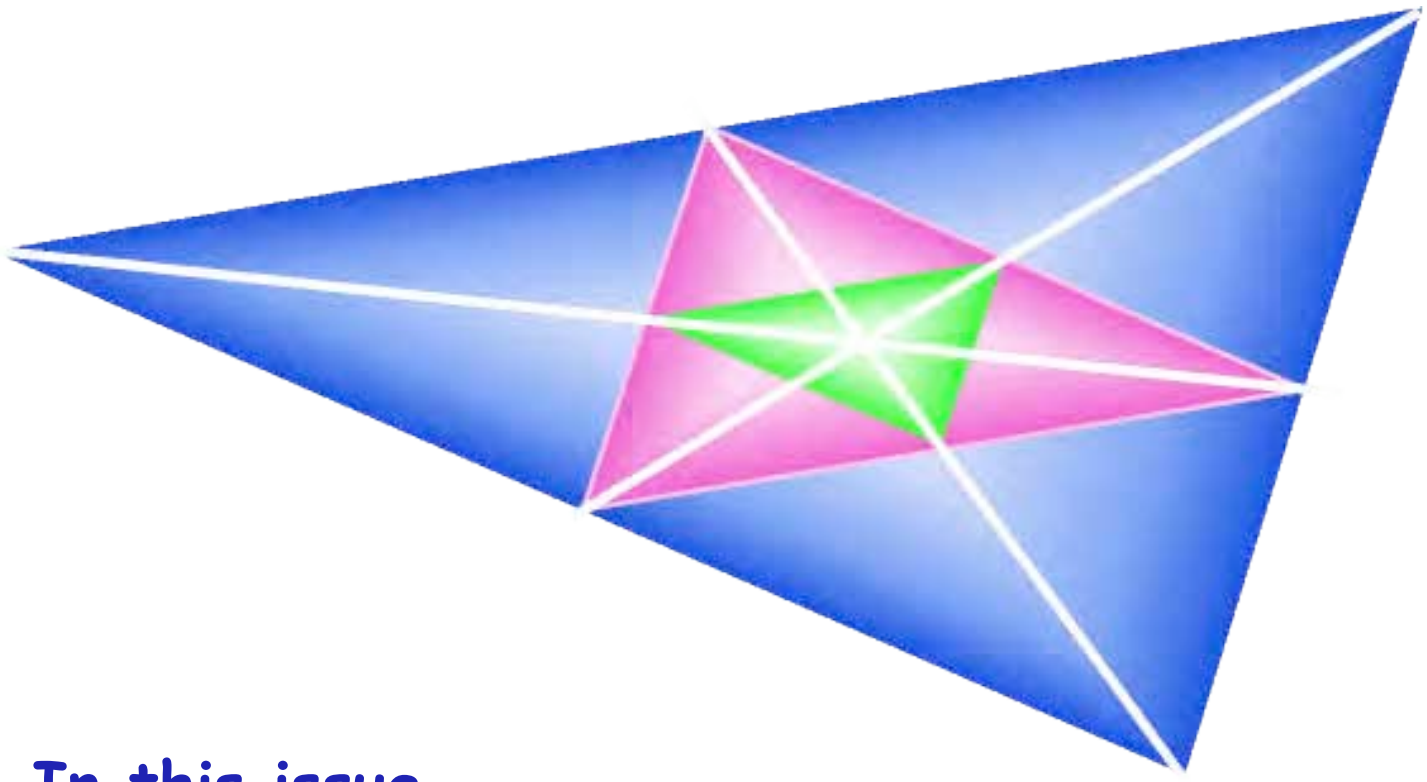
The Centroid



In this issue

OFFICIAL JOURNAL OF THE NORTH CAROLINA COUNCIL OF TEACHERS OF MATHEMATICS
VOLUME 35 • NUMBER 1 • SPRING 2009

The Centroid is the official journal of the North Carolina Council of Teachers of Mathematics (NCCTM). Its aim is to provide information and ideas for teachers of mathematics—pre-kindergarten through teacher education. *The Centroid* is published in January and August. Subscribe by joining NCCTM; see the Membership Form on the last page.

Submission of Manuscripts

We invite the submission of news, announcements, and articles useful to school mathematics teachers or mathematics teacher educators. In particular, K-12 teachers are encouraged to submit articles describing teaching mathematical content in innovative ways.

News and announcements (president's messages, award winner announcements, professional development announcements, etc.) must be received by December 1 for the spring issue and by July 1 for the fall issue.

Articles that have not been published before and are not under review elsewhere may be submitted at any time to the address below. Submit one electronic copy via e-mail attachment (preferred) or diskette in *Microsoft Word* or rich text file format. To allow for blind review, the author's name and contact information should appear *only* on a separate title page. Manuscripts should not exceed 10 pages double-spaced with one-inch margins. Figures and other pictures should be included in the document in line with the text (not as floating objects). Scannable photos are acceptable and should be large glossy prints mailed to the editor or minimum 300 dpi tiff files emailed to the editor. Proof of the photographer's permission is required. For photos of students, parent or guardian permission is required.

Manuscripts should follow APA style guidelines from the most recent edition of the *Publication Manual of the American Psychological Association*. References should be listed at the end of the article, and should also follow APA style, e.g.,

Bruner, J. S. (1977). *The process of education* (2nd ed.). Cambridge, MA: Harvard University Press.

National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*. Reston, VA: Author.

North Carolina Department of Public Instruction. (1999). *North Carolina standard course of study: Mathematics, Grade 3*. Retrieved October 17, 2005, from http://www.ncpublicschools.org/curriculum/mathematics/grade_3.html

Perry, B. K. (2000). Patterns for giving change and using mental mathematics. *Teaching Children Mathematics*, *7*, 196–199.

Ron, P. (1998). My family taught me this way. In L. J. Morrow & M. J. Kenney (Eds.), *The teaching and learning of algorithms in school mathematics: 1998 yearbook* (pp. 115–119). Reston, VA: National Council of Teachers of Mathematics.

General articles and teacher activities are welcome, as are the following special categories of articles:

- *A Teacher's Story*,
- *History Corner*,
- *Teaching with Technology,*
- *It's Elementary!*
- *Math in the Middle*, and
- *Algebra for Everyone*.

Editorial Board

About the Cover

The Centroid logo is based on the following theorem: The limit of the sequence of midtriangles of a triangle is the centroid of the triangle.

Copyright

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or send email to <CrockerDA@appstate.edu>. Please include a return email address with all correspondence.

The Centroid

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Articles

News & Information

NCCTM State Conference: Oct 29-30

The 2009 State Mathematics Conference is a wonderful opportunity to share research, classroom strategies, activities, and resources with your colleagues that make mathematics come alive for your students. Take the time to fill out a Speaker form and be a part of this annual professional development opportunity. Encourage colleagues to present as well. Download the form from:

<http://www.ncctm.org>

NCCTM Regional Conferences

Eastern Region Mathematics Conference
Focus on Classroom Teaching
Saturday, February 28, 2009
North Carolina Wesleyan College, Rocky Mount, NC

Central Region Mathematics Conference
MathWorks...with Any Subject
Saturday, March 21, 2009
Winston Salem State University, Carolina Hall

Western Region Mathematics Conference
Teaching Math: Get Charged Up!
Saturday, February 21, 2009
Jacobs Fork Middle School, Newton, NC (Catawba County)

More information: <http://www.ncctm.org>

Pre-registration for pre-service teachers will be free.
On site registration for pre-service teachers will be $10.

Pre-registration for in-service teachers will be $10.
On site registration for in-service teachers will be $20.

Presidents' Messages

State President
Randy Harter

randy.harter@bcsemail.org

Thank you to a great team of NCCTM leaders for putting together an outstanding State Mathematics Conference in October 2008. Special thanks to Conference Co-chairs Judy Rucker and Pat Sickles and Program Co-chairs Marta Johnson and Ron Preston. Many others, more than most of us know, play an important part in putting together all of the pieces that make for a successful state conference. Our goal is to structure state conferences so that NCCTM members have the opportunity to develop more of a shared vision for improving the teaching and learning of mathematics across the state. An impressive list of keynote and featured speakers and special panel sessions were designed to provide that opportunity.

Mathematics education in North Carolina is at an important crossroads. Policy makers need input from informed mathematics educators in making wise decisions. The K-12 mathematics curriculum is under revision with a focus on a more limited and well-defined set of Essential Standards for each grade level and course. Consideration is being given to the learning trajectory for important mathematical concepts across grade levels. Recommendations from a state Blue Ribbon Commission for changes in assessment and high stakes tests are under consideration by NCDPI and the State Board of Education, especially for North Carolina high schools. Early in the Spring semester of 2009 LEAs across the state will be making important decisions about instructional materials. The NCCTM Leadership Pre-sessions at the State Mathematics Conferences over the past two years have been designed to provide essential information for school systems that are committed to making the needs of students the foremost priority in those decisions. I am hoping that a significant number of North Carolina schools will opt for NSF-funded programs designed to support the goals of the standards documents published over the past 20 years by our national affiliate, the National Council of Teachers of Mathematics.

The primary goal for our students is best summarized, in my opinion, by the phrase mathematical power, defined by NCTM as "an individual's abilities to explore, conjecture, and reason logically, as well as the ability to use a variety of mathematical methods effectively to solve non-routine problems." Number sense and computational fluency, including accuracy, efficiency, and flexibility, is an important component that can be developed through problem solving. Problem solving is a phrase some hesitate to use because its interpretation can be so varied. The phrase "problematic tasks" makes clearer the emphasis on tasks that, while accessible to students, are challenging and require mathematical reasoning, perseverance, and perhaps collaboration with other learners. Problematic tasks are not ones for which teachers or texts have provided examples or sample solutions. The only way to become a problem solver is to regularly wrestle with problematic tasks by yourself and with other like-ability learners, creating and communicating your own solution strategies that make sense for you. In order for teachers of mathematics to communicate and model a genuine love for life-long learning to our students and orchestrate a problem–centered learning environment in our classes, we, as educators, need to be life-long learners who enjoy doing mathematics. If students experience mathematics primarily as memorizing facts, formulas, and computational procedures, it would be hard for them to see how anyone would find such activity enjoyable. But solving engaging problems their way and making sense of solution strategies is something that can be intrinsically satisfying to students. Problem solving will be a new strand in the revised course of study in North Carolina. It needs to permeate all strands. It needs to become the clear focus of mathematics in every grade and in every course.

Eastern Region President
Rose Sinicrope

SINICROPER@ecu.edu

Greetings from the East!

I am still thinking about the fall 2008 conference. The focus was on problem solving, reasoning, and student discourse in mathematics instruction and what that means at each of the grade bands. As we select new texts, develop and implement new curricula, and meet new standards for student learning, we are challenged to look deeply at student learning, mathematics, curricula, assessment, and our classroom practices.

