## The Centroid



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- The State Mathematics Contest Celebrates its $25^{\text {th }}$ Anniversary
- Charlotte's Web and the County Fair
- Thomas Fuller and his Calculation Ability
- 2003 Outstanding Elementary Teachers
- 2003 W.W. Rankin Memorial Award Winner
- 2003 Innovator Award Winner


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 page 32.

## Submission of Manuscripts

The Editorial Board invites 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. To be considered for inclusion in an issue, news and announcements must be received by November 1 for the spring issue and by June 1 for the fall issue. Manuscripts that have not been published before and are not under review elsewhere may be submitted at any time to the address below. Submit five (5) printed copies plus one electronic copy via e-mail 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 and should be word-processed, single-sided, and double-spaced with 1.5 -inch margins. Figures should be on separate sheets. Photographs should be large glossy prints or minimum 300 dpi tiff files. Proof of the photographer's permission is required. For photos of students, parent or guardian permission is required.
Manuscripts should follow the APA style guidelines from the fifth edition of the Publication Manual of the American Psychological Association (2001). References should be listed at the end of the article, and should also conform to APA style guidelines:
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 [On-line]. Available: 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 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

All are faculty at Appalachian State University.

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Pamela W. Schram

## Women and Minorities Column <br> Sarah J. Greenwald

Problem Editor
Gregory S. Rhoads

## 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.

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## From the Editor

# Supporting the NCCTM 

Holly Hirst<br>Appalachian State University<br>Boone, North Carolina

While I have been a member of NCCTM for years, until partnering with Brian Felkel to edit The Centroid I was like most of you: I read the journal; I presented at the regional and state conferences when time permitted. Attending my first board meeting in October was an eye-opening experience: so many activities and opportunities, all for a very small membership fee. How is this possible? Through the hard work of many dedicated people. Your help is needed. The Presidents' messages outline some of the ways you can participate to make NCCTM the best it can be. I would like to draw your attention to another way to help. The NCCTM Trust Fund was established to support North Carolina teachers who are enrolled in graduate programs to enhance mathematics instruction. Tax-deductible contributions are welcome; we have added this option to the membership form on page 32 .

We hope you enjoy the articles in this issue. The Women and Minorities column reminds us of the contributions to mathematics by persons of African descent. This issue also contains It's Elementary, in which a third grade teacher outlines an extended activity motivated by the book Charlotte's Web, from which her students gained experience with money and making change.

In honor of NCCTM's $35^{\text {th }}$ year in 2005, we have included an article recapping the history of the State Mathematics Contest, which celebrated 25 years of operation in 2003. The next Centroid will highlight other NCCTM sponsored accomplishments. As always, we encourage you to consider assisting with The Centroid by:

- submitting a manuscript - general articles 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.
- becoming a reviewer - please send email to me if you are interested in helping in this way.
- serving on the editorial board - we are interested in adding several $\mathrm{K}-12$ teachers to the board. If you are interested in serving on the board, send me e-mail.

Contact information. Feel free to contact us at any time with submissions, news items, questions, or concerns.

Holly Hirst [HirstHP@appstate.edu](mailto:HirstHP@appstate.edu)
Brian Felkel [FelkelBH@appstate.edu](mailto:FelkelBH@appstate.edu)
Department of Mathematical Sciences
Appalachian State University
Boone, NC 28608
828-262-3050

## Mini-Grants from NCCTM

The mini-grant program is designed to promote excellence in mathematics education. There are no preconceived criteria for projects except that students should benefit from the grant. Possible projects for consideration include math clubs, field days, contests, workshops for parents, math activities, math laboratories, and research topics. A total of $\$ 6,000$ will be awarded in each of the three NCCTM regions. Applications will be accepted only from persons who are NCCTM members as of 1 September 2004.

Completed applications must be received by 15 September 2004 to be considered. For more information and submission guidelines, contact Phyllis W. Johnson by email at [pwjohnson210@earthlink.net](mailto:pwjohnson210@earthlink.net) or by phone at 252-752-1796.

## Presidents' Messages

## Fall 2003 State President Jan Wessell

When I stood before the members at the Business Meeting and Awards Ceremony at the NCCTM State Conference this past October, I was so pleased to be your president. I don't know of another organization in North Carolina - or in the United States for that matter - that has the fortitude that NCCTM has. It gave me great pleasure to reside over this year's business and awards ceremony because I know that each person who does a job for NCCTM does it well. We need your help to continue.

To remain vital and vibrant we need good leadership. As I looked around at the October meeting, I realized that I, like many of my colleagues, have been a member of NCCTM for more than 25 years. It brought me to the realization that we need more people participating in NCCTM and taking over the jobs of the veterans. I want to encourage you to get involved. Serve on a committee. Be a judge at the regional or state mathematics fair. Have your students participate in the Math Logo Contest. Volunteer to serve as a regional or state officer. Work with the Mathematics Contest. We need all of you to keep the organization dynamic!

I thought, too, that we need to reward those who have spent many long hours serving the organization and/or serving mathematics education. One way to do that is to nominate a colleague for the W. W. Rankin Memorial Award. The Rankin Award is the highest award NCCTM bestows on a member. I received the Rankin Award in 2000 and was overwhelmed by its power, the power to keep me involved in the organization and the power to make me work harder for those who honored me. Instead of seeing the award as the end of my career, I saw it as a new beginning. There is a nomination form on page 28. I hope you will copy it many times and send the committee your nominations for this honor.

Another way we can honor our members is through the Innovator Award. This award is a relatively recent addition to the organization's honors. The award is for a
member who does something mathematically innovative, begins a new program, works with students in a new and profound way or provides leadership to solve an old problem. Think of the many colleagues who deserve this award! You can find the Innovator Award nomination form on page 31 .

Another way to honor your colleagues is through the NCCTM Trust Fund. By making a donation in honor or in memory of a colleague, you are providing funds for mathematics teachers to continue their education. In the past three years, NCCTM has awarded close to $\$ 20,000$ in scholarships to those who are returning to school for advanced degrees. Whether giving or receiving, this is a wonderful honor.

I believe that NCCTM is growing leadership, honoring those who have served, and promoting higher education. There are ways that this organization can serve you and you can serve the organization. It is never too late to start.

Contact your regional president and/or me to find out ways you can serve!

## Central Region President Vickie Moss

This is a busy time for mathematics educators. Most of you are involved in reviewing new textbook options. While reviewing materials you should look at the changes in the 2003 Mathematics Curriculum. The new curriculum and transition documents are available at <www. learnnc.org/dpi/instserv.nsf/ Category7>.

The Spring Conference for the Central Region is March 27 at Greensboro College. The focus of the conference is Forming Partnerships in Mathematics Teaching. Representatives from NCDPI will talk about the newly revised Mathematics Standard Course of Study and share summer staff development opportunities. The remainder of the morning will be spent working with classroom teachers on managing and organizing the mathematics classroom.

Math scores on state EOG and EOC tests continue to be strong. In addition, results recently released from NAEP show
tremendous growth in mathematics for fourth and eighth graders in North Carolina. The new Standard Course of Study addresses many of the changes in the NAEP framework. It is important that we stay informed of these changes and continue to excel in mathematics. Participating in NCCTM activities and professional development opportunities is necessary to continue our success.

Remember to encourage your students to participate in the Math Fair, to be held concurrently with the Spring Conference. Math Fair registration forms for each region follow the presidents' columns. I look forward to seeing you at Greensboro College on March 27.

## Western Region President Betty Long

Spring 2004 promises to be an exciting and busy time for mathematics teachers in the western region. First, there will be a math conference for in-service teachers on Saturday, March 6, at Owen Hall on the campus of the University of North Carolina in Asheville. The theme of the conference will be Climbing to the Top With the New Mathematics Curriculum, and Mathematics Specialists from the North Carolina Department of Public Instruction will provide information by grade level bands (K-2, 3-5, 68, 9-12) on the revised Standard Course of Study for Mathematics. The conference will begin with check-in at 8:30 a.m. and end at 12:00 noon. There is a ten-dollar registration fee to help with the cost of the conference. If you want to learn more about the new mathematics curriculum, this is surely the place to be on March 6.

There will be another math conference on Saturday, March 20. The theme will be Becoming a Teacher in Grades K-8: Opening New Doors, and it will be held in Karpen Hall on the campus of the University of North Carolina in Asheville from 8:30 a.m. to 1:00 p.m. Drs. Deborah Crocker and Kathleen Lynch are the conference co-chairs. The sessions will be in the form of seminars and workshops for pre-service teachers and first-year teachers and will be conducted by experienced K-8 classroom teachers who will share their strategies for success as well as some math activities that have worked well for
them. There is no registration fee for NCCTM members, but there is a five-dollar registration fee for non-members. A conference similar to this one was held last year, and those who attended felt that they received helpful information and activities to use in their classrooms.

More information and a registration form for both of these conferences were mailed to all NCCTM members in the western region in December. You must pre-register for each of these conferences since space is limited. The registration deadline for the March 6 conference is February 25, and the registration deadline for the March 20 conference is March 10. You will pick up your name badge and registration receipt at the check-in desk at 8:30 a.m. on the day of the conference.

In addition to the two mathematics conferences, the Math Fair will be held on Saturday, March 27, in the Plemmons Student Union on the campus of Appalachian State University in Boone. Projects may be entered in one of the following categories: K-2, 3-5, 6-8, 9-12. Math Fair registration forms for each region follow the presidents' columns. Each school can enter a maximum of nine projects per category. The winners will be invited to participate in the State Math Fair on April 30 at the North Carolina School of Science and Mathematics in Durham. The Western Region Math Fair brochure was mailed out in October to all NCCTM members in the western region as well as to the curriculum coordinator for every school system in the region.

If you did not receive information about these two math conferences and the math fair or if you have questions, please contact me by e-mail at [longbb@appstate.edu](mailto:longbb@appstate.edu) or by phone at 828-262-2372.

As you can see, we have something for every math teacher and student this spring. I would like to encourage you to participate in one or more of these events. I think you will find the conferences to be worthwhile professional development opportunities and the math fair to be a very rewarding experience for you and your students. See you in March!

## Eastern Region President Kathryn Hill

Our thoughts and prayers continue to go out to our teachers in the eastern region who were affected by hurricane Isabel. Let us know if there is anything we can still help you with. Your courage in educating students during such disastrous times is greatly admired.

Congratulations on making our State Math Conference in Greensboro such a success. I have heard great reviews from those who attended the conference; sessions and workshops included many wonderful and creative ideas to take back to the classroom. Thank you for all you do to make math education an exciting and positive experience through our conferences.

The new curriculum will be brought on board during the 2005-2006 school year. To help us with this implementation, we have
invited mathematics specialists from the North Carolina Department of Public Instruction to make presentations at our spring conference. The spring conference will be held at Meredith College in Raleigh on March 20. Co-Chairs Jane Gleason and Lucy Kay are planning sessions according to grade bands: K-2, 3-5, 6-8, 9-12, and pre-service mathematics educators. Presenters will also include classroom teachers and mathematics educators who will help us "Take Flight With the New Curriculum."

Please continue to let us know how to best meet your needs. You are welcome to email me at [kghill@wcpss.net](mailto:kghill@wcpss.net) with your suggestions, questions, and concerns, and we would welcome any help you could give with our spring conference.

## Call for Proposals: NCTM 2005

The National Council of Teachers of Mathematics 2005 Annual Meeting and Exposition will be in Anaheim, California, Wednesday, April 6 through Saturday, April 9, at the Anaheim Convention Center, the Anaheim Marriott Hotel, and the Hilton Anaheim Hotel. The conference theme is Embracing Mathematical Diversity. The Program Committee seeks proposals that represent diverse perspectives, approaches, information, and ideas. Proposals are encouraged that address topics, ideas, issues, and strategies that can contribute to participants' professional learning, especially:

- knowing and understanding mathematics more deeply,
- improving instructional effectiveness to produce results with students, and
- expanding awareness of crucial or timely issues.

The meeting's theme calls for presentations that address diverse ways that students learn or demonstrate mathematics, teaching strategies that help a diverse group of students learn, and diverse models of mathematics professional development, and issues of equity and bias. Approximately 20 percent of the program will be selected to address NCTM's professional development Focus of the Year, Developing Algebraic Thinking. We especially encourage K-12 teachers to submit proposals to share their first-hand classroom experiences and observations.

Information about the types of presentations, criteria for selection of proposals, and the speaker proposal form are available at <www.nctm.org/meetings/>. The deadline for proposals is May 1, 2004. We hope to see you in Anaheim in 2005 for a fantastic professional development and networking experience that you won't find anywhere else!

Cathy Seeley<br>NCTM President-Elect

Bettye Forte and Carol A. Edwards Program Co-Chairs

## NCCTM Regional Math Fairs

Each spring the NCCTM Regions sponsor Student Mathematics Fairs. 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 6-8 (Individual Projects)

Grades 3-5 (Individual or Class Projects)
Class projects must involve a majority of the students in the class. Individual projects may involve one or two students only. Projects must be pre-registered to be accepted for the competition, and there is a limit of 9 projects per category per school. During the judging, each project must be represented by 1 or 2 students whose names appear on the project. After completion of the judging, there will be an awards ceremony.

Some examples of ideas that can be explored include:

- Original games, puzzles, geometric explorations
- Experiments in estimation, numeration, measurement, and problem-solving
- Applications of math in navigation, astronomy, economics, photography, music, etc.
- Concrete or visual models
- Analysis, Trigonometry, Topology, Statistics, Probability

There are many more original ideas that may be used. Be as creative as you wish. The Math Fair Committee and/or Judges reserve the right to re-categorize entries. They also reserve the right to limit or eliminate the awards presented in a given category, based on quality or quantity of projects submitted.

Judging will be based upon the following criteria:
A. Written Documentation, which must include:

1. Origin of idea
2. An outline of the development of the project
3. Discussion of mathematical concepts investigated
4. References used including names of resource people
B. Oral presentation, which must include:
5. Clear and well organized discussion of mathematical concept presented
6. Response to evaluator's questions
C. Development and demonstration of mathematical concepts in an effective manner
D. Investigations which extend beyond the student's everyday class investigations
E. Student creativity
F. Organization of ideas, thoroughness, and clarity
G. Appearance

Rating Scale: $0=$ Below Average, $1=$ Average, $2=$ Above Average, $3=$ Outstanding

## Physical Specifications for Exhibits:

Size: One (1) meter in width (side to side); One (1) meter in depth (front to back); One (1) meter in height. All projects must be displayed on a project board. All measurements will be made at the widest points.
Labels: Each project must be labeled with a $3 \times 5$ index card with the following information:
A. Name of person(s) or class
D. Teacher's name
B. Course and/or grade level
E. School and school system
C. Category of project
F. City and County

Projects that fail to meet these requirements will not be judged. Students must be present when judging begins and must be available to discuss their project. No adults other than judges may be present during the judging. Any special equipment, such as computer, printer, extension cord, power strip, etc., must be supplied by the presenter.

The regions have slightly different logistical arrangements; please consult the table below, and fill out the appropriate registration form to enter each project.

|  | Eastern | Central | Western |
| :--- | :---: | :---: | :---: |
| Submission <br> Deadline: | March 9 | March 10 | March 10 |
| Competition <br> Date: | Friday, March 19 | Saturday, March 27 | Saturday, March 27 <br> (snow date: April 3) |
| Location: | Bate Building, <br> East Carolina University | Greensboro College | Plemmons Student Union, <br> Appalachian State Univ. |
| Registration <br> Time: | $8: 00-8: 45$ a.m. | $9: 30-10: 00$ a.m. | $9: 30-10: 00$ a.m. |
| Judging <br> Time: | 9:00 a.m. | 10:15 a.m. | 10:15 a.m. |
| Contact: | Bobbie Parker <br> [parkerb.bco@bertieschools.com](mailto:parkerb.bco@bertieschools.com) | Stacy Elliott <br> [stacy.elliott@dpsnc.net](mailto:stacy.elliott@dpsnc.net) | Betty B. Long <br> [longbb@appstate.edu](mailto:longbb@appstate.edu) |

## WESTERN REGION MATH FAIR REGISTRATION FORM

All entries must be postmarked by March 10, 2004. Please duplicate this form for each project as needed. Return this form to:

Betty B. Long
Appalachian State University
Dept. of Mathematical Sciences Boone, NC 28608

E-Mail: longbb@appstate.edu
Fax: 828-265-8617
Phone: 828-262-2372

Name of Student(s)
Name of Teacher
School $\qquad$ School Phone $\qquad$
School Address
City and Zip Code
Teacher's E-Mail address
Please check the category of the project: $\qquad$ K-2 3-5 $\qquad$ 6-8 $\qquad$
Will your project require electricity? $\qquad$ Yes $\qquad$ No

There will be a $\$ 6.00$ registration fee for each student entering a project. Lunch will be provided for participating students.
___ \# of people preferring a vegetarian lunch
\# of students attending at $\$ 6.00$ each. Total enclosed: $\$$
(Checks made payable to NCCTM Western Region Math Fair must be enclosed with this form.)

## CENTRAL REGION MATH FAIR REGISTRATION FORM

All entries must be postmarked by March 10, 2004. Please duplicate this form for each project as needed. Return this form to:

$$
\begin{array}{ll}
\text { Stacy Elliott } & \text { E-Mail: stacy.elliott@dpsnc.net } \\
\text { 808 Burch Avenue } & \text { Fax: 919-560-2217 } \\
\text { Durham, NC 227701 } & \text { Phone: 919-560-3926 ext. } 23484
\end{array}
$$

Name of Student(s) $\qquad$
Name of Teacher
School $\qquad$ School Phone $\qquad$
School Address
City and Zip Code
Teacher's E-Mail address
Please check the category of the project: $\qquad$ 3-5

6-8
Will your project require electricity? Yes $\qquad$ No

There will be a $\$ 6.00$ registration fee for each student entering a project. Lunch will be provided for participating students.
___ \# of people preferring a vegetarian lunch
\# of students attending at $\$ 6.00$ each. Total enclosed: $\$$
(Checks made payable to NCCTM Central Region Math Fair must be enclosed with this form.)

## EASTERN REGION MATH FAIR REGISTRATION FORM

All entries must be postmarked by March 9, 2004. Please duplicate this form for each project as needed. Return this form to:
Bobbie Parker E-Mail: parkerb.bco@bertieschools.com

Bertie County Schools
P.O. Box 10

Windsor, NC 27983

E-Mail: parkerb.bco@bertieschools.com
Fax: 252-794-9727
Phone: 252-794-6002

Name of Student(s)
Name of Teacher
School $\qquad$ School Phone $\qquad$
School Address
City and Zip Code $\qquad$
Teacher's E-Mail address
Please check the category of the project: $\qquad$ K-2 $\qquad$ 3-5 6-8
Will your project require electricity? $\qquad$ Yes $\qquad$ No

# The State Mathematics Contest Celebrates its Twenty-Fifth Anniversary 

Ralph H. Willis ${ }^{1}$<br>Western Carolina University<br>Cullowhee, NC

The involvement of North Carolina colleges and universities in giving high school students an opportunity to compete with others taking similar courses across the state has a history older than the history of the NCCTM organization. As early as 1948, contests were held for high school students at the University of North Carolina at Chapel Hill. The 1970s saw the expansion and coordination of contests in the state. Many people were instrumental in instigating and developing the Regional and State Contests as they are held today. This article recaps the evolution of the contests, acknowledging the hard work of the individuals responsible. The photos below are printed with the permission of Bruce Clark Photography and Video, Raleigh, North Carolina.


The Contest Network as it is Today
In 1970, Western Carolina University (Ralph Willis) and Campbell University (Jerry Taylor) initiated regional mathematics contests on their campuses. The next year, Appalachian State University (Bill Paul) instigated a regional contest. In 1974, Wingate College (Cliff Adams) began its regional contest for students. The next year, Pfeiffer College (Harold Williford) began its regional contest.

In 1977, the Mathematics Division of the State Department of Public Instruction (Bob Jones) and the President of NCCTM (Al

Myrick) formed an ad hoc Committee on Mathematics Contests. This Committee was tasked with initiating additional regional contests to fill out the state with Comprehensive Test sites and designing a second round of testing to be called the State Mathematics Contest (the State Finals Competition in Comprehensive).

Through the work of the committee, Atlantic Christian College (now Barton College) (Jerry Cooper), Wayne Community College (John Dunn), and East Carolina University (John Daniels) initiated regional contests in 1977. In 1978, Elon College (Gerry Francis) began a regional contest. The first State Mathematics Contest was held at the Research Triangle Park in May of 1979.

In 1979, the University of North Carolina at Charlotte (Harold Reiter) and the University of North Carolina at Wilmington (Richard Burkhart) initiated regional contests. The Second Annual State Mathematics Contest was held at the Research Triangle Park in May of 1980. A team of sixteen of the top finishers from the Second Annual State Contest entered the Atlantic Region Mathematics League (ARML) Competition held at Rutgers University in June of 1980. This group of young people scored second in its division. Following this initial experience, two teams of fifteen students each have been selected and entered in the ARML Competition from each subsequent state contest.

During 1980, the Western Region of the NCCTM (Jan Orr, President) appointed a committee chaired by Ralph Willis (WCU), with members Bob Jones (SDPI), Virginia Hawn (Lenoir Rhyne College), and representatives from Appalachian, Western Carolina, the University of North Carolina at Charlotte, and Wingate College. This committee worked to initiate other contests in

[^0]Algebra I, Geometry, and Algebra II where needed to fill out the region and to initiate Run-off Testing (second round competition) at Lenoir Rhyne College in the subjects according to the following schedule: 1982-Algebra I, 1983--Geometry, and 1984-Algebra II.


In 1982, the State Contest Committee worked to fill out the state with additional Algebra I sites and established Run-off Testing sites in Algebra I for the Eastern and the Central Regions at Beaufort Community College (Hugh Barnett) and at Fayetteville State University (Leo Edwards), respectively. Run-off sites for these regions were established in 1986 for Geometry and Algebra II as well. In 1994, testing at the second level of competition, now called the State Finals Competition in Algebra I, Algebra II, and Geometry, was consolidated at the three regional test sites as follows: Western Region at the University of North Carolina at Asheville (Lothar Dohse); Central Region at the University of North Carolina at Greensboro (Madeline Bradley); and Eastern Region at Wesleyan College (Gail Stafford).

In 1995, there were 24 sites holding contests for approximately 10,000 students. Of these, thirteen held tests in Algebra I, eleven held tests in Geometry, eleven held tests in Algebra II, and twelve held tests in the Comprehensive area. By contrast, in 2003, due to consolidation of some test sites, there were nineteen sites holding contests for approximately 8,000 students. Of these, twelve held tests in Algebra I, eleven held tests in Algebra II, eleven held tests in Geometry
and eleven held tests in Comprehensive. Each region conducts a second level of testing in the first three areas--all the same so that data can be merged to find state winners. The State Mathematics Contest for top students in the Comprehensive area is now held at the School of Science and Mathematics in Durham. John Goebel has served as the coordinator of the State Finals in Comprehensive every year that NCSSM has hosted this event.

Today, all of the mathematics contests in the state are organized into a network under the purview of NCCTM's State Mathematics Contest Committee, derived from the original ad hoc committee first organized in 1977. This committee consists of the coordinators of each of the local site contests, the coordinator of each of the three Regional State Finals sites, the coordinator of the State Finals in the Comprehensive level, the test construction coordinator, a representative of the Mathematics Section of the Department of Public Instruction, and a public high school teacher from each of three regions of the state who are appointed by the NCCTM President.

In 2002-03, the State Mathematics Contest Committee celebrated its twenty-fifth year anniversary. The current Committee Chair, John Goebel, contacted several former student participants and faculty sponsors and asked that they write a brief summary of how their participation in the contest had impacted their lives and/or careers. These narratives were summarized in booklet form and made available to the State Mathematics Contest participants. Each of the State Mathematics Contest Committee's Chairpersons was recognized at the contest prior to the announcement of the 2003 contest winners.


Pictured, left to right: Harold Williford, Jerry Taylor, Theresa Early, Bob Jones, Richard Haworth, and Ralph Willis

For display at the celebration, Ralph Willis constructed a fourteen panel Historical Exhibit tracing various aspects of the contest during the last twenty-five years. Panels relating to committee formation and governance, history, ARML competition, tests, contest day programs, listings of each year's winners, photographs of each year's winners,
and activity photographs were among the many aspects depicted on the panels.

For additional information relating to the State Mathematics Contest Committee, the various test sites, its history, each year's winners, ARML competitions, and sample test questions, go to the NCCTM web page or the State Mathematics Contest web page. Both sites can be accessed from <www.ncctm.org>.

## Western Region Spring Conferences

President Betty Long [longbb@appstate.edu](mailto:longbb@appstate.edu)

$$
\begin{array}{ll}
\begin{array}{l}
\text { I. Title: } \\
\text { Where: }
\end{array} & \text { Climbing to the Top with the New Mathematics Curriculum } \\
\text { When: } & \text { University North Carolina-Asheville } \\
\text { Registration fee: } & \text { March 6, 2004 (snow date: March 13), 8:30a. m. -12:00 noon } \\
\text { Description: } & \begin{array}{l}
\text { The Mathefundable) } \\
\text { provide information becialists with NC Department of Public Instruction will } \\
\\
\end{array} \\
& \text { revised Stands (K-2, 3-5, 6-8, 9-12) for the newly }
\end{array}
$$

II. Title: Becoming a Teacher in Grades K-8: Opening New Doors

Where: University North Carolina-Asheville
When: $\quad$ March 20, 2004, 8:30 a. m.-1:00 p.m.
Registration fee: Free for NCCTM members
\$5 (membership fee) for Non-members
Description: Sessions will be in the form of seminars and workshops for pre-service teachers and first-years teachers in Grades K-8. Experienced classroom teachers will share their strategies for success and some mathematics activities that have worked well for them.

# Upcoming NCTM and NCCTM Meetings 

NCTM 82 ${ }^{\text {nd }}$ Annual Meeting<br>21-24 April 2004<br>Philadelphia, PA<br>14-16 October 2004<br>Baltimore, MD<br>NCTM Regional Conferences<br>4-6 November 2004<br>New Orleans, LA<br>11-13 November 2004 Minneapolis, MN<br>NCCTM State Conference<br>7-8 October 2004<br>Greensboro, NC<br>Speaker Nomination Deadline: 1 April 2004<br>Download Forms under Announcements at <www.learnnc.org/dpi/instserv.nsf/Category7>.

## 2004 NCCTM Math Logo Contest

The Celebrate Mathematics Committee will once again sponsor a Math Logo Contest. The winning logo will be the mathematics logo for NCCTM for the 2004-2005 school year. This logo will be used on a poster to promote interest in mathematics and as the basic design for NCCTM's 2004 Tshirt.

Please be aware that a professional graphic artist will prepare the final art of the winning entry for printing. Though the illustration is an important part of the logo, entries are judged on idea or concept conveyed. Use of copyrighted work (clip art, cartoon characters, etc.) will automatically disqualify the entry. The words of the slogan should not be on top of or touch the design.

Please duplicate the following label and include on the back of each entry. Entries submitted with incomplete information may be disqualified.

Student's Name: $\qquad$ Grade: $\qquad$
Home Address: $\qquad$
School Name:
LEA:
School Address:
Teacher's Name:
*NCCTM Region: Eastern Central Western
(circle one) *See NCCTM Regional Map Below

Please submit the entries on $81 / 2 \times 11$ paper in black ink or black marker only.
Entries must be postmarked by 1 March 2004
Mail to: Rebecca Caison, MATH LOGO CONTEST,
101 E. Laramie Drive, Mebane, NC 27302


## It's Elementary!

# Charlotte's Web and the County Fair <br> Learning about Making Change and the Value of Money 

Lisa J. Embree ${ }^{1}$<br>Bluff City Elementary School<br>Bluff City, TN

Students love the story Charlotte's Web, and it lends itself to many lessons integrating literature and other subjects. While I was teaching a unit to my third graders on this E.B. White classic, we were also studying money in math class. So, once we read about Wilbur the pig being taken to a county fair we set up a real fair in our classroom to integrate mathematics and literature. The mathematical goals of this activity included learning about U.S. currency, making change, and practicing the basic arithmetic operations.

## Planning and Setting up the Fair

The students got into groups of two or three and decided what kinds of things might have been available at a county fair during this time period. We discussed the prices of things in the past. Once the students had made a list of things that might be at the fair, they chose which booths they would be interested in setting up. In all, eight booths were created.

Two girls decided to make an entrance gate to the county fair. They charged an admission of 50 cents for persons under age 10 and one dollar for persons over age 10. Two other girls made a petting zoo out of Beanie Babies and other stuffed animals. The girls included various animal research books for visitors to read about other animals not included at the zoo. The cost to visit the petting zoo was 70 cents. Another popular booth sold balloons. Two students brought in the balloons with strings to sell for 25 cents each. They started out charging 35 cents, but decided that was too expensive and they reduced their cost by 10 cents.

At another booth a Ferris wheel and a merry-go-round were constructed out of building materials and tinker toys. These pretend rides were 20 and 35 cents per ride, respectively. Still another booth featured a roller coaster constructed out of bulletin board paper. Metal matchbox cars were rolled down the paper ramp for 25 cents per ride. Matchbox cars were again used for the bumper cars at another booth. Those rides were 25 cents also.

One student brought an indoor horseshoe game, and three tosses were 30 cents or six tosses were 50 cents. For one unique booth, three boys designed a strongman contest using textbooks. For 25 cents a person tried to hold up to seven books. The boys recorded the number of books and the total minutes that the books were held for each attempt. They then determined the strongest man or woman that visited. A group of three different boys designed a ring toss game using girls' bracelets and cones they made out of paper. For 50 cents a person could have three tosses. Also at this booth, the boys made up a magic nut game where for 25 cents a person guessed which square of paper contained a purple dot. The boys brought old toys and pencils from home to give out as prizes for winners of the ring toss or magic nut game.

Finally, two girls ran the concession stand. They provided three choices of soda and charged 30 cents per glass; refills were 10 cents. They popped microwave popcorn, and a Ziploc bag of popcorn cost 15 cents. Also sold were pizza, hamburgers, ice cream, cotton candy, and caramel apples for various amounts, all under 30 cents. For these last

[^1]items, the girls gave out candy representing the various items being sold.

The entire fair was the outcome of my students' creativity. The students decided everything including the cost, decorations, and materials. I was a mere facilitator in the process. They designed, decorated, marketed, and advertised their booth and its product or game completely on their own. They arranged their desks in pairs or triples and scattered the booths all over the classroom. Students decorated each booth, came up with their booth's name, made a sign, produced tickets of all sorts, made cash register drawers, and even had "open" signs, "closed" signs, and signs that said "gone to lunch" and "be back in ten minutes."

## Running the Fair

I allowed each student to spend $\$ 5.00$ at the fair. I first had them each make play money in denominations of their choosing totaling $\$ 5.00$. The purpose of this activity was to make certain each student understood U.S. currency; I didn't want any 30 cent pieces! Before we had the fair, students showed how they made their combinations of five dollars. We then discussed equivalent sets and determined how many different ways $\$ 5.00$ had been represented.

Once the fair began the children were ecstatic at the opportunity to shop and to run their booths. While they were shopping, each student had a clipboard and a pencil. They were instructed to write down everything they bought. After they had shopped, they determined how much money they had spent and how much, if any, change they had left. As the students running the booths were given money, they were instructed to write the appropriate money problem on paper before giving any change back to their customers. This provided an excellent opportunity for students to practice addition regrouping,
subtraction with zeros, and multiplication. They showed the ability to recognize coins, count sets of money, and give correct change to customers.

## Extending the Fair

We kept the fair set up for several days. After all the students in my class visited the fair, 60 fifth grade students came as well as 21 kindergarten children. All of the students had a wonderful experience. In addition to student visitors, the principal, assistant principal, office staff, Title 1 teachers and instructional aides, support staff, all related arts teachers, and classroom teachers from all the grades came to the fair. The adults were very complimentary of our fair and the students' ability to count money and produce correct change.

Most importantly, one afternoon we invited parents and other family members to the fair. I had 21 of my students' family members participate. This number included three parents who had not attended any event at school all year! All the family members who attended were actively involved in the students' use of real world math and were astonished at what the students had put together.

## Conclusion

Overall, this was an excellent opportunity to integrate language arts and authentic mathematics in my classroom. Our county fair was definitely worth all of the work that went into it. There is no doubt that, in the area of money and basic operations, my students' competence and confidence have been greatly expanded.

## References

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## Professional Development Opportunities

Check out <www.learnnc.org/dpi/instserv.nsf/Category7> to learn about opportunities for North Carolina teachers of mathematics, including grants, workshops, and teleconferences.

Check out <www.meredith.edu/professional/education.htm\#cgi> for information on some professional development opportunities for K-3 teachers.

# Women and Minorities in Mathematics 

# Incorporating Their Mathematical Achievements Into School Classrooms Thomas Fuller and his Calculation Ability 

Sarah J. Greenwald ${ }^{1}$<br>Appalachian State University Boone, NC<br>Amy Ksir ${ }^{2}$<br>United States Naval Academy Annapolis, MD<br>Lawrence H. Shirley ${ }^{3}$<br>Towson University<br>Towson, MD

In 1792, Thomas Jefferson, who would later become the third president of the United States, said:

Comparing them by their faculties of memory, reason, and imagination, it appears to me that in memory [the Negro] are equal to the Whites; in reason much inferior, as I think one could scarcely be found capable of tracing and comprehending the investigations of Euclid; and that in imagination they are dull, tasteless, and anomalous. (Williams, 1999d)
There are many counterexamples to Jefferson's claims. The existence of African American mathematicians before and during the time of Thomas Jefferson, such as Benjamin Banneker and Thomas Fuller, contradict Jefferson's assertions. In fact Banneker, living in the U.S. at the time, responded to Jefferson's comments with a twelve-page letter (Williams, 1999b). Not only are people of African descent capable of studying and understanding known mathematics, but they have also shown imagination, creativity, and mathematical ability in their investigations of original mathematics (Williams, 1999c).

Much has been written about Banneker, including ideas for incorporating his mathematics into classrooms (e.g., Johnson, 1999; Lumpkin, 1997a; Lumpkin, 1997b;

Lumpkin \& Strong, 1995; Smith, 1996). Less has been written about Fuller, another African American mathematician who lived during the same time period. Thomas Fuller was a slave who possessed remarkable calculation abilities. This article discusses Fuller along with his mathematical ability, the ethnomathematical context, and related classroom activities.

## Thomas Fuller

Thomas Fuller was born in Africa in 1710. At the age of 14 , he was sold into slavery and taken to Virginia. While he never learned how to read or write, he had an amazing ability to perform mental calculations. In 1788, abolitionists interviewed Fuller in order to demonstrate that African American men were not mentally inferior to White men. They asked him to perform a number of calculations. One of the questions was to compute the number of seconds a man who is 70 years, 17 days, and 12 hours old has lived. Astoundingly, he answered 2,210,500,800 (the correct answer) in only a minute and a half. According to a newspaper account:

One of the gentlemen, who employed himself with his pen in making these calculations, told him [Fuller] he was wrong, and that the sum was not so great as he had said-upon which the old man hastily replied, 'top, massa, you forget de leap year.' On adding the

[^2]seconds of the leap years to the others, the amount of the whole in both their sums agreed exactly.
In addition, when one of the men remarked that it was a shame that Fuller had never had a formal education, Fuller replied, "No, massa, it is best I got no learning; for many learned men be great fools." One should remember that Fuller's style of speech was typical of accounts of slaves (usually written by Whites) during this time. In addition, it would have been unusual for an African American slave to correct or contradict a White man, and the fact that Fuller did so is worth noting.

Today no one knows exactly how Thomas Fuller performed his calculations. However, the algorithms he used were probably based on traditional African counting systems. The people of the Yoruba area of southwest Nigeria have a complex counting system with very high numbers that probably dates back to Fuller's time. Europeans arriving in the area were amazed at the complexity of Yoruba numeration. It is thought to have developed from counting the cowrie shells that were used for currency. Economic inflation may have raised the magnitude of the numbers to be counted. Yoruba numeration has a wellorganized structure, base twenty with an intermediate base ten, that allows for easy calculation and has provisions for large numbers as multiples and powers of twenty. Yoruba also uses subtraction that is similar to the "IX" for nine in Roman numerals. For example, the numbers from fifteen to nineteen are expressed as subtractions from twenty, the base number. This may also help with calculation, since calculating with "twenty minus three" might be easier than dealing with seventeen.

We have additional evidence of superior calculation abilities on the coast of Benin from John Bardot's 1732 account of the abilities of the inhabitants of Fida (Fauvel \& Gerdes, 1990):

The Fidasians are so expert in keeping their accompts [accounts], that they easily reckon as exact, and as quick by memory, as we can do with pen and ink, though the sum amount to never so many thousands: which very much facilitates the trade the Europeans have with them.
In 1788, Thomas Clarkson discussed the calculation ability of an African slave broker (Fauvel \& Gerdes, 1990):

He reduces them immediately by the head to bars, coppers, ounces, according to the medium of exchange that prevails in the part of the country in which he resides, and immediately strikes the balance. The European, on the other hand, takes his pen, and with great deliberation, and with all the advantages of arithmetick [sic] and letters, begins to estimate also. He is so unfortunate often, as to make a mistake; but he no sooner errs, than he is detected by this man... Incidences of this kind are very frequent.
The Bassari people of southeastern Senegal also have a mathematical tradition that dates back to Fuller's time. Recently, Ron Eglash talked to a Bassari elder about calculation ability (Eglash, 1999):

> The Bassari elder who demonstrated these tallies to me... told me that he did not know much about traditional forms of calculation, but he did know that in pre-colonial times it was performed by specialists who were trained in memorization of sums.

Knowing which part of Africa Fuller came from might shed light on the kinds of algorithms he used. While we hope that math historians will someday track the African heritage of Fuller, Alex Haley was an exception in his success at tracking individual slaves back to an area of origin, and so this would probably be very difficult. However, some guesses can be made. Eglash (1999) discusses some theories:

> Curtin (1971) shows that the slave trade from what is now northern Senegal diminished after 1700 , and that the Nigerian area did not begin major activity until after 1730 . This still leaves the possibility that Fuller came from the area of present-day Benin and Ghana, which would be too far south to have directly shared influences with the Bassari, but Holloway (1990, pg 10) notes that Virginians showed some preference for Africans from the Senegambian region.

Even if we knew Fuller's birthplace, the next problem would be to document more fully the mathematical thinking that was being done at the time. This might be even more difficult given the paucity of historical records, especially about mathematical thinking.

## Classroom Activities

Lumpkin \& Strong (1995) present a number of classroom worksheets about Fuller. We offer additional activities designed to introduce ideas related to Fuller and his calculation
ability to students. Classroom Activity Sheets 1 and 2 can be found at the end of this column.

## Introductory Activity

Introduce Fuller to the class, and calculate the number of seconds lived by a man who is 70 years, 17 days, and 12 hours old. Tell the class that he answered $2,210,500,800$ in only a minute and a half. Break the class up into two groups. Allow one group to use only calculators in order to identify with Africans with superior mental calculation ability. Allow the other group to use only pen and paper. Present problems to the class and time the groups. Bring the class together, and relate the activity to the quote from Thomas Clarkson about the comparison of the mental calculation ability of an African slave broker with the pen and paper work of a (White) European.

## Activity Sheet 1: Yoruba Numeration and Calculation Algorithms

Students will study the patterns of Yoruba counting words and practice expressing numbers in the Yoruba language. They will also see how the distributive law used with subtraction can assist with calculation.

## Activity Sheet 2: Calculation Time

Students will need a way to time themselves. Students will complete several computations similar to Fuller's calculations. They will compute mentally, on paper, and with a calculator, and they will record how long it takes. They will then pair up with another student to compare answers. Students will do Web research on early computing machines, and they will examine and write about ideas relating to computation speed.

## NCTM Standards

Classroom activities relating to Thomas Fuller will address several parts of the NCTM Principles and Standards for School Mathematics. The NCTM has standards for computational fluency, including mental computations and working with very large numbers, and the suggested activities should stretch students' abilities in both areas. These activities are also relevant to the NCTM standards on problem solving, asking students to develop their own problem solving strategies for these mental calculations, and on communicating mathematical ideas, by
comparing their answers with another student and evaluating each others' solutions. One might also consider a discussion of Thomas Fuller's life and how his mathematical ability was used by abolitionists, as addressing the standard on connections between mathematics and other contexts.

## References

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## Activity Sheet 1: Yoruba Numeration and Calculation Algorithms

A. Here is a list of some counting words in the Yoruba language of Nigeria (spelling varies). Study these words and look for patterns. The "teens" are especially interesting. Can you find a pattern in the numbers 11 through 14 ? How are the numbers 15 through 19 represented? Twenty is a special number in the Yoruba language. Compare the numbers that are multiples of twenty $(20,40,60)$ with the first ten numbers. How do the multiples of ten that are not multiples of twenty $(30,50,70)$ fit into the pattern?

| 1 | okan | 28 | eeji din logbon |
| :--- | :--- | :--- | :--- |
| 2 | eeji | 29 | okan din logbon |
| 3 | eeta | 30 | ogbon |
| 4 | eerin | 31 | okan le logbon |
| 5 | aarun | 38 | eeji din logoji |
| 6 | eefa | 40 | ogoji |
| 7 | eeja | 50 | aadota |
| 8 | eejo | 60 | ogota |
| 9 | eesan | 70 | aadorin |
| 10 | eewa | 80 | ogorin |
| 11 | okanla | 90 | aadorun |
| 12 | eejila | 100 | ogorun |
| 13 | eetala | 110 | aadofa |
| 14 | eerinla | 120 | ogofa |
| 15 | aarundinlogun | 130 | aadoja |
| 16 | eerindinlogun | 140 | ogoja |
| 17 | eetadinlogun | 150 | aadojo |
| 18 | eejidinlogun | 160 | ogojo |
| 19 | okandinlogun | 170 | aadosan |
| 20 | oogun | 180 | ogosan |
| 21 | ookan le logun | 190 | aadowa |
| 22 | eeji le logun | 200 | igba (note: this special number |
| $\ldots$ |  |  | does not fit into the pattern) |

(1) How would you write the following numbers in Yoruba words?
a. 33
b. 37
c. 46
d. 54
e. 85
f. 107
g. 136
h. 164
i. 192
j. 199
(2) Yoruba people count in groups of twenty. An old English "score" meaning "twenty" shows that English speakers have also used groups of twenty.
a. What famous speech that was delivered in 1863 used the word "score" in a number sense in its opening words?
b. Convert the opening words of the speech referred to in (2) into a number.
c. What year does the speech refer to if you know that it was delivered in 1863 ?
B. Sometimes you can speed up mental calculations by using the distributive law. For example, 12 x

35 can be thought of as

$$
(10+2) \times 35=10 \times 35+2 \times 35=350+70=420
$$

(1) Complete these multiplications mentally as you practice using the distributive law.
a. $11 \times 43$
b. $32 \times 51$
c. $105 \times 24$

Sometimes we can use the distributive law with subtraction. For example,

$$
19 \times 46=(20-1) \times 46=(20 \times 46)-(1 \times 46)=920-46=874
$$

(2) Try to compute these multiplications mentally with the distributive law and subtraction.
a. $39 \times 45$
b. $98 \times 121$
c. $108 \times 269$

Perhaps Thomas Fuller used the distributive law in combination with his own counting system in order to complete quick mental calculations.

## Activity Sheet 2: Thomas Fuller and Calculation Time

Thomas Fuller was born in Africa in 1710. At the age of 14 he was sold into slavery and taken to Virginia. While he never learned how to read or write, he had an amazing ability to perform calculations in his head. When Fuller was 78 years old he was interviewed. White abolitionists asked him to perform a number of calculations. One of the questions was to compute the number of seconds a man who is 70 years, 17 days, and 12 hours old has lived. Astoundingly, he answered 2,210,500,800 (the correct answer) in only a minute and a half. According to a newspaper account:

One of the gentlemen, who employed himself with his pen in making these calculations, told him [Fuller] he was wrong, and that the sum was not so great as he had said-upon which the old man hastily replied, 'top, massa, you forget de leap year.' On adding the seconds of the leap years to the others, the amount of the whole in both their sums agreed exactly.
In addition, when one of the men remarked that it was a shame that Fuller had never had a formal education, Fuller replied, "No, massa, it is best I got no learning; for many learned men be great fools." One should remember that Fuller's style of speech in this account was typical of White accounts of slaves during this time. In addition, it would have been unusual for an African American slave to correct or contradict a White man, and the fact that Fuller did so is worth contemplation.

Try the following problems to gain insight into Fuller's amazing calculation abilities.
Problem 1: Fuller was also asked to calculate the number of seconds in a year and a half, and he answered the problem correctly in approximately 2 minutes. Using your calculator, find the answer and time yourself to see how long it takes.
Problem 2: Use the following steps to find the number of days in your lifetime.
Part A: In order to calculate how many days have you lived, first try to answer this just in your head - no calculator, computer, or paper allowed! Time yourself to see how long it took you to do this in your head and write down the answer and your time here.
Part B: Now time yourself on paper. Show your work and write down how long it took.
Part C: Now pair up with a partner. Using your calculator, figure out how many days your partner has lived, and time yourself again.
Part D: Compare your answers with your partner's answers on Parts B and C. If they do not match, then go back over them to see which is correct.
Use a search engine on the World Wide Web to see what you can learn about the speed of the fastest "calculators" today: modern computers.
Problem 3: Conduct some research on the Web in order to find out about the history of early calculation machines and computers such as ENIAC. Could the first calculation machines and computers have beaten Fuller's calculation times?
Problem 4: Could modern calculators and computers beat Fuller's calculation times?
Problem 5: The calculation speed of computers improves each year. Find out the speed of a computer at home, at school, or in the library.
Problem 6: Do you think that there is a limit to how fast the human mind can calculate? Do you think that there is a limit to how fast computers will be able to calculate in the future?

## Answer Keys for these two worksheets are available at <www.mathsci.appstate.edu/centroid/>

## Outstanding Elementary Teachers 2003

To underscore the importance of mathematics instruction in the elementary classroom, each year NCCTM recognizes teachers who make mathematics exciting and who nurture their students' enthusiasm. By involving them in projects, and competitions, thereby extending classroom experiences, these teachers succeed in motivating children to excel in mathematics.

Principals of North Carolina schools with any combination of grades kindergarten through five nominate the teacher who does the most effective job teaching mathematics in their schools. From those nominated, each LEA is asked to select one teacher who represents the best in the entire system. These teachers received one year's NCCTM membership, were recognized at the meeting in Greensboro in October, and received a special memento of the occasion. This year's awardees are:
Donna F. Epps, Alamance-Burlington
Chris Hefner, Alexander County
Kelly Paul, Anson County
Mary McClure, Ashe County
Wendy Doiron, Asheboro City
Jerelene K. Lutz, Asheville City
Jan Stanley, Avery County
Catherine Revels, Beaufort County
Marilyn Flythe, Bertie County
April Causey Trull, Brunswick County
Martha C. Cauble, Buncombe County
Nikki Stamey, Burke County
Joy Johnson, Cabarrus County
Sharon Oxford, Caldwell County
Celeste Young, Carteret County
Virginia M. Foster, Caswell County
Debra Harwell-Braun Catawba County
Katie Stein, Chapel Hill-Carrboro
Kim Smith, Charlotte-Mecklenburg Schools
Tracy Hoskins, Metrolina Reg'l Scholar's Academy
Nancy S. Berryhill, Bethel Hill Charter School
Debra Leonard, Chatham County
Donna G. Beck, Cherokee Central Schools
Pamela W. Burkhart, Davidson County
Laurinda Lassiter, Edenton/Chowan
Tom Price, Cleveland County
Brenda L. Caldwell, Craven County
Patricia Holloway, Cumberland County
Lisa Frost, Currituck County
Allison Rollinson, Dare County
Laura Schwiebert, Davie County
Julia Dupree, Duplin County
Helen Cheek, Durham County

Lynn S. Barnhill, Elizabeth City/Pasquotank
Angela Shimel, Franklin County
Donald McAllister, Gaston County
Dorothy S. Moore, Granville County
Kary L. Ewald, Guilford County
Vickie Weaver, Harnett County
Joyce Reeves Massie, Haywood County
Shannon Marlowe, Henderson County
Jennifer Attkisson, Hertford County
Amy Jablonski, Hickory City
Lisa W. Chestnutt, Hyde County
Corinne Petro, Iredell-Statesville Schools
Kelly Turner, Johnston County
Tammy Wicks, Jones County
Melissa Idleman, Kannapolis City
Margaret D. Normann, Lee County
Nancy Cagle, Lexington City
Jacque W. Weaver, Lincoln County
Jenny Ayers, Martin County
Tracy Crumpler Merchant, Moore County
Kristi Adkins, Nash-Rocky Mount Schools
Patricia Jones Pike, Mount Airy City
Maggie Williams, New Hanover County
Steven Hall, Newton-Conover City
Kathleen Nester, The O'Neal School
Deena Keeter, Orange County
Donna L. Emery, Pender County
April Benton, Perquimans County
Chrystal Welch Brooks, Person County
Pam Maness, Randolph County
Tracey Hedrick, Roanoke Rapids City
Nancy Isley, Rockingham County
Joyce H. Davis, Rowan-Salisbury
Rinda Wilson, Rutherford County
Ava Lori Bass, Sampson County
Paula Dial, Scotland County
Henry Boyd, Shelby City
Sandra E. Carter, Stanly County
Karen Hall, Stokes County
Cara Gordon, Surry County
Shirley Grant, Swain County
Joanne T. Ellis, Thomasville City
Leigh Hyett, Transylvania County
Dana L. Best, Union County
Bessie Bulluck, Vance County
Lynne Davis Allen, Wake County
Morgan Taylor, Watauga County
Tracy McKeel, Wayne County
Sharilyn Cokley, Whiteville City
Catherine Lockhart, Wilkes County
Kim Eatman, Wilson County
Mary Ann C. Davis, Winston-Salem/Forsyth
Chandra W. Davis, Yadkin County
Kimberly T. Rathburn, Yancey County

## Problems to Ponder $\Omega$

# Spring 2004 Problems 

Gregory S. Rhoads<br>Appalachian State University<br>Boone, North Carolina

Grades K-2 John's mother gave him a bag with cookies in it. John offered his sister Jane some cookies and Jane took 3 from the bag. John saw his friends Gus and Lee and gave them each 2 cookies from the bag. When John came home, his mother baked some more and put 4 more cookies in John's bag. John went to his room, dumped the cookies on his desk and counted 12. How many did John have in his bag originally?

Grades 3-5 John's mother gave him another bag of cookies. John gave half of the cookies to his sister Jane, then gave one-third of the remaining cookies to his friend Gus. If there were 6 cookies left in the bag, how many cookies were there originally?

Grades 6-8 Peter gets a soft drink from a machine and notices the can and drink together weighs 13.65 ounces unopened. After Mary drank exactly half of the soda in her can, her can and the remaining soda weigh 7.45 ounces. If both Peter's and Mary's cans were identical, how much does an empty can weigh?

Grades 9-12 Let C be a circle of radius 10 units, and let $\overline{A B}$ be a chord in C . If the shortest distance between $\overline{A B}$ and the center of C is 1 unit, what is the length of $\overline{A B}$ ?

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.

## 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.

## Send solutions by 15 April 2004 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 a significant part of the work was completed by the student.

## Solutions to Problems from the Spring / Fall 2003 Issue

## Grades K-2

Jane and her mom went to a petting zoo, which had sheep, cows, and rabbits. While there, Jane counted 24 cow legs, 14 dog ears, and 6 rabbit tails. If every animal was counted exactly, how many animals in all were at the petting zoo?


Solution: Preston Wilson, $2^{\text {nd }}$ Grade, of Fleetwood Elementary (Teacher: Billie Gardner)

Editor's Note: Preston may have a career in art!!! Not only do his pictures give a good visualization of the problem, but they provide good practice in counting.

Correct Solutions were received by Preston Wilson of Fleetwood Elementary, Jared Arsenault, Kaila Johnston, Jackson Koenig, Austin Rich, and William Suits of Liberty Elementary, Natalie Brown, Cody Jacobson, and Garrett McCoy of South Topsail Elementary, William Baker, Sarah Dyer, Skylar Edwards, Connor Elliott, Quin Ferguson, Mikayla Marlow, Jack Owens, Sam Ross,, Logan Russell, Lauren Smith, Kasey Tackel, David Zabel of Union Academy, James Sapp of W.D. Williams Elementary, Ashely Johnson of Yadkinville

## Grades 3-5

You finish doing your homework on addition and decide to get a snack. While you are gone, your little brother has some fun and erases all of your addition signs on one problem. What remains of the problem is $987654321=99$. Assuming the answer, 99 , is correct, where were the addition signs on the left-hand side of the equation? (Can you find more than one solution to this problem?)

Solution: By Mary Gwen Miller, $4^{\text {th }}$ grade, of David Cox Road Elementary School (Teacher: Mrs. Bell).


Correct Solutions were received by Rack Brown, Timothy Hensley of Burnsville Elementary, Avery McGuirt(*), Mary Gwen Miller(*), Brianna Pauser of David Cox Road Elementary, Garrett Dorfman(*), Sage Miller of Easley Elementary, Sierra Wilson of Fleetwood Elementary, Nichole Aldesson, Matthew Bishop, Dustin Edelen, Darius, Haith(*), Komal Khalid, Deanna Roberts, Joshua Wagner(*) of Lincoln Elementary, Baker Boomer, Donna Clark, Larry Collins, Chris Foy, Shannon Hayes, Shaquila Jones, Brandon Maides, Emily Manning, Tymia Moore, Amanda Ray, Andrew Reed, Kenzie Shuler, Jimmy Smith, Erica Wilcox and Levy of MaysvilleElementary, Sara Price, Cassandra Lindquist(*) of West Smithfield Elementary. (Those with an asterisk (*) after their names found both solutions.)

## Grades 6-8

At Earmuff Junction Middle School, 100 students were asked which neighboring states they had visited. When asked if they had visited Virginia, 61 students raised their hands, and when asked if they had visited Tennessee, 47 raised their hands. If 22 students had visited both states (and raised their hands both times), how many students had visited neither state (and didn't raise their hand either time)?


Solution: By Rose Buchanan, $7^{\text {th }}$ grade, of Turrentine Middle School (Teacher: Ms. Ann Hughes).

Correct Solutions were received by Lisa Adams, Kristen Ahrens, Carlie Badder, Graham Bennett, Cameron Buck, Emily Casey, Katie Collins, Drayton Dillon, Wesley Hagy, Christian Johnson, Taylor Jones, Bryan Kim, Amanda Nelson, Amanda Nguyen, Caylin Posey, Sean Record, Jacob Reedy, Marcus Setzer, Rohan Shah, Sara Shariff, Bobby Siegworth, Alle Springhetti, Samantha Strahan, Erika Swanger, Andrew Tugman, Ariel Waldroop, Jordan Whittaker, and Andrew Wrist of Alexander Middle, Caitlin Mayo of Broad Creek Middle, Morgan Cooke of Chowan Middle, Alexis Andrews, Taylor DeGrasse, Patrick Easters, Matthew Fornes, Palmer Gay, Tanika Marshall, Laura Mayo, Jordan Smith, and Aya Zakaria of E. B. Aycock Middle, Dakota Norris of Harris Middle, Eyad Al-Kobri, Courtney Alvey, Bryant Bullock, Pedro Bulluck, Ryan Davis, Steven Hamilton, Jessica Hill, Garrett Landrum, Erin McAuliffe, Daquain Richardson, and Shakeita Thorne of J. W. Parker Middle, Joshua Wagner of Lincoln Elementary, Kayla Graham and Anthony Moreland of Newport Middle, Kelly Coalson and Kaitlin Crepps of Southeast Guilford Middle, Sarah Balance and RaShawnda Murphy of Southwestern Middle, Lydia Allen, Rose Buchanan, Jim Frazier, Brooke Guthrie, Abby Haithcock, Al Lunsford, Sam Mize and Christin Willis of Turrentine Middle, Alex Vannoy of West Alexander Middle, John Bernan, Megan Creech, Allie Hodges, Galen Kinney, Sophia Kropaczek, Madison LeCroy, Hannah McMurry, Elizabeth Powell, Colin Powlowski, Ajay Ravichandran, Matthew Spaulding, Kelsey Wiseman, Lindsay Wright and Todd Youngblood of Wilmington Academy of Arts and Sciences

## Grades 9-12

Alice and Barbara painted a fence. If Alice had worked alone, it would have taken her 3 hours more than the two of them working together; and Barbara would have taken 2 hours more than the two of them working together. How long did it take both of them working together to paint the fence?

Solution: Jessica Church, $11^{\text {th }}$ grade, of East Forsyth High School (Teacher: Mrs. Branoff)


Editor's Note: Many solvers had the correct number in their answer, but the wrong units.
Correct Solutions were received by Justin Arnall, Brianna Baughman, Justin Blair, Ebony Brooks, Jessica Church, Matt deCourcelle, Tyler Fager, Anna Hamilton, Valerie Hammett, Lindsay Haslebacher, Andrea Henningsen, Catherine Howard, Melissa Jennings, Matt Jester, Luke King, Jonathan Lail, Phillip Landphair, Nathan McRae, Lee Ann Minard, Brittany Murray, LeAnn Nettles, Robert Nowicki, Joseph Orenstein, Daysha Robinson, Henry Tai, Stephen Tate, David Wall, Steven Weifenbach, Craig Wence and Brian Wheeler of East Forsyth, Josh Ogle of Gaston Day, Steffenie Conrad and Anthony Moreland of Newport Middle, Jessica Boyd, Madelyne Cearley and Ashley Winfree of Salem Academy, Samuel Smith of South Stanly High.

## NCCTM Trust Fund Scholarship <br> \section*{North Carolina Council of Teachers of Mathematics}

$\$ 500$ 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;
- Currently enrolled in a mathematics or mathematics education course, or have completed a mathematics or mathematics education course 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
P.O. Box 121

Sugar Grove, NC 28679

Direct inquiries to:
Bill Paul, Chairperson
Phone: 828-297-3839
E-mail: bnpaul@skybest.com

## PERSONAL INFORMATION:

Name: $\qquad$
Home address: $\qquad$

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:

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:

## 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 verification of acceptance and enrollment in accredited graduate program in North Carolina.

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.

## Awards

## The W. W. Rankin Memorial Award for Excellence in Mathematics Education-2003

Robert Joyner East Carolina University Greenville, North Carolina


Dr. Diane L. Frost

Dr. Diane L. Frost, Superintendent of the Asheboro City Schools, has received the prestigious W.W. Rankin Award for Excellence in Mathematics Education during the State Conference of the North Carolina Council of Teachers of Mathematics (NCCTM). The Rankin Award is designed to recognize and honor individuals for their outstanding contributions to NCCTM and to mathematics education in the State. The award, named in memory of W.W. Rankin, a Duke University Mathematics professor, is the highest honor NCCTM can bestow upon an individual.

Dr. Frost has been actively involved in the teaching of mathematics to students for more than 26 years. Her many contributions to mathematics and mathematics education include service as a:

- Classroom teacher and department chairperson at the secondary level,
- Director of Curriculum and Instruction for a school system,
- Regional K-12 Mathematics Coordinator, and
- President of the North Carolina Council of Supervisors of Mathematics.

In these capacities, Dr. Frost has developed and implemented a technologyoriented secondary level math course for a School of Excellence in Science and Mathematics, and planned, developed, and delivered mathematics staff development services for several school systems.

She has also contributed many hours to the North Carolina Council of Teachers of Mathematics as:

- Program Chair and then Conference

Chair for the state conference

- State Secretary
- President of the Central Region
- President of NCCTM

In these roles, she has been instrumental in establishing the NCCTM Trust Fund Committee, which provides scholarships for teachers taking mathematics course work while working toward a master's degree. She has also presented workshops and sessions at regional and state meetings

In the twenty-five year history of the W.W. Rankin Award for Excellence in Mathematics Education, Dr. Frost is the first superintendent to receive this distinction.

## Rankin Award Nomination Form

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 now, please submit as much of the following information as possible.
> Nominations are accepted at any time.

Nominations should include 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: Dr. Robert Joyner
1302 Oakview Drive
Greenville, NC 27406

# The North Carolina Council of Teachers of Mathematics Innovator Award - 2003 

Phillip Johnson<br>University of North Carolina at Charlotte<br>Charlotte, North Carolina



Ms. Becky McLawhorn

At the State Mathematics Conference, held in Greensboro on October 9-10, 2003, the North Carolina Council of Teachers of Mathematics presented its prestigious Innovator Award to Becky McLawhorn. The purpose of the award is to recognize and reward individuals or groups who have made an outstanding or noteworthy contribution to mathematics education and/or NCCTM by founding, initiating, pioneering or developing a program in mathematics education in a region of the state or in the entire state.

This year's winner of the Innovator Award was a high school mathematics teacher and coach from 1976 to 1986. Since 1986, she has been a member of the mathematics faculty at Chowan College. In May of 1999, Becky received the Excellence in Teaching Award at Chowan College. She has also been honored with recognition by Who's Who in American Education in 1992 and Who's Who Among America's Teachers in 1994 and 1998. Her B.S. and M.A.Ed. Degrees are from East Carolina University, where she has also done further graduate studies.

During academic year 1986-87, Becky was instrumental in convincing the Chowan College Mathematics Department to host a regional mathematics contest. At that time, East Carolina University was the nearest site for northeastern North Carolina schools. Chowan began with the comprehensive test, but switched to the four-subject format upon the State Math Contest Committee's request in 1990, with the aid of Western Carolina University.

During academic year 1996-97, Becky became chairperson and coordinator of the Chowan College Mathematics Contest and has served in this capacity for four years. The coordinator of a regional (local site) contest has many duties, including correspondence with the schools, coordinating enrollment, securing and preparing awards materials, preparing tests, administering and grading tests, announcing winners, and doing followup correspondence with participating schools.

Under Becky's direction, the Chowan College Contest operates with four subject divisions (Algebra I, Algebra II, Geometry and Comprehensive) and school competition divisions for both junior and senior high schools. The Chowan College Contest is one of only three sites to offer competition in all four subjects. Annually, the Chowan contest attracts 300 to 400 students from the region.

As a consequence of Becky's serving as coordinator of the Chowan College Contest, she became a member of the NCCTM State Contest Committee. She has served on this committee since 1989. During this time, she has attended all the annual meetings of the committee (held on the evening prior to the State Finals in Comprehensive Contest) and has assisted in administering the State Mathematics Contest in each of those years.

In 1990, Becky was elected to a two-year term as the Eastern Regional Representative to the Executive/Steering Committee of the State Contest Committee. She has been elected to subsequent two-year terms since then. In addition to attending the bi-annual
meeting of this committee, which is held prior to the annual meeting of the full committee each April, she has attended each of the biannual meetings of the Executive/Steering Committee held in conjunction with the annual state conference of NCCTM. As the name of the committee implies, this ninemember committee determines the agenda of the full committee as it attempts to distill the issues and make recommendations (for discussion) to the full committee. The Executive/Steering Committee, and, in turn, the full State Contest Committee, coordinate and oversee the work of a network of some
twenty-one local site contests, the three regional runoff sites, and the state finals Comprehensive Contest that exist today. Some 10,000 students were estimated to have been contestants in the series of contests conducted during 1999-2000. Through the dedication of Becky and those like her, the Contest Network has become a viable and active enterprise for the students of North Carolina, touching the lives of many of them while leading them to the further study of mathematics.

## Eastern Region Spring Conference

Conference Co-Chairs Jane Gleason [gleasonj@meredith.edu](mailto:gleasonj@meredith.edu) and Lucy Kay
Title: Get On Board: Taking Flight With The New Curriculum
Where: Meredith College, Raleigh, NC
When:
Registration fee
Saturday, March 20, 2004, 9:00 a.m. -1:00 p.m. (Check in: 8:00 am)
Description:
\$10 (nonrefundable; NO ON-SITE REGISTRATION)
Sessions are being planned according to grade level bands: K-2, 3-5, 6-8, 912 and pre-service mathematics educators. Presenters will include classroom teachers, mathematics educators, and mathematics specialists with the NC Department of Public Instruction.

## Central Region Spring Conference

President Vickie Moss [vmoss@randolph.k12.nc.us](mailto:vmoss@randolph.k12.nc.us)<br>Title:<br>Forming Partnerships in Mathematics Teaching<br>Where:<br>Greensboro College<br>When: Saturday, March 27, 2004,<br>Registration 8:30, Conference 9:00 a.m. - 1:00 p.m.<br>Registration fee: $\quad \$ 10.00$ (non refundable) Teachers<br>NCCTM Student Members Refundable $\$ 5.00$<br>Non-Student Members Non Refundable $\$ 5.00$ for Membership<br>Description: This conference welcomes in a special way Preservice, ILTs, Lateral Entry Teachers. Sessions include changes in the new Mathematics Standard<br>Course of Study. Concurrently, the Central Region welcomes the Central Region Math Fair.

## Nominations for the Innovator Award

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. 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 that serve 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
Address $\qquad$
Phone: Business $\qquad$ Home $\qquad$ Email $\qquad$

Send to: Phillip Johnson, Dept. of Mathematics, UNC Charlotte, Charlotte, NC 28223

## NCCTM Membership Application

## Directions:

1. Print this page and complete
2. Fax with credit card information to: (704) 642-0840 OR Mail with check or credit card information to:
$\square$ New $\square$ Renewal -- Membership Number (if known) $\qquad$
Name: First $\qquad$ Middle: $\qquad$ Last: $\qquad$
Mailing Address: $\qquad$
City: $\qquad$ State: $\qquad$ Zip: $\qquad$ $-$ $\qquad$
Telephone: Home: ( $\qquad$ ) - $\qquad$ - $\qquad$ School: (___)- $\qquad$ - $\qquad$
Fax: ( $\qquad$ )-_ - $\qquad$ E-mail: $\qquad$
School System: $\qquad$
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
Other $\qquad$


## Membership dues:

| $\square 1$ year: | $\$ 10.00$ |
| :--- | ---: |
| 3 years: | $\$ 25.00$ |
| 10 years: | $\$ 75.00$ |
| