## The Centroid

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- Using Spatial Reasoning to Enhance K-2 Number Sense
- Mini-grant Report: Hands-on Equations
- Mathematics Leadership Academy: Promoting Students' Awareness About the Applications of Mathematics
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- Futoshiki

2009 NCCTM Mathematics Logo Contest Winners


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 email 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 $\mathrm{http}: / / \mathrm{www}$. ncpublicschools.org/curriculum/mathema tics/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.


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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.

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## The Centroid



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## From the Editors

Hello from Boone! The summer is over, we are all back to school, and it is time for a new Centroid. We hope you enjoy this issue and ask for your help to keep the Centroid going! Please send us your article submissions. We are particularly interested in submissions about what works when teaching activities or topics from the NC Mathematics Curriculum at any grade-level; how to conduct successful professional development; etc. No article is too short. Please write about what works for you! Sharing ideas is key as the new mathematics curriculum is implemented.

- Debbie Crocker and Holly Hirst


## DPI News: 2009 Curriculum Revisions

## Essential Standards and Objectives

The State Board of Education approved the plan to develop the Essential Standards and Objectives in all content areas at its October 2008 meeting. Mathematics will be one of the first content areas to identify Essential Standards and Objectives. To read more about the essential standards see the LearnNC websites:
[http://community.learnnc.org/dpi/math/archives/2007/06/standard_course.php](http://community.learnnc.org/dpi/math/archives/2007/06/standard_course.php)
[http://community.learnnc.org/dpi/math/archives/2009/02/essential_stand.php](http://community.learnnc.org/dpi/math/archives/2009/02/essential_stand.php)
Revised time-line for K-12 Mathematics Transition (from the LearnNC website)
2009-2010--Teach the 2003 SCS [EOG will be based on the 2003 SCS]
2010-2011--Transition year--Teach the 2009 Essential standards/objectives as well as the 2003 Standards that are not included in the 2009 Essential standards/objectives [DPI will produce a "transition document" to be used during this year.] [EOG will be based on the 2003 SCS. Field test items will be based on the 2009 Essential Standards/Objectives.]

2011-2012--Teach the 2009 Essential standards/objectives. [Testing will be based on the 2009 Essential Standards/Objectives.]

## NCCTM State Conference: Oct 29-30

## Zooming in on the Essentials!

Come and learn about the revisions to the standard course of study! 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. Registration will be open soon online.

## Presidents' Messages

State President

Wendy Rich
wrich@asheboro.k12.nc.us
It is hard to believe another school year is upon us already. I have spent part of my summer in professional development with teachers. I am always invigorated by the excitement and eagerness of North Carolina teachers to learn new ways to help students understand mathematical concepts. The beginning of a new school year is filled with anticipation, and the 2009-2010 school year will certainly be just that for math teachers across our state!

North Carolina is embarking on a new, cutting-edge curriculum in mathematics. A curriculum that will include Essential Standards that identify the big ideas students should master at each grade level. The Essential Standards will be accompanied by Clarifying Objectives to assist teachers by elaborating on skills and concepts students need so they can master these essentials. Assessment Prototypes will complete this document. These prototypes will inform all stakeholders of example questions students can answer if they have a true understanding of these mathematical standards. The North Carolina Department of Public Instruction has been working diligently over the past two years to create standards that will be rigorous enough to prepare our students for the 21 st Century, while allowing for depth - fewer standards in each grade so students are able to grasp concepts to be successful in subsequent years. We want to afford North Carolina students every opportunity to be competitive with our nation and with the world.

NCCTM plans to have a huge role in communicating these curriculum changes to our teachers across the state. The theme for our fall conference this year is: Zooming in on the Essentials! Our fall conference will have many featured sessions by NCDPI to help roll-out the new standards and support documents. Please invite your friends and colleagues to attend the conference October 29-30, 2009. Every school needs to have representation at this year's conference!

Here are some of the sessions to expect from NCDPI staff regarding the new curriculum and the direction for our state on many important issues:

- K-5 \& 6-12 Essential Standards (Background, Learning Trajectory, and the ES Document)
- K-2, 3-5, 6-8, \& 9-12 How to Use the Standards to Teach - (Resources and Expectations)
- Revised Bloom's Taxonomy and its Impact on the New Curriculum (Verb Power)
- Improving Mathematics Instruction through Writing (Writing in the Math Content Area)
- Formative Assessment
- Preparing for the Next Generation of Assessments (What to Expect)
- Making Middle School Math Accessible
- Creating a Concept Based Unit for the High School Classroom
- MSP Grant Updates

I truly hope that in these difficult economic times, school districts make it a priority for teachers to attend the conference this year. It is a most important year to be informed of changes and be ready for implementation in the 2010-2011 school year. NCCTM has formed a strong partnership with NCDPI to ensure that our teachers are kept abreast of these changes. The remaining sessions and workshops at our fall conference will ensure that our teachers are also equipped with best practices and resources to teach for understanding.

Mathematics remains strong in our state primarily through the dedicated service of our NCCTM members. I am blown away by the amount of time our members volunteer for mathematics education each and every day. I owe a huge debt of gratitude to all of our committee members, board members, and volunteers. I am proud to serve alongside so many wonderful mathematics educators! If you would like to be more involved in NCCTM, please contact me or contact your regional president. We are always looking for ways to better serve our membership.

## Eastern Region President <br> Ray Jernigan <br> jernigan@suddenlink.net

These are trying times for many people, and our schools and classrooms are not exceptions. However, in times like this we need to reflect on what we know about teaching as expressed in the excerpt from a whitepaper written by myself and several colleagues entitled Mathematics Coaching: A Next Step in the NC-Pims Mathematics Leadership Initiative (2006).

> The importance of high quality teachers has never been as evident as it is in the twenty-first century. The North Carolina Professional Teaching Standards Commission believes "the quality of teaching is the single most important factor in achieving quality schools. No innovation or effective school reform can take place if teachers are not equipped, prepared, and eager to implement change." In one form or another, most people have heard the maxim that " student learning depends first, last, and always on the quality of teachers.' Experts may disagree about how highly to value the size of a class or school, how the system functions, or whether it is adequately funded-but nobody's list of education's priorities fails to place teacher quality at or very near the top" (School Leadership for the $21^{s t}$ Century Initiative 2001, p.1). Research in New York City Schools involving high- and low-achieving schools with similar populations indicates that "teacher qualification accounted for more than 90 percent of the variations in students' achievement in reading and mathematics at all grade levels tested" (Darling-Hammond and Ball 1997).

I read that as saying you, the classroom teacher, are number one! So in spite of the circumstances that you may face this year, you can make the difference for your students. Share your best teaching strategies with other teachers at your school, district and at the NCCTM conferences. Hope to see you at the NCCTM State Conference, October 29-30. Have a great year!

## Central Region President

## Barbara McGill

motley455693@bellsouth.net
Greetings to the members of the Central Region of NCCTM. I am excited about the upcoming school year and all that it has to offer the teachers and children in mathematics classes in North Carolina. There are many new and innovative ideas coming forth for usage in each classroom. Textbooks are coming forth with new technologies that will appeal to all grade levels and teaching styles. Your input is necessary and your expertise is needed to implement the curriculum! If you are interested in serving as an officer, conference presenter or in any other volunteer position, just let an officer know of your desires. We can always use your expertise!!!

Thanks to Rebecca Caison for her support and guidance as the members of our Central Region Board begin our service to you. The members of the Central Region Board are: Bob Vorbroker, Elementary Vicepresident, Donna Thomas, Middle School Vice-president, Billie Bean, High School Vice-president, Kerri Richardson, College Vice-president, and Fanisha Fuller, Student Representative (UNCG). Each of us pledges to work diligently to share ideas and be accessible to you as needed. We thank you for your support and trust. We look forward to working with our own Wendi Rich as State President. Congrats to her!!

It was great seeing those of you who attended the Central Region Conference held at Winston Salem State in March of this year. Now that you are back in the swing of a new year, those ideas and activities can enhance your curriculum on a daily basis. I heard you say that it was useful and beneficial to you and your students. Come join us for the 2010 Regional Conference to be held in Greensboro on March 20th. Ana Floyd and Vincent Snipes have agreed to chair the conference once again. The Regional Math Fair will be again chaired by Angie Kerr and Deanna Ferree in Asheboro. The Central Region Math Fair will be Saturday, March 13th at North Asheboro Middle School.

Lastly, a very special 'thank you' to Rebecca Caison and the past board members for their continued support and as job well done! We appreciate all you do for math education in the Central Region of North Carolina!

## Western Region President

## Kathy Jaqua

kivey@email.wcu.edu
Welcome to a new school year and a new year for NCCTM! I am happy to be starting my term as the Western Region President. We have several excellent colleagues who are serving our region as officers. This year, Deborah Crocker, Helen Byrd, Zada Taylor, Sheila Brookshire, and Adam Harbaugh are serving along with me as Western Regional Officers. When you see these people, remember to thank them for their time and commitment to our professional organization. We are currently at work planning the spring regional meeting, and we hope that many of you will consider sharing some of your wonderful teaching ideas with us. We have set the date for that meeting as February 27, 2010, and we plan to meet in the Asheville area. Mark your calendars, watch your email, and check the NCCTM website for how you can participate in that meeting as a presenter or as an attendee. More details will be available to you as we finalize plans.

As you begin your new year in the classroom, or continue the year for those of you on year-round schedules, think about all the growth and progress that you can expect from your students over the upcoming months. You can work with your students to encourage them to make sense of mathematics and to see mathematics in the world around them. You will help them develop skills, concepts, and understanding of many new ideas that will prepare them for the next steps in their mathematical journeys. Like many of you, I have been on that mathematical path for many years. I am constantly amazed by learning something new about a mathematics topic that I have studied and taught for many years. The chance to learn something new about something old keeps me on my toes and keeps me fascinated by the whole world of mathematics. I believe that teachers share my fascination with ideas and techniques and that is what makes us different. I hope that each of you will help a student develop a love of mathematics that will set up our next generation of teachers so that the fascination can continue. Have a great year, and I look forward to seeing you in Greensboro this fall and Asheville in the spring.

## In Memoriam: Ruth W. Rufty

The North Carolina Council of Teachers of Mathematics membership morns the passing of Ruth Rufty on July 12, 2009. A long time member of NCCTM, Ruth taught mathematics for over thirty years at high schools in North Carolina, including Newton-Conover, Hickory, Taylorsville, and Alexander Central. She was named Alexander County Teacher of the Year in 1981 and received the NCCTM Rankin Award in 1985 for her many contributions to mathematics education in North Carolina.

Ruth was known as a forward thinker and empowering teacher, embracing the "new math" introduced in American classrooms in the 1960s in response to the Sputnik crisis and recognizing even then that computers and technology were important in mathematics education. As stated in the editorial entitled "Teacher led way in critical education" in the Hickory Daily Record on July 19, 2009,

Rufty was among the few who envisioned a time when they [computers] would be in everyone's hands. There was, and is, no limit to high-tech. Thus, the need to understand, innovate and stay a step ahead in the technological revolution. "Changes have taken place in the many uses of mathematics, and the new math is essential to understanding these changes," Rufty said. There was much to learn and much to discover, and she understood that the key was mathematics. Students had to know why as well as how.

She did not teach her students "Do it this way because I said so." Those are her words, not ours. Her students - of all ages - flourished. Ruth Rufty empowered her students to think, question and apply their knowledge to the present and the future. That was a big part of her genius and why her approach to education is as fresh today as it was in 1967.

## 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](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? Here is a report from April Collins on her mingrant:

## Mini-grant Report: Hands-on Equations April S. Collins Lowell Elementary School

When I look back on my mathematics education, I remember always scoring well on the tests. I loved math in elementary and middle school. However, I remember struggling with Algebra II and Geometry in high school. It was then that I decided never to further my mathematics education. Little did I know that I would be standing in front of students teaching them Algebra and Geometry. What I learned from my own experiences was that students need a more concrete approach to learning these concepts. After watching the Academically and Gifted Programs teacher use the "Hands-on Equations" to teach algebra with the higher performing students, I knew I just had to use this program with all of my 5th graders. I was discouraged to learn that the entire kit cost over $\$ 300$. I decided to apply for the NCCTM mini-grant program. I was pleased to learn I had been awarded the money needed to purchase this program.

Since purchasing the program, I have been able to use these hands-on materials to challenge my high performing students and bring concrete understanding to my lower performing students. I am especially excited that I have had parents attend my Math Camp to work on these materials with their children. One parent told me that he never understood algebra in school but that he could understand it with the "Hands-on Equations" kit. For anyone looking for help to purchase resources to enhance your mathematics instruction, I encourage you to apply for the NCCTM mini-grant. It will be well worth the effort.

More information on Hands-on Equations:


April Collins and students working with Hands-on Equations

> [http://www.borenson.com/](http://www.borenson.com/)

# Using Spatial Reasoning to Enhance K-2 Number Sense Catherine Stein East Carolina University Kerri Richardson The University of North Carolina at Greensboro 

At the 2008 NCCTM conference, we offered a session for in-service teachers that highlighted ways to connect spatial and number sense tasks for Grades K-2. An important vehicle for doing so is through the process standard of communication (NCTM, 2000), which is also included as a goal for all learners of mathematics in the state of North Carolina (NCSCOS, 1999). During the session, K-2 teachers commented that their students might benefit from communicating about the spatial and number sense tasks we were posing to the audience. In response, we summarize here the ideas that came out of our NCCTM session, More than Just Sorting Shapes. Spatial Sense

Spatial sense can be defined "as an intuition about shapes and the relationships among shapes.... a feel for the geometric aspects of their surroundings and the shapes formed by objects in the environment" (Van de Walle \& Lovin, 2006, p.187). Why is spatial sense important? Students who have a well-developed spatial sense tend to solve tasks in more meaningful ways, not just as rote learners (Reynolds \& Wheatley, 1997). Wheatley (1998) also notes that a network of mental imagery of mathematical patterns and relationships helps students solve problems in multiple ways.

As part of the mathematics methods curriculum, spatial reasoning tasks are integrated throughout weekly activities and assignments. One such activity, Quick Draw (Wheatley, 2007), is one we use extensively, and we require that our preservice teachers do the same with elementary and/or middle grades students. In this activity a geometric image is displayed on an overhead projector for a few seconds and participants draw what they saw (Figure A).

The image is almost always seen, interpreted, and drawn in a variety of ways, which surprises the preservice teachers in our classes. Two people may have produced the same image, but the path used to transfer that image from their mind to their hand is very different. For example, concerning Figure A, one student may have described how they drew the outside square first, then a smaller square and finished with a diagonal. Others may describe the image as having a " $Y$ " inside and not even noticed the smaller square. Communicating their interpretation of each image to one another and to the class as a whole is vital in the Quick Draw activity (Richardson \& Stein, 2008). The instructor plays a strong role in facilitating this communication, especially at first. After several Quick Draw sessions, students quickly learn that they are required to


Figure A. (Weatley, 2007) communicate their ideas about how they saw, interpreted, and drew the image.

The Quick Draw exercise helps with mental imagery, recognition of shapes, spatial memory, communication about mathematics, and the ability to see that a mathematical task can be done in multiple ways. Many people feel they do not have a good sense of direction, cannot read a map, or are only good at numbers. It is from our experience with preservice teachers and the students they work with that spatial sense can be improved with exposure to meaningful activities such as Quick Draw. It is the "numbers people" that we found to be of particular interest because we wanted to help them connect number sense with spatial sense.

## Number Sense

Number sense can be defined as an intuitive feel for numbers and their relationships that develops when children solve problems for themselves (Carboni, 2001). Although memorized facts can be a useful skill, by coming to know the idea of "number" and working flexibly within numbers, students can explore mathematics problems in more meaningful ways. For the K-2 student, it is vital to understand all the combinations of ten, not just all of the addition facts that show an answer of ten. Number sense involves not just working with numbers in multiple ways but also speaking about numbers using more than just basic language (i.e., 'five plus five equals ten'). A teacher might help students enhance their mathematical communication by asking, "How many fours are in twelve?"

Quick Draw can assist in making direct connections to number concepts. For example, students often use a particular piece of the drawing that repeats itself throughout to help them complete the drawing (Figure B). Some students use the small hexagons, or "arrows." Others use the bigger hexagons; while still others view two congruent figures layered on top of each other with one figure rotated 45 degrees. The use of this repeated part of their drawing as a unit can be connected explicitly to unitizing, an important concept of number.


Figure B. (Weatley, 2007)

## Connecting Number Sense and Spatial Sense

In our NCCTM session, we modeled activities that used communication and spatial reasoning as a means to develop number concepts. For example, we handed out pattern blocks and described the picture seen in Figure C. A mixture of mathematical and everyday language was intentionally used to help participants make connections between them. Our comments included:

- My picture looks like a shark.
- In the middle of my picture is a shape with six sides.
- The pointy part of the hexagon is towards the top.
- To the right of the hexagon is a trapezoid. The sides of the two shapes match exactly. They are touching.
- On the opposite side of the hexagon is a triangle. The side of the triangle is touching the side of the hexagon.
- There is another triangle on the hexagon one side counterclockwise from the first side.
Some clues could be interpreted in more than one way, which allowed participants a chance to ask questions for clarification and to focus on being precise about their mathematical language.

We then went on to encourage attendees to repeat the activity in pairs. They were instructed that their picture should have exactly five blocks. After the pairs each worked a pattern, questions asked were, "What words did you use to describe?" and "What kinds of things did you have to think about as the giver of clues? As the receiver of clues?" To help the teachers see the connection to number, we asked them to prove to their partner how they knew their picture had five blocks. Responses included, "I counted the blocks - one, two, three, four, five" and, "I used two trapezoids, two triangles, and a hexagon.

Two and two and one is five." The experience was especially useful in thinking about how a kindergarten student, for example, might prove that they used five blocks and how teachers might help support students' conceptions of five.


Figure D. (Weatley, 2007)
Another tool to help students create mental images of number is dot cards. We flashed dots on the screen for three seconds (see Figure D) and then asked participants how many dots they saw. Most teachers said that they saw eight dots and began to explain how they saw the dots arranged. For example some saw four dots on the top row and two groups of two dots on the bottom row. Others saw two groups of three on the ends and two dots in the middle. Having students do this same activity encourages number sense in two ways. First, in listening to other students describe their strategies; such as partwhole relationships of a particular number. In this case, eight could be four plus two plus two or three plus three plus two, or any other combination that the arrangement suggests for a student. Secondly, because the dots were flashed quickly, attendees at our session (and also students in the classroom) did not have time to count. Therefore they were forced to think in units rather than counting one-by-one. Both of these connections help lead students to a natural development of number facts.

## Final Thoughts

We hope this article will provide support for what teachers are already doing in their classrooms and help them think about spatial sense and number sense in new ways - especially through communication as a fundamental concept. The activities we have offered here can be expansive and not only do we encourage all K-2 teachers to try some of the ideas, we also encourage mathematics teacher educators to include this type of spatial instruction in their preservice curriculum.

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## NCTM ⓔminars

## On-Line Professional Development

Single-session seminars will be held August through December 2009 and include the following: The $\$ 59$ registration fee includes:

- One Internet connection and one phone connection to the live program - use a projected or large-screen computer and a speaker phone and you and your colleagues can participate for one registration fee!
- Participation in one 60 -minute session
- One electronic copy of the E-Seminar

Upcoming seminars:
Effective Mathematics Instruction: The Role of Mathematical Tasks - General Interest E-Seminar Date: Wednesday Sept. 16

Education in the Obama Administration: What does it Mean for Math Educators? - General Interest E-Seminar Date: Tuesday, Sept. 22

Can You Put a Lid on That? Exploring Limits in the Regular Classroom - Grades 9-12
E-Seminar Date: Wednesday, Sept. 30
[http://www.nctm.org/profdev/content.aspx?id=23401](http://www.nctm.org/profdev/content.aspx?id=23401)

# Mathematics Leadership Academy: <br> Promoting Students' Awareness About the Applications of Mathematics <br> Pamela R. Moses-Snipes <br> Winston-Salem State University 

Two areas of particular concern in the field of mathematics education are the mathematics achievement of minorities and the mathematics achievement of women. The 2007 National Assessment of Educational Progress (NAEP) results show that the test scores of minority students were lower than those of their White counterparts (The Nation's Report Card, 2007).

Table 1
$8^{\text {th }}$ Grade Students' Test Scores for 2007 National Assessment of Educational Progress (NAEP) Results by Race

| Race | Test Scores |
| :--- | :---: |
| American Indian/Alaska Native | 264 |
| Hispanic | 265 |
| Black | 260 |
| White | 291 |

Furthermore, in the state of North Carolina minority students scored lower than their White counterparts at the 8th grade level (North Carolina Department of Public Instruction, 2007).

Table 2
Percentage of $8^{\text {th }}$ Grade Students' End of Grade Mathematics Test Results by Race scoring At or Above Level III for 2007 in the State of North Carolina

| Race | Percentage |
| :--- | :---: |
| American Indian/Alaska Native | $52.4 \%$ |
| Hispanic | $54.3 \%$ |
| Black | $45.1 \%$ |
| White | $76.7 \%$ |

These results are consistent with the End of Grade test results for 2007 regarding females. Minority females scored lower than their White counterparts at the 8th grade level (North Carolina Department of Public Instruction, 2007).

Table 3
Percentage of $8^{\text {th }}$ Grade Female Students' End of Grade Mathematics Test Results by Race scoring At or Above Level III for 2007 in the State of North Carolina

| Race | Percentage |
| :--- | :--- |
| American Indian/Alaska Native | $82.8 \%$ |
| Hispanic | $80.3 \%$ |
| Black | $76.1 \%$ |
| White | $93.0 \%$ |

Based on current data, there is a need to improve minority student achievement. In particular, minority females are in need of support to assist them in improving their mathematics achievement. The purpose of this article is to provide enlightenment on how the Mathematics Leadership Academy can be used as a model for other programs in an effort to increase mathematics and science achievement as well as promote science, technology, engineering, and mathematics (STEM) awareness for minority females.

## Purpose of the Academy

The Mathematics Leadership Academy furthers the mathematics achievement of participants and prepares them for leadership roles. Participants are encouraged to develop an appreciation for mathematics by field trips and by exploring careers in mathematics. The enrichment portion of the academy includes guest speakers who
expose participants to careers in STEM-related fields and help them understand the connections between mathematics and other disciplines such as science, health science, business, and technology. The academy also produces positive energy within the local educational community and increases interest in mathematics among participants. The academy exposes participants to math-related careers and aspects of mathematics that would otherwise remain unknown to them.

## Overview of the Academy

I received a mini-grant from the North Carolina Council of Teachers of Mathematics for the Mathematics Leadership Academy (MLA). The Mathematics Leadership Academy addresses mathematics achievement of girls and minorities through the systematic provision of enrichment activities. Although the focus of this project is to provide support for minority female exposure to various aspects of mathematics in an effort to increase their motivation regarding mathematics as well as their achievement in mathematics, the Mathematics Leadership Academy is open to anyone who wishes to participate.

The academy had an enrollment of 22 middle school students. Academy sessions were held at WinstonSalem State University one Saturday morning each month during the regular school year. The academy's focus,


Middle school students participating in the Academy mathematics, was connected to the other disciplines during the Saturday sessions in order to heighten awareness of disciplinary and career opportunities (e.g., Mathematics and Science, Mathematics and Health Sciences, Mathematics and Technology, and Mathematics and Business). Additionally, students participated in enrichment experiences that were part of the leadership component of the academy. Participants learned skills related to public speaking, in an effort to increase self esteem, and communication skills that included requiring participants to do journal writing. Students also participated in etiquette workshops focusing on table manners and professional attire. There were opportunities for students to learn about
preparing for high school, to speak to college students, and to tour a university campus.

The Mathematics Leadership Academy partnered with the North Carolina-Mathematics Science and Education Network (NC-MSEN) Center at Winston-Salem State University to strengthen participants' content knowledge in mathematics. This program allowed MLA participants to attend free tutorial sessions from 5:00 to 7:00 p.m. every Tuesday and Thursday. Furthermore, participants were encouraged to enroll in the MSEN program as a secondary program upon completing eighth grade. The NC-MSEN program is funded by North Carolina and has a proven track record of its participants pursuing degrees and careers in math-related fields.

The Mathematics Leadership Academy also partnered with a 96 -year old, world renowned community service organization, Delta Sigma Theta Sorority, Inc. Members of this organization were invited to speak to students about the mathematics used in their respective professions. This collaboration also emphasized selfesteem, as well as academic awareness for the participants. When guest speakers were invited, they were asked to include answers to some of the following questions in their presentation:

- What is your profession? What led you to choose this profession?
- How does one prepare for a profession such as yours?
- Were you offered opportunities for internships?
- To what extent is math involved in what you do? Bring some models - real, computer generated or others. (Computer access is available)
- What leadership skills are required to do what you do?
- Do you have access to samples or other materials that might be disseminated?
- Can you make presentations creative, interactive, and as stimulating as possible?
- Can you provide handouts and give-aways?


## Schedule

The following table provides a brief synopsis of each academy session. The academy met one Saturday a month and each month had a theme. In addition, each session had a mathematics-based activity and at least one presentation. A tentative schedule for each of the monthly sessions is as follows:

| 9:00am - 10:15am | Mathematics Activities |
| :--- | :--- |
| 10:15am - 10:30am | Break |
| 10:30am -11:45am | Enrichment Activities/Speakers |
| 11:45am -12:00pm | Session reflections/journal writing |


| Month | Description |
| :---: | :---: |
| October | During the Opening Reception parents, participants, and community members such as Winston-Salem State University representatives and representatives from Delta Sigma Theta Sorority, Inc. were enlightened on the purpose of the academy, how it was developed, the schedule for the academy, and introduced to academy partners. |
| November | Two facilitators worked together to enlighten students about technology. They demonstrated how to use Microsoft Word and Excel. They also had students choose from various mathematics websites to carry out mathematics activities (algebra) on the internet. Participants enjoyed learning a variety of functions such as making tables, Clip Art, creating graphs, solving equations, and building on data from an initial cell. These functions can be useful not only with academics, but with students' activities and hobbies such as sports, scrapbooking, Girls Scouts, etc. The participants enjoyed what they learned so much that they immediately began using what they had learned by incorporating some of the clip art into their journal writing at the end of the academy session. |
| December | Business Careers and prerequisites for college were the themes for the day. There were three speakers: an insurance agent, a banker, and a high school counselor who enlightened students about preparing for college. This college discussion served as a precursor to the tour of WSSU's campus. I facilitated the mathematics activity, which involved students going on a virtual shopping spree. This particular activity will be discussed in further detail following the overview of the schedule of monthly sessions. <br> Undergraduate members of Winston-Salem State University's undergraduate chapter of Delta Sigma Theta Sorority, Inc. (Gamma Phi) took academy participants on a tour of WSSU's campus. The participants enjoyed interacting with college students and appreciated the opportunity to ask the college students questions about college life, their majors, and the classes they were taking. |
| January | There were four speakers discussing health and medicine: a pharmacist, nurse, medical researcher, and a health analyst. The speakers engaged participants in hands-on math activities as well as exposure to a variety of medical equipment. Students learned how to take blood pressure, how to use an IV, and how medicine is made. Measurement was a major concept that was addressed during the health science related activities. The participants enjoyed these activities because they had an opportunity to actually experience how to use medical instruments as opposed to simply being told about the instruments. |
| February | Two presenters, a biologist and a veterinarian, discussed the use of science and mathematics in their professions. The veterinarian showed participants how to extract DNA from vegetables and the biologist discussed analyzing bacteria on agar in Petri dishes. Measurement was the main mathematics concept associated with the science activity. The DNA extraction was the main mathematics activity. It was a hands-on activity that involved students measuring the appropriate amounts of materials needed to extract the DNA and participants followed procedures to complete the extraction of DNA. |
| March | Academy participants and chaperones went to the SciWorks science museum in Winston-Salem. There were several exhibits for participants to explore such as the Toy Time Exhibit and the Black Inventors Exhibit. They also learned about the inner workings of the human body as well as animals indigenous to North Carolina. Participants had an opportunity to experience a planetarium show during their visit SciWorks. This field trip reinforces the goals of the academy, which are for students to see mathematics' connection to the real world and other disciplines as well as develop more of an appreciation for mathematics. In particular, the Black Inventors exhibit promoted self esteem because the participants had an opportunity to see that people from their heritage made contributions to science and used the creations for everyday applications. Self esteem was promoted for all participants because there were also women inventors discussed in the exhibit. Therefore, this field trip to SciWorks was not only an educational experience, but an opportunity for personal growth and awareness. |


| April | During the month of April, students prepared for the Closing Reception by reflecting on their experiences <br> during the program. Students worked diligently creating posters and reflection papers to share their <br> experiences during the academy with their family, friends, and community members. Students used <br> pictures from the disposable cameras assigned to them and posted them on their posters. Their <br> reflection papers provided them an opportunity to recall the memorable events they had during the <br> academy. They also had opportunities to practice their presentations prior to the Closing Reception. <br> They received feedback regarding their public speaking as they were practicing their presentations, so <br> they would be better prepared for their presentation during the Closing Reception. |
| :--- | :--- |
| May | The Poster Presentation and Closing Reception was the final session of the academy. During a poster <br> presentation, participants shared their reflections of the mathematics they learned and their experiences <br> throughout the academy to communicate the importance of mathematics to parents, mentors, teachers, <br> professors, and other community members of the importance of mathematics. Their reflections included <br> how mathematics is related to other subjects, their daily lives, and various careers. They really enjoyed <br> the hands-on activities and the field trip. They had an opportunity to be involved in their learning as <br> opposed to hearing a lecture about various careers. They also mentioned that they had an opportunity <br> to ask questions and carry out tasks done in various professions and use the mathematics that is <br> necessary to complete the tasks. Lastly, the field trip provided them with a learning opportunity outside <br> of the classroom. After participants shared their reflections, they were presented with awards and <br> certificates. |

A particular activity that can be explored in greater detail is the Shopping Spree activity carried out during the December session. First students were asked to provide examples of decimals to the hundredths place to serve as a review of adding, subtracting, and multiplying decimals. Then the students used the internet to select at least five items from their favorite store, which for this group of students was Toys ' $R$ Us. Students were provided with a scenario of the cash register malfunctioning. They had $\$ 500$ to spend, and they had to add up their selected items, determine the amount of tax, and have no more than $\$ 20$ left over. Participants' knowledge of decimals was reinforced and they made real world connections from the mathematics classroom to making store purchases. The students enjoyed going on their virtual shopping spree. Teachers could also use


Dr. Snipes with a student on the last day of the Academy store advertisements for students to select their items. See the next page for more details on the activity.

## Summary and Reflections

The Mathematics Leadership Academy provided participants with several benefits and learning opportunities. Participants were exposed to the use of mathematics and science in a variety of careers. This information may have otherwise remained unknown to them. The participants were able to see other people like themselves who achieved their goals by having careers in STEM fields, members of Delta Sigma Theta Sorority, Inc., a minority women's community service organization. They learned a wealth of information from the field trip and their mathematics content knowledge was further reinforced due to the mathematics activities.

In the future, my goal is to spend one hour on each component of the academy: mathematics, leadership, and enrichment (speakers enlightening students on math related careers) in effort to spend an equal amount of time on each component of the academy. Another goal is to recruit more participants, to expose as many students as possible to opportunities provided by the academy. The students enjoyed the Mathematics Leadership Academy and were able to make connections between the mathematics they learned and real world applications.

## References

National Center for Education Statistics. (2007). The nation's report card 2007 [On-line]. Retrieved August 20, 2009, from http://nationsreportcard.gov/math_2007/m0009.usp?tab_id=tab2\&subtab_id=Tab_1\#chart
North Carolina Department of Public Instruction. (2007). Reports of supplemental disaggregated state, school system (LEA), and school performance data for 2005-2007 [On-line]. Retrieved August 20, 2009, from http://disag.ncpublicschools.org/2007/app/disag/disag-public.cgi

# Middle Grades Activity: Shopping Spree <br> Pamela Moses-Snipes 

Congratulations! You are the lucky winner of a shopping spree courtesy of MATHWORKS. Details will follow regarding how you will be able to take advantage of this great opportunity. In order to be eligible to go on your shopping spree, you must carry out the following tasks: Create your own examples of numbers with decimals to the hundredths place. Create two more examples each of the addition, subtraction, and multiplication problems.

Operation
754.12
136.89
$+\quad$
525.64

| -436.89 |
| :--- |

371.03
0.07
$\times \quad 0$

## Technical Difficulty

You are almost ready to begin your shopping spree. You are now at the store and an announcement comes over the intercom, "We are sorry, but due to technical difficulties, the computers are down. At the present, we are unsure when we will have the problem fixed. We appreciate your patience and understanding." You are anxious to start your shopping spree and you really do not want to come back another day. How can you still go on your shopping spree today? You have $\$ 500$ to spend. Try to spend as much money as possible so you have less than $\$ 20$ left. You may use your calculator to check your total.

1. Fill in the blank with the store.
2. Select at least five items from the store and list their cost.
3. Solve for the subtotal of the items.
4. Solve for the amount of tax on the items.
5. Solve for the total of the items.
6. Explain how you know you have less than $\$ 20$ left? Be sure to show all your work.

STORE: $\qquad$
ITEMS

| $\square$ |  |
| :--- | :--- |
|  | $\square$ |
| SUBTOTAL: | $\square$ |
| SALES TAX: | $\square$ |
| TOTAL: |  |
|  |  |

## Problems to Ponder $\Omega$

## Fall 2009 Problems <br> Gregory S. Rhoads <br> Appalachian State University

Grades K-2: For a school assignment, Judy is to note the high and low temperatures for a particular day. At the high temperature, her thermometer appears as below:

and at the low temperature, her thermometer appears as below:


What are the high and low temperatures for that day and what was the difference between the high and low for that day (high minus low)?
Grades 3-5: Order the following numbers from smallest to largest: $1, \frac{8}{9}, 0.871$, the perimeter of a square with sides of length $\frac{1}{5}$, the value of $\frac{2}{3}-\frac{1}{4}+\frac{1}{2}$.

Grades 6-8: Find all values of $x$ that satisfy both $|2 x-1| \leq 5$ and $3-x>2$.
Grades 9-12: Let $T$ be a rectangular solid such that the top face has area 180, the front face has area 75, and the side face has area 60 . What is the volume of $T$ ?

## 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 1 December 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.

## SOLUTION: Grades K-2 Spring 2009 issue

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.

Solution (by the Editor): The students from smallest to largest scores were: Mary, Peter, Jordan, Mike, Brook, Logan, Julie, Anthony, and Paula.

## No correct solutions were received.

## SOLUTION: Grades 3-5 Spring 2009 Issue

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?

Solution: by Victor Yang, $3^{\text {rd }}$ grade of Leadmine Elementary (teacher: Ms. Melissa Davidson)

```
1 buffalo coin \(=3\) wheat coins
1 mercury coin \(=5\) buffalo coins or \(5 * 3=15\) wheat coins
21 wheat coins \(=21 / 3=7\) buffalo coins
7 buffalo coins +8 buffalo coins \(=15\) buffalo coins
15 buffalo coins \(=15 / 5=3\) mercury coins
3 mercury coins +5 mercury coins \(=8\) mercury coins
8 mercury coins / \(2=4\) mercury coins
4 mercury coins * \(\$ 5.00=\$ 20.00\)
So the answer is \(\$ 20.00\)
Victor Yang
\(3^{\text {rd }}\) Grade
Leadmine Elementary
Ms. Davidson (teacher)
```

Correct Solutions were received by: Edward Yang and Victor Yang of Leadmine Elementary.

## SOLUTION: Grades 6-8 Spring 2009 issue

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?

Solution: by Edward Yang, $5^{\text {th }}$ grade of Leadmine Elementary (teacher: Mrs. Michelle Willis)

$$
\begin{aligned}
& 79,92, x \\
& \text { Mean }=\frac{7 a+92 x+x}{3} \\
& \text { median possibilities }=7 a, 92, x \\
& \text { Case 1:79 as median } \\
& \frac{7 a+92+x}{3}>79 \\
& \left(\frac{x+7 a+92}{8}\right) \cdot 6>79 \cdot 3 \\
& x+171>237 \\
& x>237-171 \\
& x>66 \\
& \text { Cases: } 92 \text { as med:... } \\
& \frac{7 a+2 x+x}{3}>92 \\
& \left(\frac{79+92+x}{3}\right) \cdot 8>92 \cdot 3 \\
& 171+x>276 \\
& x>276-171 \\
& \begin{array}{l}
x>105<\text { That is not possible because the highest: } \\
\text { case } 3: x \text { as median }
\end{array} \\
& \begin{array}{l}
\frac{79+92+x}{3}>x \\
\left(\frac{79+92+x}{3}\right) \cdot B>x \cdot 3 \\
171+x>3 x \\
171>3 x-x \\
\frac{171>\frac{7 x}{2}}{85.5>x}
\end{array} \\
& \text { My confusion is that the range of } x \text { has } \\
& \text { to be between } 66 \text { and } 85.5 \text {. The question says } \\
& \text { that } x \text { has to be the smallest integer between those } \\
& \text { so it has to be 67, It cannot be } 66 \text { because } m y \\
& \text { equations shared that } \therefore t \text { has to be bigger than } \\
& 66 \text { so the next highest integer and } 67 \text { is the next } \\
& \text { highest integeli, } H: 5 \text { overall meanscore would be } 79.33 \text {. } \\
& \text { So in conclusran, my answer for the ques tron is } 67 \text {. } \\
& 67: 5 \text { the smallest integer score that Alancan } \\
& \text { get if he wants to have hiss mean higher than } \\
& \text { Edward Yang } \\
& \text { Mrs. Willis } \\
& 5^{\text {th }} \text { Grade } \\
& \text { Leadm:ne Elementary }
\end{aligned}
$$

(Editor's Note: Many of the correct solutions assumed the score on the third exam was smaller than the others and used a guess and check method. Edward's solution looked at each number as being the median and solved the corresponding inequality to find the exact conditions, then chose the smallest. Well done!)

Correct Solutions were received by: Edward Yang of Leadmine Elementary, Corey Bateman, Grayson Byrd, Maurice Goldstein, Marie Pastorino, Jamie Pemberton, Grant Phillips, Jasmine Trogdon, and Cameron Welch of North Asheboro Middle, Austin Allen, Jade Allmon, Ariel Berry, Emily Bullins, Meghan Cholette, Madeline Cofer, Tori Coggins, Taylor Cole, Brian Conrad, Kailee Davis, Monica De La Vega, Michael Dyer, Julia Farmer, Taylor Ferree, Conner Gage, Alex Gimenez, Nick Hannon, Hannah Jones, Sam Kemp, Anthony Lineberry, Heather Malin, Taylor Maness, Lucas McLeod, Brittany McNeill, Eli Nance, Megan Priest, Kalista Routh, Ashton Russell, Ashely Webster, Jamie Weiner, Emily White, and Kenley White of South Asheboro Middle.

## SOLUTION: Grades 9-12 Spring 2009 Issue

What is the radius of the largest circle with center on the positive $y$-axis that is tangent to the parabola $y=9 x^{2}$ at $(0,0)$ and intersects the parabola only at $(0,0)$ ?

## Solution (by the Editor):

Assume the circle has radius $r$. Since the circle has center on the positive $y$-axis, it's formula is $x^{2}+(y-r)^{2}=r^{2}$. To find the intersection points of the circle and parabola, substitute $y=9 x^{2}$ into this equation and solve for $x$

$$
\begin{aligned}
x^{2}+\left(9 x^{2}-r\right)^{2} & =r^{2} \\
x^{2}+81 x^{4}-18 r x^{2}+r^{2} & =r^{2} \\
x^{2}+81 x^{4}-18 r x^{2} & =0 \\
x^{2}\left(81 x^{2}+1-18 r\right)=0 &
\end{aligned}
$$

Setting the expression inside the parenthesis to 0 , we get $x= \pm \sqrt{\frac{18 r-1}{81}}$ as the points of intersection of the circle and parabola. If we want the origin to be the only point of intersection, we must have $18 r-1=0$ or $r=1 / 18$.

## No correct solutions were received.

Lim(erick) of a Curve as $\dagger$ goes to $\infty$<br>Eric Marland; Appalachian State University; Boone, North Carolina

There once was a curve in space
That wanted to stay in one place
But it was bounded below
By a function set to grow
So it had to keep up the pace!

## 2009 Logo Contest Winner Reported by Lisa Carnell, High Point, and Amy Travis, Greensboro



Winner: Live. Math. Love
Emma Hughes 6th grade, Daniels Middle School, Raleigh
Teacher: Ms. Winnie Namatovu

## Regional Finalists

Kaila Williams, 4th grade, Pines Elementary School, Plymouth
Teacher: Mrs. Gurganus and Ms. Joyce Baker
Katelyn Biggs, 12th grade, South Central High School, Winterville Teacher: Karlee Fee

Jessica Duncan, 10th grade, Independence High School, Charlotte Teacher: Carol Huss

Marquess Moore, 8th grade, Trask Middle School, Wilmington Teacher: Colleen Quinn

Amy Rooks, 4th grade, Lincoln Elementary School, Vale Teacher: Denise Smith

Giovanna Rodriguez, 2nd grade, Socrates Academy, Matthews Teacher: Mrs. Lisa Core

Nick Henderson, 2nd grade, Trinity Elementary School, Trinity Teacher: Mrs. Christin Frank

Lauren Goodwin, 5th grade, West End Elementary School, West End Teacher: Mrs. Martinez

Tilden Phillips, Anson Middle School, Wadesboro
Teacher: Patricia Bennett
Jason Rummage, 12th grade, South Stanly High School, Norwood Teacher: Liz Nichols

## 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 News

## A New Elementary Mathematics Add-on Licensure Program

At its July 2009 meeting, the NC State Board of Education approved a new Elementary Mathematics Add-On License (TCP 2). The program (18 hours of graduate level coursework) will focus on "the mathematical knowledge needed for successfully teaching mathematics at the elementary level." The courses are being developed under the auspices of the UNC General Administration and DPI, involving mathematics and education faculty from seven Universities. The materials are being piloted in 2009-2011 with two groups of teachers from Guilford and Cumberland County schools. The goal is to place the six graduate courses on-line and make the curriculum available to every elementary teacher in North Carolina after the pilot program.

To read more about the plan, see the State Board highlights website:
[http://www.ncpublicschools.org/stateboard/highlights/2009/07highlights](http://www.ncpublicschools.org/stateboard/highlights/2009/07highlights)

## Awards

## 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: $\qquad$
Present Position: $\qquad$
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: $\qquad$ Date: $\qquad$
Name (print/type): $\qquad$
Position: $\qquad$
Business or Institution: $\qquad$
Address: $\qquad$
Phone: Business $\qquad$ Home: $\qquad$
Email: $\qquad$
Send to: John Parker
316 West Soundside Road
Nags Head, NC 27959

## Donating to the 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．

## Futoshiki 不等式

## A New Number Puzzle from Japan

Translating to＂unequal＂from Japanese，Futoshiki is a number puzzle that is played on a square grid．
Commonly 5 by 5 ，but available in 4 by 4 up to 7 by 7 ，the goal is to place the digits in the cells so that each row and column contains each digit once，and all of the inequality symbols are satisfied．

Here is an example 4 by 4 ，along with a solution．


Here are two more for you to try．One is rated as＂Easy＂and the other as＂Hard．＂


Want some of these or other Japanese number puzzles to use with your classes or in your school newspaper？Go to http：／／www．sudoku－puzzles．net and submit a request for free puzzles．

# NCCTM Trust Fund Scholarship <br> 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: | Direct inquiries to: |
| :--- | :--- |
| NCCTM Trust Fund Chair | Robert Joyner, Chair |
| 1302 Oakview Dr. | phone: (252) 756-6803 |
| Greenville, NC 27858 | e-mail: rjoyner3@suddenlink.net |

(Please print all information.)

## PERSONAL INFORMATION:

Name: $\qquad$
Home address: $\qquad$
$\qquad$ NC $\qquad$
Home phone: $\qquad$ Home e-mail: $\qquad$
NCCTM membership number: $\qquad$

## EMPLOYMENT INFORMATION:

How many years of teaching experience? $\qquad$
Currently employed in what school system? $\qquad$
School name: $\qquad$
School address: $\qquad$
School phone: $\qquad$ School e-mail: $\qquad$
Current teaching assignment: $\qquad$
Principal's name: $\qquad$

## COURSE INFORMATION: (One course only)

Institution of higher education: $\qquad$
Graduate degree program in which you are currently enrolled: $\qquad$
Course name: $\qquad$ Course number: $\qquad$
Dates of enrollment: (circle one) Fall semester
Spring semester Summer session Year: $\qquad$
Name of course instructor: $\qquad$

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

## BRIEF STATEMENT OF FUTURE PROFESSIONAL GOALS:

## REQUIRED SIGNATURES:

Applicant signature: $\qquad$
Principal's signature: $\qquad$
Instructor signature (if currently enrolled): $\qquad$
Date: $\qquad$
Date: $\qquad$
Date: $\qquad$

## 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 1099MISC 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.

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|  |  |  |  |  |
| Secretary | Katie Stein | NA | NA | NA |
|  | Durham |  |  |  |
| Vice President Colleges | Betty Long | Hollylynne Stohl Lee Durham | Kerri Richardson Greensboro | Adam Harbaugh Charlotte |
|  | Boone |  |  |  |
| Vice President Elementary | Ana Floyd | Carol Midgett Southport | Bob Vorbroker Winston Salem | Helen Byrd Tryon |
|  | Thomasville |  |  |  |
| Vice President Middle Grades | Sandra Childrey | Connie Cheston Winterville | Donna Thomas West End | Zada Taylor <br> Black Mountain |
|  | Cary |  |  |  |
| Vice President Secondary | Kim Daily | Eleanor PuseyWilmington | Billie Bean Durham | Sheila Brookshire Arden |
|  | Black Mountain |  |  |  |
|  |  |  |  |  |
| Centroid |  | SPECIAL SERVICES <br> Management Services | NCTM Rep. <br> Debbie Crocker | Rankin Award |
|  | Financial Advisor |  |  |  |
| Deborah Crocker \& | Jan Wessell | Hoover \& Hoover |  | Jan Wessell |
| Holly Hirst | Wrightsville Beach | Cary | Boone | Wrightsville Beach |
| Boone |  |  |  |  |
| Convention Services <br> Marilyn Preddy <br> High Point | Historian <br> Kathryn Hill <br> Raleigh | Mini Grants <br> Sandra Childrey Cary | NCSSM Rep. <br> Cheryl Gann Cary | Computer Services |
|  |  |  |  | Bill Scott Charlotte |
|  |  |  |  |  |
| DPI <br> Everly Broadway Raleigh | Innovator Award John Parker Nags Head | Math Fair <br> Betty Long <br> Boone | Nominations Randy Harter Asheville | Trust Fund Robert Joyner Greenville |
|  |  |  |  |  |
|  |  |  |  |  |
| Development | Math Celebrations <br> Amy Travis \& Lisa Carnell High Point | Math Contests <br> John Goebel <br> Durham | Parliamentarian Julie Kolb Raleigh |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

MEMBERSHIP - NORTH CAROLINA COUNCIL OF TEACHERS OF MATHEMATICS
Name: $\qquad$ Home Telephone: $\qquad$ ) - $\qquad$
Address: $\qquad$ School Telephone: $\qquad$ ) - $\qquad$
City: $\qquad$ State: $\qquad$ Zip: $\qquad$ E-mail:

School System:

## POSITION

## LEVEL

- Teacher
- K-3
$\square$ Department Chair
Supervisor/Administrator
Full-time College Student
- Retired
- Other $\qquad$ .


## MEMBERSHIP STATUS

$\square$ New Former/Renewing Member \# $\qquad$

## MEMBERSHIP DUES

4-6
Junior High/Middle School

- Senior High

2-Year College/Technical
4-Year College/University
$\square 1$ year:

- 3 years:

F Full-time Student:
Contribution to Trust Fund:
Total Payment Enclosed:
Payment by $\square$ Check $\square$ Visa MasterCard
Card \#
Exp. Date
Signature
$\$ 20.00$ $\qquad$
$\$ 50.00$ $\qquad$
$\$ 10.00$ $\qquad$
$\qquad$
$\qquad$

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CARY, NC 27519
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