We want to continue with the state conference focus and the discussion at our regional conference at North Carolina Wesleyan College in Rocky Mount on Saturday, February 28, 2009. We reach out to all teachers of mathematics in the East. By "all" we mean all teachers who engage students in the learning of mathematics. With so many innovative approaches, I am avoiding a list for fear of omission. We hope that teachers in the East will find meeting in Rocky Mount on a Saturday morning in February much more manageable than driving to Greensboro for meetings during the school day. Gail Stafford at NC Wesleyan has graciously agreed to serve as our site coordinator. Our regional officers are working on the program. Holt Wilson is the Vice President for High School, Julie Cazin is the Vice President for Middle School, Kitty Rutherford is the Vice President for Elementary School, Tim Hendrix is Vice President for College, and Katie Stein is our Secretary. Also helping with the program is our new student representative, Sarah Ives from North Carolina State University and Ray Jernigan, President Elect. Please contact us. We welcome your suggestions and participation. There is wonderful talent and commitment from teachers of mathematics in the East. The opportunity to get together and to get to know one another and to learn from one another is a powerful, affirming experience. Please join us on February 28!

The East is getting ready for the NCCTM Logo Contest, MathCounts, NCCTM Math Fairs, NCCTM High School Math Contests, the American High School Math Exam—the list goes on and on!

Central Region President
Rebecca Caison

rbcaison@mebtel.net

Greetings to the members of the Central Region. The school year seems to be flying by faster every year, and I hope you and your students are having a wonderful year. Have you have taken the opportunity to participate in at least one activity from NCCTM? If not, explore what the organization has to offer. The fall conference was a huge success. There were so many outstanding sessions and workshops. I always am able to take several activities and/or ideas from the conferences and use them in my classroom. Other opportunities for the spring include the Math Logo Contest, the Regional Math Fair, and the Central Region Math Conference. The Central Region Math Fair will be in Asheboro on March 14th. The Central Region Math Conference, "Making Connections with Math," will be held at Winston Salem State University on March 21st. Vincent Snipes and Ana Floyd are serving as conference chairpersons. We look forward to seeing you in Winston-Salem as we explore ways to connect math to other disciplines.

I would like to thank Donna Boyles, Pat Sickles, Adam Reeder, Vincent Snipes, and Ana Floyd for their dedicated support and service as officers during the past two years. They have represented you well and have taken on many responsibilities within the organization. It certainly was a pleasure to work with all of them. I look forward to working with Barbara McGill as she begins her term as president this spring.

In closing, serving as your Central Region President has been an honor and privilege. Thank you for giving me this opportunity.

Western Region President
Debbie Crocker

crockerda@appstate.edu

Welcome to 2009! I hope it is off to a successful start. This will be my last column as Western Region President. I have enjoyed serving the region in this capacity for the past two years. I want to thank Dana Long, Kelly Schofield, Katie Mawhinney, Nikki Costello, and Zada Taylor; the officers I have worked with during my term as president. They are a great group! I will serve as Past President for the Western Region for one year. You will be in good hands! Kathy Ivey Jaqua will start her term as President of the Western Region at the spring board meeting. Kathy has lots of exciting ideas for the region!

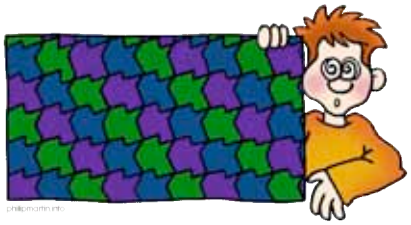
The Western Region Math Fair will be held at Plemmons Student Union on the campus of Appalachian State University on Saturday, March 28, 2009. Contact Cindy Robinson <crobinson@caa.k12.nc.us> if you need information. Information is also posted on the NCCTM website <http://www.ncctm.org>. Mark your calendars! Get your students started on their projects! Volunteer to judge, help in the student holding rooms, do registration, or be a runner!

The Western Region Conference will be on Saturday, February 21, 2009. Watch the website for the location. It will be in the Hickory/Catawba County area again. Contact me <crockerda@appstate.edu> if you would like to volunteer to speak to either teachers or pre-service teachers at the Western Region Conference this year.

I hope this year will be productive for all of us in the Western Region of NCCTM. You can contact me with questions, concerns, or ideas. I hope to hear from some of you! Have a great new year!

2009 State NCCTM Math Fairs

The North Carolina Council of Teachers of Mathematics sponsors three regional Math Fairs each spring. The best projects qualify for the State Math Fair. Only students attending school in North Carolina are eligible to enter. Projects may be entered in the following categories:



- Grades K-2 (Individual or Class Projects)
- Grades 3-5 (Individual or Class Projects)
- Grades 6-8 (Individual Projects)
- Grades 9-12 (Individual Projects)

Class projects must involve a majority of the students in that class. Individual projects involve one or two students only. Projects must be pre-registered to be accepted for competition. During the judging, each project must be represented by one or two students whose names appear on the project.

Eastern Region Math Fair
East Carolina University
March 13, 2009
DEADLINE March 2

Central Region Math Fair
North Asheboro Middle School
March 14, 2009
DEADLINE February 10

Western Region Math Fair
Appalachian State University
March 28, 2009
DEADLINE March 9

State Math Fair
(winners of Regional Fairs)
North Carolina School of Science and Mathematics
April 30, 2009

Information at: https://www.ncctm.org/ -- Follow the "Math Fairs" quick link!

Opportunities to Engage Students in Problem-Solving: A North Carolina Connection to the Math Forum's Problem of the Week Program

Dr. Tracy Goodson-Espy
Appalachian State University, Boone, North Carolina

The National Council of Teachers of Mathematics (NCTM) Principles and Standards for School Mathematics (2000) states that, "Solving problems is not only a goal of learning mathematics but also a major means of doing so." (¶1) The North Carolina Standard Course of Study also heavily emphasizes problem solving, stressing that, "Problem solving should be integrated early and continuously into each student's mathematics education." (¶7)

Problem solving research in mathematics education has emphasized the approaches: teaching about problem solving; and teaching math through problem solving. Teaching about problem solving tends to view problem solving as a skill that can be learned and transferred into various contexts. This approach led some mathematicians (Polya, 1957) and mathematics education researchers (Schoenfeld, 1985, 1987) to urge teachers to focus on instructing students in problem solving strategies. Teachers attempting to teach problem solving in this way found that, while it was helpful to familiarize students with various strategies, it was often difficult for students to transfer general strategies from one setting to another. Students could not "see" their way through problems and determine appropriate solution strategies to apply, even when they had received direct instruction about the strategies. Other researchers (Lester, 2003; Lester & Garofalo, 1982; Silver, 1985) endorsed teaching mathematical content by using meaningful problem contexts as the vehicle for learning both problem solving and mathematics. Currently, some researchers encourage the use of fully open-ended problems, such as those favored in Japanese schools, to encourage development of problem solving abilities (Becker & Shimada, 2005).

In all cases, good problems have multiple entry points and lend themselves easily to being solved using a variety of approaches. Such problems encourage students of many ability levels to attempt solutions, because they learn that mathematics makes sense and develop confidence in their ability to solve problems. Furthermore, scholars in mathematics education and in cognitive psychology agree on the significance of teaching students specific metacognitive skills. These skills include: 1) management strategies for planning, monitoring, evaluating, and revising student thinking, and 2) strategic knowledge about what information students can apply, when and why to use this knowledge, and specifically how to use it. There is also agreement that metacognitive skills are not often taught explicitly enough across the curriculum (Hartman, 2001).

This article describes an opportunity for engaging preservice teachers and students in grades 3-12 in meaningful problem solving through the Math Forum's Problem of the Week (PoW) program.

A North Carolina Connection to the Math Forum's Problem of the Week Program

One of the difficulties of teaching mathematical problem solving is learning how to effectively mentor students' problem solving efforts. Teacher educators know that prospective elementary teachers are sometimes fearful of mathematics and that it is a challenging endeavor to assist them in acquiring mathematical content proficiency and developing the confidence and skills they need to help their students.

I became involved with the Math Forum's PoW program and completed extensive online problem solving mentorship training in order to fully understand how the process works for mentors and students. Following this experience, I integrated problem solving mentorship training into my elementary geometry methods course. Preservice teachers in my course completed the online training on how to mentor students' problem solving. After completing the mentorship training, the preservice teachers had the opportunity to mentor problem-solving online with students in grades 3-7. Working with the Math Forum staff, I was able to arrange for the Fun PoW problems mentored by my students to be geometry related. The collaboration with the PoW program allowed me to link preservice teachers and schools in meaningful ways that also contributed to the development of preservice teachers' pedagogical content knowledge.

Through an in-house grant provided by Appalachian State's Reich College of Education, we were able to sponsor four North Carolina elementary school PoW class memberships, and I have integrated the mentorship training into my standard elementary geometry methods course. Elementary students mentored by the preservice teachers may be located in any part of the country.

Problem solving mentoring training helps preservice teachers achieve a number of goals:

1. Develop knowledge and understanding of relevant standards.
2. Learn the characteristics of problems that provide multiple entry points and multiple problem representations through seeing PoW problems.
3. Practice mathematical concepts, skills, and problem solving strategies by solving PoW problems.
4. Learn the characteristics of a complete, correct, and clear problem solution. These are referred to as problem expectations. Each PoW has an accompanying set of expectations that is used in problem solution analysis.
5. Learn the characteristics of superior problem solving mentorship through peer mentoring, receiving mentored replies to their own problem solutions, developing group mentorship guidelines via an online discussion board, and learning to apply the PoW mentoring guidelines.
6. Develop an understanding of how to mentor students by responding to the answers students actually give rather than describing a particular problem solution path favored by the teacher. Learning to provide guidance along multiple problem solving paths is a difficult task for beginning teachers to master. This process also teaches them how to ask a series of probing questions.
7. Learn how to encourage reflective thinking from the students and why such thinking is valuable in developing abstract thinking skills.
8. Develop realistic expectations of what students can do mathematically. Preservice teachers have to learn which concepts students find difficult. They often over-estimate, or even more frequently, underestimate students' mathematical abilities.
9. Develop an understanding of the emotional side to receiving feedback as well as the intellectual side. Preservice teachers need to learn how to accept constructive criticism, learn how to provide it to their students, and learn how to prepare their students to effectively deal with such criticism.
10. Learn how to use a rubric to score students' problem solving. Developing familiarity with applying rubrics also provides some foundational information needed for learning how to develop their own rubrics for use in their classrooms.

About the Math Forum's Problem of the Week (PoW) Program

The Math Forum, housed in the Drexel School of Education, is a leading Internet center for providing mathematics and mathematics education support. The PoW program provides a rich problem solving resource to K-12 students and teachers. There are four categories of problems: Math Fundamentals, aimed at elementary and middle school students (3-7); Pre-Algebra, directed at middle school students; Algebra; and Geometry. The latter two are aimed at high school students. Typically, a problem is posted on the PoW website on a Monday. During the following 18 days, students may post a solution to the problem, receive a mentored response, and then submit a revised solution based on that feedback, followed again by a second mentored response. Teachers are provided with online guidance concerning how to teach general problem solving strategies and meta-cognitive skills; provide information about the scoring rubric that the mentors will use to evaluate the students' responses; and explain how to support the development of a problem-rich classroom environment, including how to support students in classroom discussions involving problems and problem-solving.

An Example Math Fundamentals (Fun PoW) Problem

As an example, consider the problem below, posted on the Math Fundamentals Problem of the Week (Fun PoW) during fall 2007. The solution of this problem was directed at reinforcing students' knowledge of geometric shapes, developing students' awareness of the area relationships between the tangram shapes, and reinforcing decimal computation skills due to the numerical values associated with each of the pieces.

Tangrams have been a popular puzzle for a long time. A set consists of one small square, one parallelogram, and triangles of three different sizes. All seven pieces can fit together to form a large square. If you don't have a set of Tangrams to use for solving this problem, you can print and cut out the pieces from the Math Forum <http://www.mathforum.org>. You may also wish to use the Virtual Tangrams from the National Library of Virtual Manipulatives <http://nlvm.usu.edu> to help you solve the problem. Be sure to explain how you solved the problem.

1. How many of the small triangles would it take to cover the large square?
2. Pretend that each small triangle costs 5¢, based on its area. How much would each of the other pieces cost?
3. What would be the value of the complete set?

Extras:

1. What fraction of the area of the large square is each piece?
2. What percent of the total area of the large square is made up of triangles?

Who Provides the Mentored Replies?

Mentored replies are provided by *Math Forum* staff and volunteers, and other trained mentors, such as classes of pre-service teachers. Teachers also have the option of providing scoring and feedback to their students, based on the *Math Forum* rubric. All mentors are required to complete online mentorship training that instructs them how to score and evaluate student responses based on the *PoW* scoring rubric. The *Math Forum* scoring rubrics emphasize good problem solving activities and strong communication skills. Students are encouraged to write problem solutions that are sufficiently complete and clear that another student could easily understand the steps taken to find the solution. Student's problem solution submissions are scored based on the following:

Problem Solving

- Interpretation—The student correctly interpreted the problem and attempted to solve all parts.
- Strategy—The student selected and applied a good strategy to find the solution rather than getting a correct solution through a random process or luck.
- Accuracy—The calculations/details of the student's solution are correct.

Communication

- Completeness—The student explains all the decisions and steps taken in solving the problem.
- Clarity—The student explains the solution clearly in a way understandable to peers and the solution is reasonably correct in terms of grammar, spelling, and vocabulary.
- Reflection—The student checked the answer in some manner, reflected on the reasonableness of the answer, summarized the solution process, and/or made some connection to prior knowledge and experience.

Student solutions are scored in each of these areas using the levels Novice, Apprentice, Practitioner, or Expert. Each problem is scored using a specific rubric developed for the problem based on the areas described above. The rubric for the Tangram problem is given below (reprinted courtesy of the Math Forum).

The Math Fundamentals Problem of the Week Scoring Rubric — **Tangrams (posted 8 October 2007)**
For each category, choose the level that *best describes* the student's work.

	Novice	Apprentice	Practitioner	Expert
Problem Solving				
Interpretation	Does not show much understanding of the problem.	Shows some understanding of the math in the problem. Completes part of the problem.	Understands that each piece can be covered exactly by a number of small triangles. Understands that the complete set contains two identical small triangles and two identical large triangles. Answers the questions asked in the main problem.	Understands the Extra: the relationship of fractions and percents. Answers both Extra questions. Achieves at least Practitioner in Strategy.
Strategy *(NB: based on their interpretation of the problem)*	Does not know how to set up the problem. OR Shows no evidence of strategy. OR Strategy didn't work.	Tries a strategy that makes sense, but isn't enough to solve the whole problem, OR doesn't apply it systematically.	Picks a sound strategy, uses pieces accurately to compare relative sizes. Approaches the problem systematically, achieving success through skill, not luck. Chosen strategy accounts for any answer(s) that changed after checking our answers.	Does **one or more** of these: Uses two different strategies. Uses a good Extra strategy. Uses an unusual or sophisticated strategy, e.g., effective and appropriate use of technology.
Accuracy *(NB: based on chosen strategy)*	Has made many errors. OR Shows no math.	Some work is accurate. May have one or two errors. OR Shows very little arithmetic.	Work on main problem is accurate and contains no arithmetic mistakes.	Not available for this problem.
Communication				
Completeness *(NB: an incorrect solution can be complete)*	Writes very little to explain how the answer was achieved.	Provides explanation but does not include calculations; OR Shows calculations without rationale or explanation.	Explains most of the steps taken to solve the problems, and the rationale for them, with enough detail for another student to understand. Includes key calculations with rationale. Explanation accounts for any answer(s) that changed after checking our answers.	Includes useful extensions and further explanation of concepts or patterns. Explains strategy for Extra. Provides exceptional insight into the problem. Includes a table of data.
Clarity *(NB: incomplete and incorrect solutions can be explained clearly)*	Explanation is very difficult to read and follow.	Explanation isn't totally unclear, but another student wouldn't be able to follow it easily. Spelling errors/typos make it hard to understand.	Attempts to make explanation readable by a peer. Uses level-appropriate math language, including correct geometric terms, and notation. Shows effort to use good formatting, spelling, grammar, typing. Errors don't interfere with readability.	Formatting makes ideas exceptionally clear. Answer is very readable and appealing, might include a helpful diagram. (A diagram alone doesn't qualify for Expert status.)
Reflection (See list below.)	Does nothing reflective.	Includes one reflective thing.	Includes two reflective things.	Includes 3 or more reflective things or does an exceptional job with 2 of them.
	The items to the right are considered reflective, and could be in the solution OR in the comment they leave after viewing our answer:	• **Revises and improves the submission.** • Checks the answer using a different method. • Explains a hint she/he would give someone.	• Reflects on the reasonableness of the answer. • Connects the problem to prior knowledge/experience. • Describes any errors made and how she/he found and corrected them.	• Comments on AND explains the ease or difficulty of the problem. • Explains where she/he is stuck. • Summarizes the process used.

http://mathforum.org/funpow/ © 2005 by the Math Forum @ Drexel

An Example Student Response and Mentored Reply

In the following exchange, you will see a student response to the Tangram problem followed by an initial mentored reply from a preservice teacher that is first sent to a mentor approver, myself in this case (pseudonyms are used for the student and the preservice teacher mentor). You will see my suggestions followed by a revised mentor reply from the preservice teacher, which was then sent to the student.

From: Catie (*elementary student*)
To: Math Fundamentals PoW Staff
Date: Oct. 15 2007
Subject: Math Fundamentals PoW: Tangrams

Answer:

1. It would take 16 small triangles to fill the square.
2. The medium triangle, square, and the parallelogram would be 10 cents, and the large triangle would be 20 cents.
3. The value of the complete set would be 60 cents.

Explanation:

1. I got my answer to number one by simply cutting out many triangles and moving them around the square. I came up with 16 of them would fill the square.
2. For this problem i just figured out how many small triangles could fit in each other figure. Since i know that a small triangle is 5 cents and i figured out how many small triangles are in each figure I just added it up. For example for the large triangle 4 small triangles can fit in it so i timed 5 by 4 which is 20.
3. After figuring out how many cents every figure cost, i just added them all up and got 60 for the entire set.

Mentor Approver: Tracy Goodson-Espy
From: Heather Williams ASU Preservice Teacher
To: Catie

Hi Catie! Great try on the tangram problem! Your answers to problems 1 and 2 were correct. The answer to problem 3 was off a little. I feel you had the right strategy to answer question number three. Maybe you had a simple error in your mathematics. Check over it again using the same strategy and see what you come up with. The explanation of how you completed the problem was simple, and easy for me to understand. I was able to understand the steps you took completely because you listed them instead of writing them in paragraph form. Overall, you did a wonderful job and your explanation was great.

Good Luck!
Heather

Summary:

Problem Solving:	Communication:
Interpretation: Expert	Completeness: Practitioner
Strategy: Practitioner	Clarity: Practitioner
Accuracy: Apprentice	Reflection: Practitioner

From Mentor Approver: Tracy Goodson-Espy
To: Heather Williams
Subject: Nice response—A few suggestions

Hi Heather,
You've written a nice, friendly response. I do have a few suggestions before we send it out.
First, let's look at the scoring. I know you haven't done this before, so you didn't know how hard to be with the rubric. I think you are being a little too generous here! ☺
Catie can't receive an Expert in Interpretation because she hasn't attempted the Extra part of the problem. I agree with your scores for Strategy and Accuracy and Clarity. I would rate Completeness as Apprentice because the explanation/calculations are incomplete and I would rate Reflection as Apprentice because she hasn't done very much reflective thinking here.
Second, concerning the formatting, The Math Forum likes to see the student's response first, then your comments, and lastly, the scoring. In this way the child must re-read their own response and look at your comments before seeing their score.
Concerning your comments, you told Catie that her answer to number three was "off" but you really didn't give her any specific hints. Ask her to list each piece and state what it is worth and then show how she added up the values.
Lastly, given her a little encouragement to work on email communication details like capitalizing "I". Don't make a big deal of it but we should realize this is not a typo for her; she is doing it systematically. Nice response!

Mentor Approver: Tracy Goodson-Espy
From: Heather Williams ASU Preservice Teacher
To: Catie
Subject: Re: Math Fundamentals PoW: Tangrams

(Catie's Solution Repeated Here)

Hi Catie! Great try on the tangram problem! Your answers to problems 1 and 2 were correct. The answer to problem 3 was off a little. I feel like you had the right strategy to answer question number three. Maybe you made a simple error in you mathematics. Next time it would be helpful for you to list each piece and what it is worth. Then show me the steps that you took to add up the values. The explanation of how you complete the problem was simple, and easy for me to understand. I was able to understand the steps you took completely because you listed them instead of writing them in paragraph form. Keep an eye out for your "I's" and try to remember to capitalize them! Overall, you did a wonderful job and your explanation was great. Try problem number 3 again, including the Extra, and list your steps and the values of each piece. You will do excellent this time!

Good Luck!
Heather

Summary:

Problem Solving:	Communication:
Interpretation: Apprentice	Completeness: Apprentice
Strategy: Practitioner	Clarity: Practitioner
Accuracy: Apprentice	Reflection: Apprentice

As one reads the exchange above between the student, the mentor, and the mentor approver, and examines the rubric, one gains a sense of the difficulty in applying the rubric consistently. By reading the student's response, one can also gain a sense of the types of decisions that the mentor must make about how much instruction to provide regarding grammar and spelling as well as mathematics. In my case, I urged students to focus most heavily on the mathematics.

Benefits to Teachers and Students

The teachers and students who participate in the PoW program have the opportunity to achieve the following goals:

1. Improve their problem solving skills by having the opportunity to solve a large collection of good problems that lend themselves to multiple representations.
2. Learn about a wide variety of solution strategies via exposure to a wide scope of problems.
3. Observe models of complete, correct, and clear problem solutions.
4. Learn how and why to be reflective about problem solving and mathematical writing.
5. Experience a positive model of problem-solving feedback.
6. Experience the effective use of technological tools for problem solving (Internet, discussion groups, and various software for representing problem solutions).

My experiences with the Problem of the Week program, while time consuming and effortful, have yielded many benefits for both the preservice teachers and the elementary school students and teachers involved. As the mentoring training takes place in a Blackboard supported instructional environment, my preservice teachers learned how to participate in online professional development—a skill that will likely benefit them in the future as online professional development becomes more commonplace. As a result of this project, the participating elementary school teachers indicated that they spent more instructional time on problem solving, and that their students were more willing to engage in problem solving activities in an online context, knowing they would receive regular encouragement and feedback.

How Get Involved

Teachers interested in participating in any of the four PoW programs can get more information at the Math Forum's Problem of the Week webpage <http://mathforum.org/pow/>. Periodically, free mentoring is made available to teachers and students. Regular annual classroom memberships are available for $89 per class, which includes individual mentoring for all students and professional development support for teachers. University mathematics teacher educators interested in having their pre-service teachers complete online mentoring training

in order to serve as math forum mentors during their university mathematics methods courses should contact Claire Mead of the *Math Forum* <claire@mathforum.org>.

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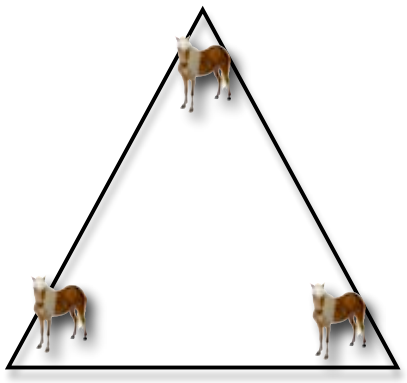
Math Puzzles and Brain Teasers

Looking for puzzles and problems for your math classes? There are many sites on-line that have free resources. Here are a few:

http://MathPuzzle.com
http://www.syvum.com/teasers
http://www.aimsedu.org/Puzzle
http://math.com
http://www.pzzls.com

Here is a puzzle from pzzls.com for you to think about:

Three horses are standing in a triangular field, which is exactly 100 yards on each side. One horse stands at each corner; and simultaneously all three set off running. Each horse runs after the horse in the adjacent corner on his left, thus following a curved course, which terminates in the middle of the field, all three horses arriving there together. The horses obviously ran at the same speed, but just how far did they run?



Mini-grants

Through its mini-grant program, NCCTM provides funding for North Carolina teachers as they develop activities to enhance mathematics education. This program will provide funds for special projects and research that enhances the teaching, learning, and enjoyment of mathematics. There is no preconceived criterion for projects except that students should receive an on-going benefit from the grant. The mini-grants are awarded by each of the three regional organizations to members within their geographic boundaries (If you incorrectly identify with the region, your proposal will be ineligible for funding). A total of $15,000 is available each year for mini-grants, with each region awarding approximately $5000 in grants to its members. In recent years, approximately 30-35 proposals have been funded, for an average grant of just less than $800.

Grant proposals must be postmarked or emailed by September 15, and proposals selected for funding will receive funds just after the state conference. You will receive an email confirmation of receipt of your proposal. If you do not receive a confirmation within one week, it is your responsibility to follow-up with the Mini-grant Coordinator.

Directions

The directions and application are available on the NCCTM website <http://www.ncctm.org>. Please read all directions carefully and fill out the application and cover sheet completely. Failure to correctly list the NCCTM region and membership number will cause your application to not be considered. Be sure that your NCCTM membership is current and active for the 2009-10 school year! Each year we have applications that cannot be considered because of the membership requirement.

Are you wondering what you could ask for from the mini-grant program?

Possible projects for consideration include math clubs, field days, contests, math activities and laboratories, research projects/topics, family math, parent workshops, etc. This list is not meant to limit you to these ideas. Creativity is encouraged! The last round of mini-grant recipients and their project titles are listed below.

Name	Project Title	School
Ashley, Shera	AfterMath: Clearing Up the Mysteries of Problem-Solving Club	Mountain View Elem.
Baker, Karen	Environmental Awareness Using Math	Belville Elem.
Braxton, Shirley	All 4 Math and Math 4 All	William H. Owen Elem.
Buckner, Stefanie	A Geometric Perspective of Our World	Bumcombe Co. Early College
Burgess, Melanie	Midweek Math Madness	Southmont Elem.
Cetner, Michelle	Using the Geometers Sketchpad to Teach Math	DH Conley High
Collins, April	Hands-on Equations	Lowell Elementary
Crites, Ginger	Math in Today's Sixth Grade Classroom	Braxton Craven School
DeLamatre, Mike	Math and Multi-Sensory Magic	American Renaissance School
Jackson, Celina	White Boards are Write On	Belmont Central Elem.
Jones, Barbara	Using Technology in the Math Classroom	S. W. Snowden Elementary
Kudva, Shanti	Home and School Connections with Algebraic Thinking	Dana Elem.
LeHew, Amy	Using Math Games to Deepen Mathematical Understanding	Long Creek Elem.
Manley, Katie	Math Mapping	Bell Elem.
Morrison, Kristin	Graph Explorers	Woods Charter School
Peoples, Renee	Read Your Math!	West Elementary
Pope, Becky	Maximizing Math Learning with Manipulatives	Hazelwood Elem.
Richardson, Malik	Buffalo Scholars Math Club	Bishop Spaugh Community Acad.
Saunders, Audrea	Math Lab	Wiley Elem.
Trollinger, Nancy	Each One Teaches…….	West McDowell Jr. High
Turney, Crystal	Math and Technology: Using a Document Camera to Enhance Mathematical Eduation	Beverly Hills Elem.
Williamson, Ruth	Family Math Event	Reidsville Middle
Wuebbles, Christie	Wireless Dynamic Sensor System	Fike High

High School Activity: Is this the One?
Contributed by Tim Tilton, Winton Woods High School, Cincinnati, Ohio

Problems with an answer of one have always been my favorite. How many of the following have an answer of 1? Show your work or explain!

1. $\left(\sqrt{14}+\sqrt{13}\right)\left(\sqrt{14}-\sqrt{13}\right)=$

2. The distance between the points (-5, 3) and (-4, 3)

3. log 10 =

4. ${}_{14}C_{14}$ =

5. What is the radius of this circle? $4x^2+4y^2-16x-12y+21=0$

6. What is the slope of the line containing (2, 5) and (-4, -1)?

7. The sum of $\frac{1}{2}$ a number and $\frac{1}{3}$ the sum of the number and 7 equals 2. Find the number.

8. $\dfrac{\left(2x^2-98\right)\left(x^3+4x^2-21x\right)}{2\left(x+7\right)^2\left(x^3-10x^2+21x\right)}=$

9. Solve for x: $3^{5x-1}=81$

10. $-\left(-\dfrac{\sqrt{2}}{2}+\dfrac{i\sqrt{2}}{2}\right)^4=$

11. A drawer contains 10 black socks. If you choose 2 socks at random, what is the probability that they are both black?

12. What is the geometric mean between $\frac{3}{5}$ and $\frac{5}{3}$.

13. $\dfrac{64^{\frac{-5}{6}}}{2^{-5}}=$

14. Find the positive solution for x: $\sqrt{2x+7}-\sqrt{x+3}=1$

15. $|8-5|-|5-7|=$

16. Give the coordinates of the midpoint between (-5, 3) and (7, -1).

17. What is the rightmost root of the following equation? $\left|x^3+5x^2+3x+2\right|=11$

18. $-e^{\pi i}=$

The full worksheet with more than 30 problems is available on the Centroid page at <http://www.ncctm.org>.

Middle Grades Activity: Teaching Subtraction of Fractions with Regrouping
Submitted by Kimberly Wagner, Jamesville Elementary, Jamesville, North Carolina

As part of the sixth grade curriculum each year, I teach subtraction of fractions with regrouping. As with most mathematical computation problems, I can teach students to follow a series of steps to the correct answer, but the big questions are: Do students truly understand? Does the algorithm make sense? Can students apply the concept in real-world situations?

If we are teaching just the algorithm with the goal being to come up with a correct answer, then more than likely the answer to each of these questions is 'no.' Through the discussion described below, I was able to guide students in understanding the regrouping necessary to subtract fractions.

Guiding Students in a Discussion of Subtraction of Fractions

As an introduction I put the problem $4\frac{1}{3} - 1\frac{2}{3}$ on the board. I asked students if it was possible to solve this problem. Some of the students thought this problem should be possible to solve but could not see how to do it. Others felt secure in saying that it could not be solved. They began discussions among themselves, but could not agree.

I then put up the subtraction problem (written vertically) \$4.35 – \$1.19 and asked if it was possible to solve this new problem. A majority of the students knew that this problem could be solved. One of the students, Casey, did not think that either of these problems could be solved. I posed a situation to Casey to help put the problem in perspective: If you walked into the neighborhood convenience store with \$4.35 in your pocket and the items you wanted to purchase cost \$1.19, would you be able to pay for the items with the money you had in your pocket? Casey initially said that she didn't think it would be possible to pay for the items until Brett spoke up and said, "Yes, you can because you have to regroup." Casey looked at me and said, "Oh." There was the connection I needed in order for this lesson to make sense. From the look on the students' faces I could tell that they were considering Brett's suggestion, and within a few seconds others were agreeing with him.

Using Money and Fraction Bars on the Overhead Projector to Visualize Regrouping

I placed 4 one-dollar bills, 3 dimes, and 5 pennies on the projector and asked the class to help me subtract \$1.19. Trevor suggested that since we couldn't subtract 9 pennies from 5 pennies that we "borrow" 1 dime from the 3 dimes. I went to the projector and removed a dime and asked what I was supposed to do with it. He suggested that I exchange it for 10 pennies. Sabrina piped up and said that I should change the 5 pennies to 10, but Trevor said that I needed to add the 10 pennies to the 5 pennies I already had, making 15 pennies. All along I kept my eyes on Casey. She was taking it all in, and I got the feeling that subtraction had never been taught to her in this manner. I got the 'that's so cool' look from her – it made sense. We were then able to use the money on the projector to subtract the hundredths, tenths, and ones to acquire a difference of \$3.16.

After doing another example using coins, I went back to the original problem of $4\frac{1}{3} - 1\frac{2}{3}$. I asked the students to consider the process we had just used to subtract money and apply that to the fraction problem. No one in the class offered an immediate suggestion, so using fraction tiles (which we called chocolate bars) I laid 4 whole chocolate bars and $\frac{1}{3}$ of a chocolate bar on the projector and asked how I could subtract $\frac{2}{3}$ from the $\frac{1}{3}$. Kendall suggested exchanging a whole chocolate bar for 3 thirds. Focusing on the 3 wholes and $\frac{3}{3}$, I asked if I still had 4 whole chocolate bars. The class agreed that I had not changed the number of bars, I had only 'renamed' them. (In our previous discussion on equivalent fractions we often referred to "AKA", also known as, as a way to give fractions different names for the same amount. For instance, a man's name might be George Henry White on his birth certificate but he is "AKA" as George, Mr. White, G.H.W., etc. All of these name the same person just like 3 $\frac{3}{3}$ is another name for 4). Looking at the projector there were 3 whole chocolate bars and $\frac{4}{3}$ so I asked again if I could subtract $\frac{2}{3}$. Immediately they shouted out that there would be $\frac{2}{3}$ left. Then we subtracted 1 whole chocolate bar from the 3 whole chocolate bars to show that there were 2 $\frac{2}{3}$ bars left.

Practicing with the Fraction Tiles

Using their own sets of fraction tiles, students were able to successfully regroup to subtract fractions as I modeled the process on the projector. When I was sure that everyone understood, I put the $4\frac{1}{3} - 1\frac{2}{3}$ problem back up on the board and asked them to guide me through the steps with the fraction tiles as I used symbols

(numbers and signs) on the board to show the process they were following – the algorithm. We did the same problem twice more as I needed to clarify for a couple of students the process of bringing over the $\frac{3}{3}$ and adding it to the $\frac{1}{3}$ to make $\frac{4}{3}$, but they were soon able to make the connection to what was going on with the fractions tiles.

This activity was intense but the students seemed to hang on every word as they 'soaked' in this concrete representation of regrouping to subtract fractions. Most important was the connection to regrouping in the subtraction of money. Using representations and making connections to prior knowledge are a must for every mathematics teacher whose goal is to help children understand and love mathematics.

NCTM National Organization News

NCTM Position on Algebra

Algebra: What, When, and for Whom

Algebra is a way of thinking and a set of concepts and skills that enable students to generalize, model, and analyze mathematical situations. Algebra provides a systematic way to investigate relationships, helping to describe, organize, and understand the world. Although learning to use algebra makes students powerful problem solvers, these important concepts and skills take time to develop. Its development begins early and should be a focus of mathematics instruction from pre-K through grade 12. Knowing algebra opens doors and expands opportunities, instilling a broad range of mathematical ideas that are useful in many professions and careers. All students should have access to algebra and support for learning it.

Read more at < http://www.nctm.org/positionstatements.aspx>.

NCTM Position on Teaching Mathematics to English Language Learners

Students who speak a first language other than English or have related cultural differences must not face special barriers to learning mathematics. Every student's cultural heritage should be accepted and celebrated for the diversity that it brings to the learning environment. Expanded opportunities should be available to English language learners (ELL students) who need them to develop mathematical understanding and proficiency. Mathematics teachers should have knowledge of content and pedagogy that support ELL students, including an understanding of the role of the first language.

Read more at < http://www.nctm.org/positionstatements.aspx>.

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Problems to Ponder

Spring 2009 Problems

Gregory S. Rhoads
Appalachian State University, Boone, North Carolina

Grades K–2	Mrs. Small's students took their exam and their scores are out of 100 points. Their scores are as follows: Julie got 86, Mike got 71, Peter got 60, Mary got 47, Brook got 74, Paula got 93, Anthony got 89, Jordan got 67, and Logan got 82. Write down the names of the students in order of their scores, from smallest to largest.
Grades 3–5	I can get a buffalo coin for every 3 wheat coins and a mercury coin for every 5 buffalo coins. The dealer will give me \$5.00 for every 2 mercury coins. How many dollars will the dealer give me if I have 5 mercury coins, 8 buffalo coins, and 21 wheat coins?
Grades 6–8	Students in a statistics class can choose either the mean or the median of their 3 exam scores for their overall course grade. Alan earned a 79 and 92 on his first 2 exams. What is the smallest integer score (between 0 and 100) that Alan can earn on the third exam so that the **mean** of his 3 exam scores is **larger** than the median?
Grades 9–12	What is the radius of the largest circle with center on the positive y-axis that is tangent to the parabola $y = 9x^2$ at (0,0) and intersects the parabola only at (0,0).

Directions for submitting solutions

1. Neatly print the following at the top of each solution page:
   - Your full name (first and last)
   - Your teacher's name
   - Your grade
   - Your school
2. Submit one problem per page.

Students who submit correct solutions will be recognized in the next issue of The Centroid. We wish to publish creative or well-written solutions from those submitted. If you would rather not have your solution published, please so indicate on your submission. Keep in mind that proper acknowledgement is contingent on legible information and solutions.

Send solutions by 15 May 2009 to:

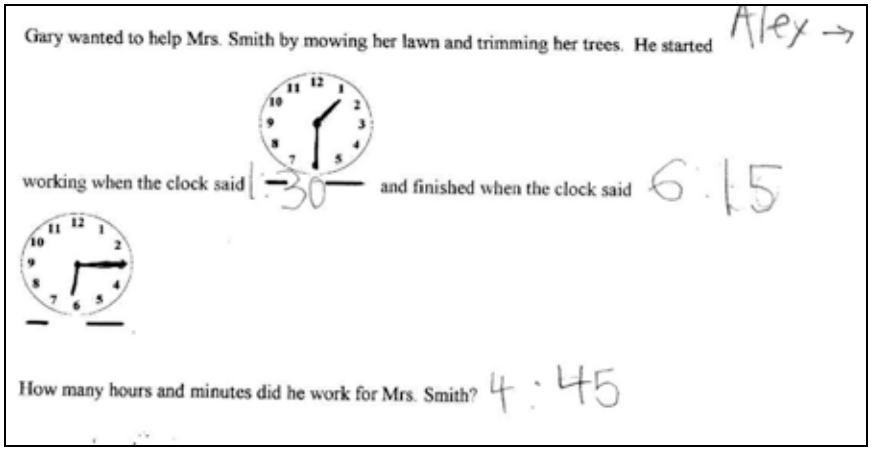
Problems to Ponder, c/o Dr. Greg Rhoads
Dept. of Mathematical Sciences
Appalachian State University
Boone, NC 28608

As these problems are intended to stimulate independent thinking, it is expected that a submitted solution indicates the student completed a significant part of the work. Please try to have the students use complete sentences when they write up their solutions to promote effective communication of their ideas.

Grades K-2 Fall 2008 issue

Gary wanted to help Mrs. Smith by mowing her lawn and trimming her trees. He started working when the clock said  and finished when the clock said  How many hours and minutes did he work for Mrs. Smith?

Solution: by Alex Phipps 1st grade of **Weddington Elementary** (teacher: Ms. Christy Martin)

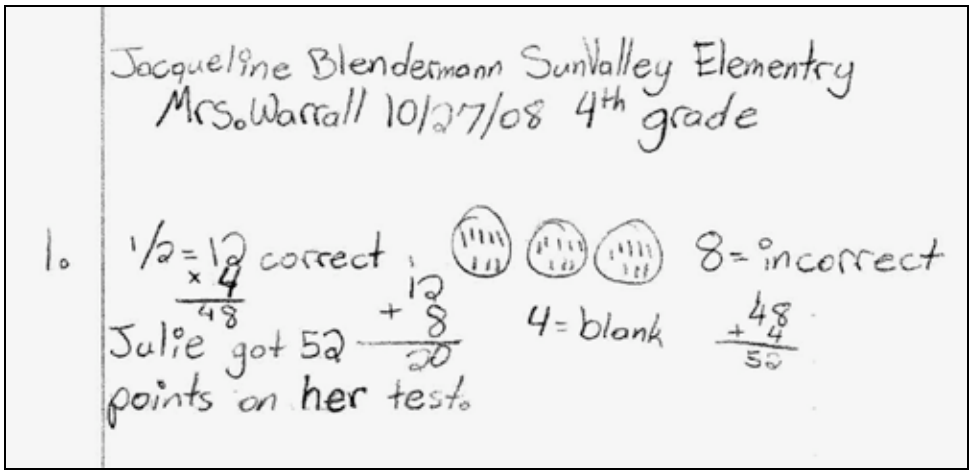


Correct Solutions were received by: Deamazsha Swain of **Pines Elementary**, Manav Parikh of **Porter Ridge Elementary**, Evan Stephenson of **Sardis Elementary**, Ashlee B., Ashlyn Bartlett, Jack Blendson, Lucas Bratton, Jamie Caffrey, Nicholas Donotrio, Bryce Frankel, Katelyn Goeller, Dylan Harris, Tate Hawkes, Ezra Melaku, Branden Moore, Darius Pierce, Cody Sailors, Nadia Salazar, Erik Smith, Andrew Young, Cassandra, and Sofia of **Sun Valley Elementary**, amd Alex Phipps of **Weddington Elementary.**

Grades 3-5 Spring 2008 Issue

Students are given a test that has 24 multiple-choice questions and 4 short-answer questions. For the multiple-choice questions, you earn 4 points for each correct answer, 0 points for each incorrect answer and 1 point for a question you leave blank. Julie got half of the questions correct, one-third of the questions incorrect, and left the remaining questions blank. How many points did Julie earn on the test?

Solution: by Jacqueline Blendermann 4th grade of **Sun Valley Elementary** (teacher: Mrs. Worrall)



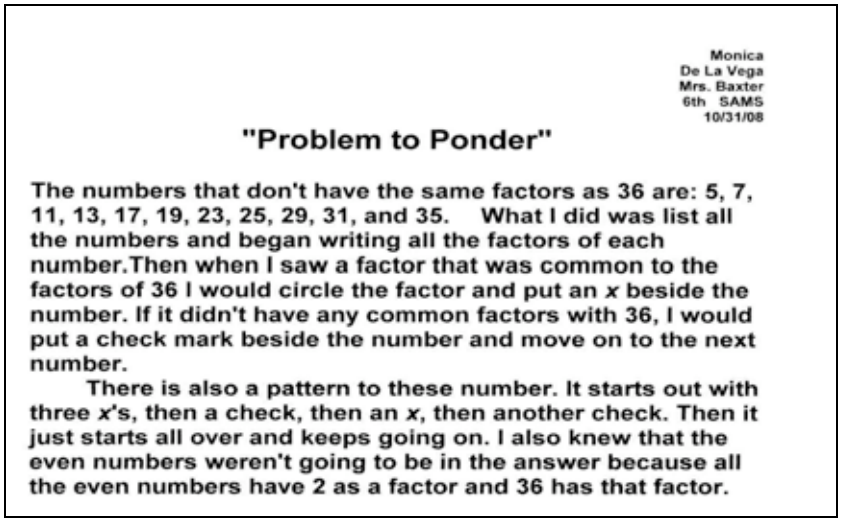
Correct Solutions were received by: Raheem Bowers, Jose Lara, Selena Locklear, Yukia McNair, Jaylen Nixon, Carolina Quintana, Marissa Sanchez, and Jamison Streater of **East Elementary**, Griffin Drye, Noah Hill, Kirsten Kirkley, Sam Little, Mayya Nguen, and Christopher Pierce of **Fairview School**, Luke Croasmon, Jesse Furr, Rebecca Malloy, Saige Mills, and William of **New Salem Elementary**, Darrell Andrews, Eliza Barsanti, Elzet Fourie, and Nathaniel Pearson of **Pines Elementary**, Kaleb Atwell, Cecilia Barnard, Noah Bays, Elijah Como, Carron Crump, Dino Dziergas, Hannah Graybill, Gabe Horne, Cathryn McCollom, and Matthew Perry of **Porter Ridge Elementary**, Cayla Belcea, Skyler Brind'Amour, James Castelman, Caroline Clark, Christie Davis, Arman Dillard, Carter Duncan, Lucy Glover, Leah Horton, Cole Hudson, Madison Hunt, Sammie Kim, Mary Pruden, Suiter Ragland, Ewan Reynolds, David Russo, Sydney Schiff, Ally Tannenbaum, and Saylor Willauer of **Ravenscroft School**, Alex Cheek, Alec Greenberg, Cameron Livers, Hanna Maleski, and Morgan Oldham of **ReaView Elementary**, Mack Despard, Emalee Schneider, Sydney Schwait, and Amanda Ward of **Sandy Ridge Elementary**, Brennan Kress, Scottie Simpkins, and Jared Watson of **Sardis Elementary**, Jacqueline Blendermann, McCayne Bound, Christine Brillon, Jesus Fernandez, Rena Gadzhieva, Ansen Gunawan, Glenn Innocent, Jillia Jordan, Scott Key, Sara McCarthy, Megan McGrath, Austin Medlin, Ariana Mendez, Mitchell Moreno, Tara Outen, Katherine Pharr, Lauren Ray, Casey Reed, Will S., Victoria Sammons, Justin Sells, Rachel Selzer, Sam Sheridan, Bryce Sumile, Jacob Thomas, Thomas Urena and Kevin Vandermoten of **Sun Valley Elementary,** Fin Carter and Kyleah Mclaughlin of **Vance Elementary**, Cameron Dion, Devon Helms, Gabrielle Hubert, Darien Ruth, and Josie Thompson of **Waxhaw Elementary**, and Alex Copps of **Western Union Elementary.**

Grades 6-8 Spring 2008 issue

List **all** of the numbers between 2 and 36 that have **no** common positive factor with 36 other than 1 (i.e. whose greatest common factor with 36 is 1). Example: 27 is not an answer since 27 and 36 both have the common factor of 9; however, 23 is an answer since 23 and 36 have no common factors except 1.

Solution: by Monica De La Vega 6th grade of **South Asheboro Middle School** (teacher: Mrs. Baxter)

(Editor's Note: I liked the way Monica wrote down all of the factors (a good exercise). That way, you can easily compare the factors with the factors of 36. There were many incorrect solutions to this problem, as students missed one of the 11 solutions or they didn't recognize that 15 has a common factor with 36.)

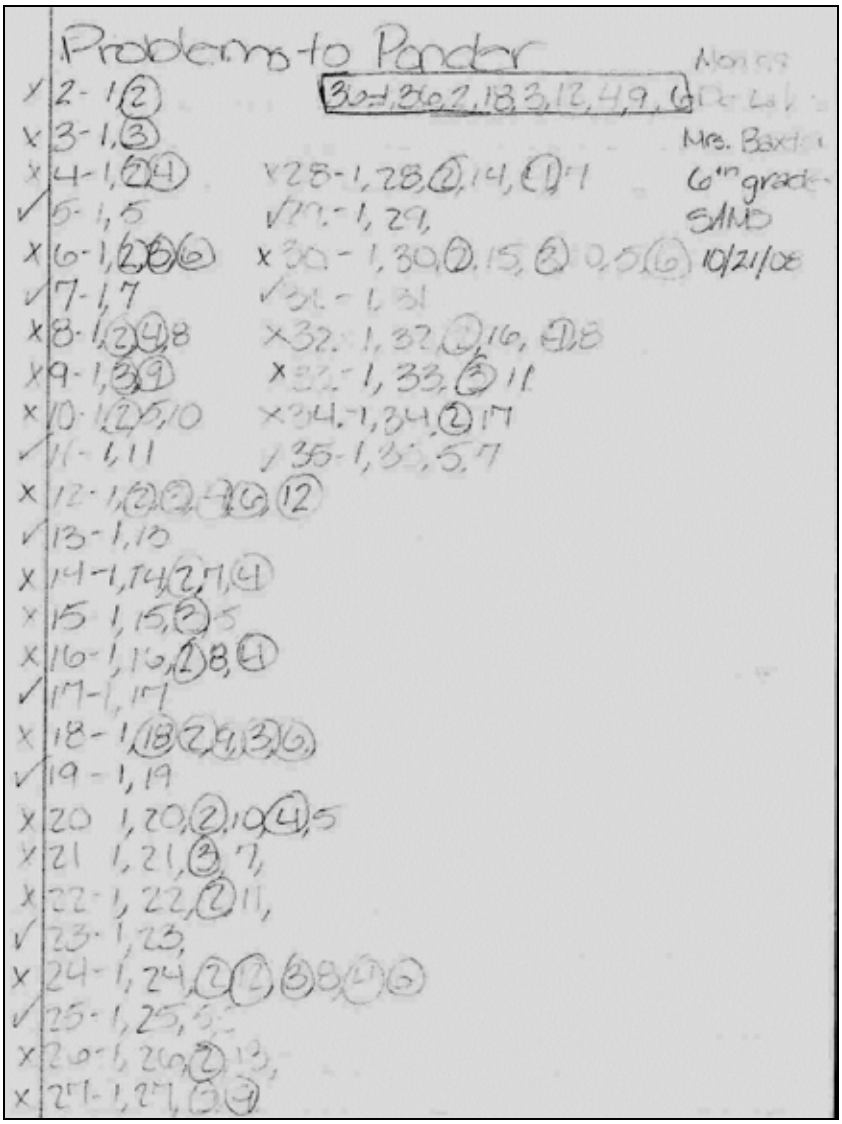


Monica
De La Vega
Mrs. Baxter
6th SAMS
10/31/08

"Problem to Ponder"

The numbers that don't have the same factors as 36 are: 5, 7, 11, 13, 17, 19, 23, 25, 29, 31, and 35. What I did was list all the numbers and began writing all the factors of each number.Then when I saw a factor that was common to the factors of 36 I would circle the factor and put an *x* beside the number. If it didn't have any common factors with 36, I would put a check mark beside the number and move on to the next number.

There is also a pattern to these number. It starts out with three *x*'s, then a check, then an *x*, then another check. Then it just starts all over and keeps going on. I also knew that the even numbers weren't going to be in the answer because all the even numbers have 2 as a factor and 36 has that factor.



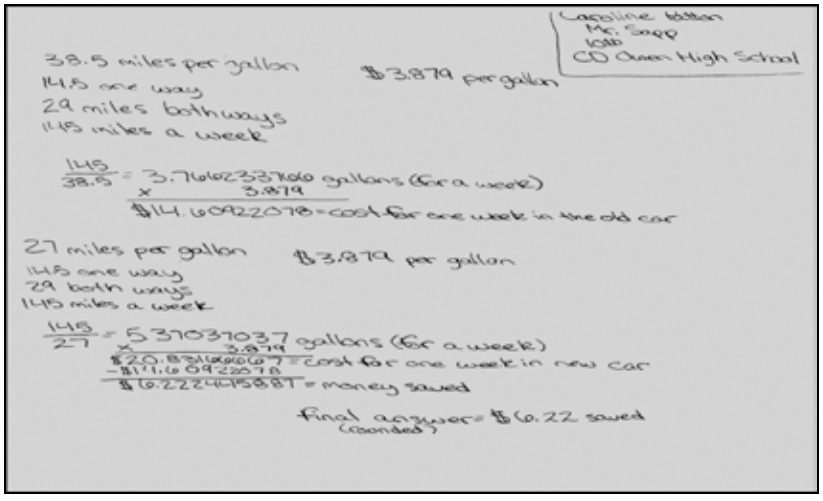
Correct Solutions were received by: Keana Bell, Rosalyn Broddie, Candace Brown, Kaitlyn Bryant, Marshall Cherry Jr., Ashlyn Cobb, William Cofield, Demetrus Futrell, Jamyia Garrett, Jaquil Hafiz, Tamara Harrell, Dashaun Hayes, Tyra Heckstall, Chelsea Hoggard, Marquis Holley, Kathalina Johnson, Michael Johnson, Trevon Jones, Laarni Lapat, Brittany Ledford, Caleb Longdale, TyEssence Martin, David McCullough, Tobe Mickens Jr., TaJalik Morgan, Adreinne Marie Orbita, Dwayne Outlaw, O'laujwan Overton, Raleigh Quintero, Brian Riddick, Andrew Ryan, Tiffany Sessions, Jakaia Shepherd, PL Speller, Deondre Stephenson, Juan Villamor, Maria Villamor, Desiree' Williams, and Quentella Winbona of **Bertie Middle**, Tyler Patrick Carter, Harrison Ferebee, Hannah Locklear, Courtney Martin, Alex Matthews, Thomas Poston, and Emma Tate of **Currituck County Middle**, Joshua Ahearn, Julia Allsbrook, Alaynna Brown, Chandler Buck, David Buck, Catherine Cary, Devin Cayton, Christina Dixon, Curtin Fitch, Raven Gales, Stacie Hardy, Sean Jenkins, Camden Johnston, Joshua Linden, Casey Lohner, Emily McGregor, Raeanna Melvin, Caroline Owens, Deanna Pilkington, Caleb Prevatte, Caroline Roberson, Lauren Tait, Nikolas Tamakis, Sawyer Umstead, Lindsay Vas, Jasmine White, Nathan Wilson, Kara Worthington, and Courtney Wrenn of **Hope Middle**, Emma Adcock, Vedaant Arora, Justin Aufderheide, Will Baker, Megan Balentine, Niharika Bhatnagar, Caroline Blackley, Walter Bonar, Tyler Brown, Allan Chan, Rachel Cheek, Harrison Chewning, Bryanna Coker, Ashely Cooper, Zakiya Covington, Zach Dougherty, Shannon Farley, Kristin Free, Melissa Fu, Julian Gaines, Tristan Galuppo, Christopher Garrick, Sophia Garrison, Caitlin Geiger, Steven Glaser, Andrew Glenn, Rochelle Griffin, Nicole Gugliemo, Victoria Herring, Elizabeth Higdon, Sean Keady, Ben Laramee, Michael Licciardello, Russell Lombardo, Mikaela Maldonado, Rachel Malseed, Taylor Matheny, Lyndsey McClain, Prakash Mishra, Rachel

Morgan, Kailash Nagapuoli, Johnalton Pague, Cameron Pelletier, Alyson Pritscher, Jack Rich, Cassie Robb, Matt Rollyson, Tanner Roseborough, Laura Rouse, Jonathan Rubin, Jessica Ruday, Georgia Santos, Turner Schwartz, Ryan Scott, Sam Shelley, Brendan Sodergren, Gavin Sroczynski, Megan Stephens, Katelyn Sutherland, Alyssa Taflinger, Andrew Vlasov, Zsofia Voros, Woody Watson, Hayden Wohlfarth, and Leah Wright of **Marvin Ridge Middle**, Angel Arroyo, Valeria Bustamante, Pablo Chavez, Marie Pastorino, Jamie Pemberton, Alexandra Smith, and Kaitlyn Swaney of **North Asheboro Middle**, Matthew Carpenter and Regan Waters of **Piedmont Middle**, Austin Allen, Jade Allmon, Emily Bullins, Perla Castro, Madeline Cofer, Brian Conrad, Moncia DeLaVega, Julia Farmer, Alex Gimenez, Guy Kemp, Joshua Lamason, Sean Price, Carol Sisson, Rebecca Smith, and Torey Stutts of **South Ashe boro Middle**, Alexis Abram, Vilma Bolanos, and Sarah DeSantis of **Southview Middle**, John Ary, Will B., Jovan Baslions, Jessica Baucom, Christopher Bristle, Katia Brock, Amanda Brook, Shane Brown, Kelsey Cabrera, Jack Calcaterra, Rebekah Callarman, Evan Chroins, Keller Chryst, Shawn Dashty, Clay Edwards, J. D. Ellison, Lauren Feinstein, Steven Fusco, Kelly Ginsberg, Carlye Guido, Lauren Harrison, Marley Hazeltine, Tomas Hilliard, Alyssa Hollifield, Sarah Huntley, Allison Jeffords, Micah Johnson, Allison Jones, Emily Klink, Lars Knapp, Chase Kuehler, Lindsay Label, Ashely Linner, Jenna Louis, John Malatres, Philip Mascolo, Haley Matson, Ryan Mattera, Jordon Mayfield, Elizabeth McNeil, Cole Middleton, Josh Miller, Katie Moore, Peter Morrison, Stephen Morrison, Juan Osorio, Aleene Owais, Kim Perez, Brandon Phillips, Nanci Premani, Jay Rodriguez, Jack Ryan, Courtney Schepel, Anthony Sgro, Kylie Shaeffer, Justin Shanahan, Allison Smith, Rachel Snider, Danny Sodano, Jason Spinney, Joanna Stefano, Connor Stewart, Elijah Stezer, Samuel Strader, Cassie Strutowski, Chelsey Thomas, Wes Thompson, Emma Tippett, Audrey VonAmsberg, Kelsey Warren, Brandon Watts, and Austin Zaretsky of **Weddington Middle.**

Grades 9-12 Spring 2008 Issue

My old car got 38.5 miles per gallon and my new car gets 27 miles per gallon. If the trip from my house to my work is 14.5 miles one way and the price of a gallon of gas is currently $3.879 per gallon, how much money will I save by driving my old car **to work and back** this week (5 days) and not driving in my new car?

Solution: by Caroline Patton 10th grade of **Charles D. Owen High School** (teacher: Mr. Sapp)



Correct Solutions were received by: Tyler Ables, Sam Barker, Gabrielle Blackstock, Kayla Rae Calloway, Ashworth Cone, Aston Cone, Tobiah Cramer, Katie Fiore, Sara Gardiner, Alex Horner, Stephanie Jones, Hannah Kelly, Brijesh Kishan, Justin Lunsford, Joshua Tyler Metcalf, Jamie Mitchell, Joey Murphy, Andrew Oakes, Justin O'Connor, Kelsey Oliver, Matthew Owenby, Kyla Parry, Caroline Patton, Nicholas Patton, Kelly Peterson, Tait Piercy, Jake Reynolds, Hannah Robinson, Matt Russell, Janie Sircey, Michael Sobol, Morgan Stewart, Hanna Torrence, Guy Tracey, Clinton Vickery, Candice Welborn, Maegan Wells, Amanda Wheeler, and Elly Withers of **Charles D. Owen High**, and Kenneth Carver III, Garrett Dorthy, and Jared Litchfield of **Roxboro Community School.**

Awards

2008 Outstanding Mathematics Education Award Winners

Reported by Bampia A. Bangura, North Carolina A&T State University

Each Fall, NCCTM sponsors the selection of three Outstanding Mathematics Education Students. Nominations are requested from all colleges and universities in North Carolina with teacher preparation programs. Nominees receive a certificate and a one-year membership in NCCTM. Top award winners are recognized at the Awards Program at the State conference in the fall. The winners also receive a plaque and a check for $100.00. A plaque is presented to each college or university in recognition of its honoree as well. The recipients of this year's awards are: ALAN FAULKNER from East Carolina University in the Eastern Region; KERRI ELIZABETH BERNHARDT from Western Carolina University in the Western Region; and MARGARET E. McCASKILL from the University of North Carolina at Greensboro in the Central Region (pictured in that order).

ALAN FAULKNER is a senior at ECU completing a B.S. in Mathematics Education and a B.A. in Mathematics. Alan will graduate with the double major in three years. An active student leader, he is currently the Vice-President of the NCCTM student chapter and the Eastern Region Student Representative. Alan has attended NCCTM board meetings and regional NCCTM conferences in Raleigh and Rocky Mount, where he and his professor made presentations. He also attended the NCCTM Fall 2007 conference in Greensboro. Alan's professor wrote: "Mr. Faulkner is a natural scholar. He has both the confidence and ability to experiment with novel ideas and carries himself with professionalism in any situation. Rarely have I met such a mature and self-directed undergraduate student." Alan is a certified tutor in the Math Lab and participates in the Mathematics Contests and Math Counts. In addition to his involvement in math-related activities, Alan is also active in other campus societies such as the National Society of Collegiate Scholars, Phi Eta Sigma Honor Society, National Scholars Honor Society, and the Golden Key International Honor Society. Alan has a GPA of 3.91 and a mathematics / computer science GPA of 4.00 .

KERRI ELIZABETH BERNHARDT is a junior at WCU who is pursuing a B.S. in Mathematics Education. Kerri has been involved in many aspects of the mathematics and mathematics education program at Western. She served as a student assistant for the WCU Mathematics Contest in 2007 and 2008. She served as student clerical assistant in the Department of Mathematics and Computer Science in 2007-08. She was Vice President of the NCCTM Student Affiliate Organization in 2006-07 and is currently serving as President. Kerri is a North Carolina Teaching Fellow and a member of the Teaching Fellows Leadership Committee. She also served as a Teaching Fellows Mentor during 2007-08. As a consequence of her strong academic record, Kerri has been accorded the following honors and awards: Dean's List Status, nominee for the All American Scholars Award, nominee for National Collegiate Mathematics Award, nominee for the College of Arts and Sciences Sloan Scholarship 2007-08, and co-recipient of the Spring 2007 Freshman Mathematics Award Spring 2007. Kerri is a mature mathematics educator who will contribute immensely to the lives of many young people. Kerri's GPA in Mathematics is 4.00 and her overall GPA is 4.00.

MARGARET E. McCASKILL is a senior at the UNCG pursuing a B.A. Degree in Mathematical Sciences with a minor in Psychology. She is working on secondary licensure and plans to teach when she completes the program in May 2009. Margaret is a Teaching Fellow. In addition to her activities in the UNCG secondary mathematics teacher education program, Margaret is involved in several campus activities, including the Pi Mu Epsilon Honor Society, Phi Beta Kappa, and the French club. Margaret has been on the Dean's List and the Chancellor's List every semester since 2006. Her community and civic activities are exceptional as well. She has been involved with the Children's Health and Welfare Celebration, Fundraiser for Mary's house, and St. John's Episcopal Church. Margaret has tutored math in several places, including the UNCG Teaching and Learning Center and Southern Guilford High School. She acted as an intern at Kiser Middle School, Northeast Guilford High School, and as Undergraduate Assistant for the UNCG Math Department. Margaret is not only an excellent scholar but also a fine teacher candidate who is truly an outstanding mathematics education student. Margaret has an overall GPA of 3.96 and a Mathematics GPA of 4.00.

Awards

2008 W. W. Rankin Award Winners
David Royster and Jerry Taylor
Reported by Harold Williford, Western Carolina University

2008 Recipients of the W. W. Rankin Award for Excellence in Mathematics Education, David Royster and Jerry Taylor were honored at the Fall 2008 NCCTM Conference. Both have been active members of NCCTM and the mathematics community for many years.

DAVID ROYSTER has been a mathematics educator for nearly 30 years. In this time, he has taught mathematics to college students and provided in-service and professional development training to teachers all across North Carolina. A past president of the NCCTM noted that Dr. Royster "is known as a teacher and a teacher of teachers…" and is recognized for his love of, and expertise in, the teaching of non-Euclidean geometry. Now serving as the Director of the Center for Mathematics, Science, and Technology Education at the University of North Carolina at Charlotte, Dr. Royster has spent his career in North Carolina helping teachers and students of mathematics come to terms with changing technologies, changing curricula, and changing times.

Dr. Royster's contributions to mathematics and mathematics education include service as 1997-98 NCCTM Regional Vice President for Colleges, Program Co-Chair for the 1998 NCCTM State Mathematics Conference, Program Chair for the 2000 NCCTM State Mathematics Conference, Local Committee Co-Chair for the 2000 Annual Meeting of the Southeastern Region of MAA, 2001-03 NCCTM Regional President, Program Officer in the Elementary, Secondary, and Informal Education Division of the National Science Foundation (NSF), and Statewide Co-coordinator for the MAA/NSF joint project, Preparing Mathematicians to Educate Teachers.

JERRY TAYLOR recently retired from a distinguished career of 47 years which includes service at both the high school and college level. This career began through employment as a teacher of high school mathematics and science in 1960. Then in the fall of 1961 Dr. Taylor moved to one of North Carolina's very fine small colleges where he served as a mathematics professor for the next 46 years. Dr. Taylor's skills as a teacher of mathematics are well noted. One former mathematics student who later became a colleague writes that "while he was my professor, he demanded nothing but my personal best. .. . he encouraged me to push myself beyond my limits. . . . he was always willing to help me find a solution, or at least lead me in the right direction. . . . later, as a colleague I looked to him for advice. His caring attitude and sense of humor helped me from the beginning. He is my role model."

Primarily through his efforts, Dr. Taylor and his department conducted the first high school mathematics contest in North Carolina. This was some 9 years prior to the first NCCTM sponsored State Mathematics Contest. He worked with others in NCCTM to do the initial planning for this State Mathematics Contest and he remained a member of the State Mathematics Contest Committee until 2001. He chaired the Test Construction Subcommittee from 1982 until 1992. One of his test construction colleagues writes, "when some of the faculty from our college gave up the job, he carried out the duties of test construction by himself for three years running. He did a great job each year." From 1994 until 2001 he served as overall Chairman of the State Mathematics Contest Committee. One of his fellow committee members writes "We could always count on him to be cheerful and supportive towards us, even though his burden was a heavy one indeed. He never once complained about how much he had to do but focused instead on the contributions of others."

Rankin Award Nominations

The Rankin Award is designed to recognize and honor individuals for their outstanding contributions to NCCTM and to mathematics education in the State. Presented in the fall at the State Mathematics Conference, the award, named in memory of W. W. Rankin, Professor of Mathematics at Duke University, is the highest honor NCCTM can bestow upon an individual.

If you have nominated someone in the past who has not received the award to date, or if you would like to nominate someone new, please submit as much of the following information as possible!
Nominations are accepted at any time.

Please submit the following information. Use as many typewritten pages as needed. If possible, attach a vita of the nominee.

- Name of the nominee
- Current position
- Your relationship to the nominee (e.g. principal, co-worker, etc.)
- The nominee's contributions to mathematics education, NCTM, NCCTM, etc. (Please include information on specific offices held and honors received by the nominee.)
- Any information about contributions to the community, teaching, and education that would be of value to the Rankin Award Committee in its deliberations
- Other relevant information
- Letters of endorsement from other colleagues may be included.
- Date of nomination

Nominator* Name
Current position; Business or educational institution
Preferred mailing address; Preferred telephone number

*The Rankin Award Committee reserves the right to use portions of nomination information in the presentation of the award if the candidate is selected.

Send to: Ms. Jan Wessell
23 Shore Drive
Wrightsville Beach, NC 28480

NC DPI Seeking Input

Essential Standards Revision Survey Reminder

Earlier in 2008, following extensive input from the Blue Ribbon Commission on Testing and Accountability, the State Board of Education crafted the Framework for Change - twenty-seven recommendations to dramatically change the scope of the Standard Course of Study and assessments and testing. The NC DPI has a five-year plan to implement the Framework for Change. As the first wave of content areas develop Essential Standards, it is pertinent that NC DPI receive input internally and externally. To provide input and feedback, you are requested to complete the brief survey located at

<http://www.zoomerang.com/Survey/survey-intro.zgi?p=WEB228MB3BQWHK>

The survey will be open until the end of February 2009.

Awards

2008 Innovator Award Winners
Individual Award: Bampia Bangura
Group Award: Professional Engineers of NC
Reported by John Parker, Nags Head, North Carolina

Each year, the NCCTM special awards committee selects an individual and/or group that make significant contributions to creatively stretching the mathematics education community in NC. This year, the individual award was presented to Bampia Bangura and the group award was presented to the Professional Engineers of NC for their support of the Statewide MathCounts Competition.

BAMPIA BANGURA worked in NC briefly in the mid 1970's and returned to the state in 1990 as a professor at Bennett College. During his tenure as an Assistant Mathematics Professor at Bennett from 1990 -- 2002, he provided leadership in the Mathematics Department in a number of ways: by providing leadership for Bennett's SACS review in 1999, by making presentations that enriched the Saturday Seminar Series, by teaching an extended class load that included courses ranging from Developmental Mathematics to Linear Algebra, and by serving as Acting Department Chair.

In 2002, he moved to the position he still holds at NC A&T State University as an Associate Professor of Mathematics. His distinguished teaching career has continued at A&T while he also supervises student teachers. Throughout his teaching experiences in NC, he has been a leader in NCCTM, having served as Vice President for Colleges from 1995 – 1997, being a leading member of the Special Awards Committee since 2003, working as the coordinator of the high school mathematics contests at A&T since 2003, and serving as the Chair of the Special Committee for Coaches Award on the State Mathematics Contest Committee since 2005.
His quiet presence and affirming personality have supported the development of many students and colleagues in NC for the past 20 years.

THE PROFESSIONAL ENGINEERS OF NC (PENC), were instrumental in introducing the MathCounts Competition—a national project to improve the math abilities of America's middle school students through a competition that challenged students and teachers to do more mathematics—to NC in 1982. PENC is a group of enthusiastic and committed people brought together by their shared interest in promoting the future of their profession.

What began as a handful of schools in 1982 now involves 270 schools organized into 10 chapters around the state. The professional sponsors invest approximately $50,000 each year to ensure this broad level of participation. Since 1982, over $800,000 has been given to this effort. In addition to the broad reach of this competition, NC student winners consistently do well in the national competition that follows the state program, competing against teams from all 50 states, the District of Columbia, Guam, Puerto Rico, and Panama. Thanks to the support of this professional group, state winners also now receive scholarships to UNC-Asheville, NC State, and East Carolina. All participants are encouraged through the donation of themed tee-shirts, calculators, trophies and other prizes.

The national chapter of this competition has given six awards for innovation in their history. It speaks to the dedication and support of the Professional Engineers of NC that the NC MathCounts program has received this award two times.

Innovator Award Nominations

The North Carolina Council of Teachers of Mathematics accepts nominations for the Innovator Award at any time. The purpose of this award is to recognize and reward individuals or groups who have made an outstanding and noteworthy contribution to mathematics education and/or NCCTM by having founded, initiated, pioneered, or developed some program in mathematics education of service to a geographic region of the state or the entire state. Further, this program must have been sustained for a period of at least three years. A number of organizations have made significant contributions to mathematics education in North Carolina; the Committee encourages the nomination of organizations as well as individuals. Any NCCTM member may submit nominations by sending in the form below. Nominations will be retained in the active file for at least three years.

NOMINATION FORM

Name of Nominee: _____

Present Position: _____

Outstanding contributions to mathematics education in North Carolina which serves as the basis for this nomination:

Additional information that would be of value to the selection committee:

Signature: _____ Date: _____

Name (print/type): _____

Position: _____

Business or Institution: _____

Address: _____

Phone: Business _____ Home: _____

Email: _____

Send to: John Parker
316 West Soundside Road
Nags Head, NC 27959

Graduate Scholarships: Support for Mathematics Teachers' Education

Reported by John Kolb, Raleigh, North Carolina

The NCCTM Trust Fund Committee accepts applications from NCCTM members who are elementary or secondary school teachers of mathematics and who are taking graduate courses in mathematics and/or mathematics education as part of a graduate degree. The Committee awards scholarships of $600 to as many qualified applicants as the available investment income from the Trust Fund will permit. Scholarship applications may be submitted at any time, but will be reviewed twice a year. The application review deadlines are October 1 and March 1. From its inception in 2000, the NCCTM Trust Fund has been able to provide 89 scholarships for a total of $45,100.

Donations to the Trust Fund increase the investment principal and in time result in greater investment income and the opportunity to support more teachers of mathematics seeking continued professional growth through graduate degrees in mathematics and mathematics education. Over the period 2006 to 2008, the Trust Fund has received $4700 in donations.

DONATIONS TO THE NCCTM TRUST FUND 2006-2008	
In Memory of…	**Donor**
Gwen V. Clay Professor, Meredith College	Maggie Holder; Jan Wessell
John Daniels Professor Emeritus, East Carolina University	John Crammer
William F. Palmer Professor Emeritus, Catawba College	Ron Hahn; other anonymous donors
Katye O. Sowell Professor Emeritus, East Carolina University	John Crammer; Jan Wessell; Lucille Moore
William R. Spickerman Professor Emeritus ,East Carolina University	John Crammer

DONATIONS TO THE NCCTM TRUST FUND 2006-2008	
In Honor of…	**Donor**
Robert Joyner and Ann Joyner Professors Emeriti, East Carolina University	Jesse and Lucille Moore

To Donate to the NCCTM Trust Fund

If you wish to memorialize or honor someone important to you through a donation to the NCCTM Trust Committee, please send your donation to:

Rebecca Hoover, NCCTM Business Manager
P.O. Box 4604
Cary, NC 27519

Contributions (checks) should be made payable to Pershing LLC for the NCCTM Trust Fund. Please provide the name of the person being honored or memorialized through the donation and the name and address of the person that NCCTM should notify of your gift. For more information, contact John Kolb, Trust Fund Chair.

For memorials, a letter explaining the purpose of the Trust Fund is sent to the family of the person memorialized informing them that their loved one has been honored with a donation.

For honors, the letter is sent to the honoree. The name and address of the donor is provided (unless the donor requests anonymity). The donor also receives a letter acknowledging the gift and expressing the gratitude of NCCTM and the Trust Fund Committee.

NCCTM Trust Fund Scholarship

North Carolina Council of Teachers of Mathematics

$600 scholarships are available from NCCTM to financially support North Carolina teachers who are enrolled in graduate degree programs to enhance mathematics instruction.

Applicants must be:

- Currently employed as a pre-K - 12 teacher in North Carolina;
- Currently an NCCTM member (for at least one year) at the time of submitting this application;
- Currently enrolled in an accredited graduate program in North Carolina;
- Seeking support for a mathematics or mathematics education course in which they are currently enrolled or have completed within the previous four months of the application deadline.

Applications will be reviewed biannually, and the deadlines for applications are:

- **March 1**
- **October 1**

Send completed applications to:
NCCTM Trust Fund Chairperson
6520 West Lake Anne Drive
Raleigh, NC 27612

Direct inquiries to:
John R. Kolb, Chairperson
phone: (919) 787-8116
e-mail: JKolb1@nc.rr.com

(Please print all information.)

PERSONAL INFORMATION:

Name: _____

Home address: _____
Street

_____, NC _____
City Zip

Home phone: _____ Home e-mail: _____

NCCTM membership number: _____

EMPLOYMENT INFORMATION:

How many years of teaching experience? _____

Currently employed in what school system? _____

School name: _____

School address: _____

School phone: _____ School e-mail: _____

Current teaching assignment: _____

Principal's name: _____

COURSE INFORMATION: (One course only)

Institution of higher education: _____

Graduate degree program in which you are currently enrolled: _____

Course name:_____ Course number: _____

Dates of enrollment: *(circle one)* Fall semester Spring semester Summer session Year: _____

Name of course instructor: _____

PROFESSIONAL ACTIVITIES WITHIN PAST 5 YEARS WITH EMPHASIS ON ACTIVITIES RELATED TO MATHEMATICS EDUCATION:

BRIEF STATEMENT OF FUTURE PROFESSIONAL GOALS:

REQUIRED SIGNATURES:

Applicant signature: _____ Date: _____

Principal's signature: _____ Date: _____

Instructor signature (if currently enrolled): _____ Date: _____

REQUIRED ATTACHMENTS:

Please attach a copy of

1. A letter of acceptance to an accredited graduate program in North Carolina;
2. Official verification of enrollment in the graduate course described in the COURSE INFORMATION above if the course is currently being taken, **OR** official transcript containing the grade awarded to the applicant if the course described in the COURSE INFORMATION above has been completed.

NOTE: Applications must be complete to be considered. If your application is approved, an official course grade report must be submitted to verify successful completion of the course before scholarship funds will be issued.

Internal Revenue Information for Grant Recipients: Please be aware that NCCTM is required to report all grants of $600.00 or more to the Internal Revenue Service. In such a case you will receive an IRS Form 1099-MISC from NCCTM. However, you should be able to avoid the payment of any income tax on this. NCCTM has been advised that, if you receive one of the NCCTM grants, you must include the grant proceeds in income unless you made a binding commitment to have the proceeds paid directly to the sponsoring school.

NORTH CAROLINA COUNCIL OF TEACHERS OF MATHEMATICS

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Name: _____ Home Telephone: (___) - ____

Address: _____ School Telephone: (___) - ____

City: _____ State: _____ Zip: _____ E-mail: _____

School System: _____

POSITION
- ❑ Teacher
- ❑ Department Chair
- ❑ Supervisor/Administrator
- ❑ Full-time College Student
- ❑ Retired
- ❑ Other _____

LEVEL
- ❑ K-3
- ❑ 4-6
- ❑ Junior High/Middle School
- ❑ Senior High
- ❑ 2-Year College/Technical
- ❑ 4-Year College/University

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❑ New ❑ Former/Renewing Member # _____

MEMBERSHIP DUES
- ❑ 1 year: $20.00 _____
- ❑ 3 years: $50.00 _____
- ❑ Full-time Student: $10.00 _____
- ❑ Contribution to Trust Fund: _____

Total Payment Enclosed: _____

Payment by ❑ Check ❑ Visa ❑ MasterCard

Card # _____

Exp. Date _____

Signature _____

Please make your check or money order payable to NCCTM. Send this form and your payment to
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CARY, NC 27519
Payments by credit card may be mailed or faxed to
919-859-3342

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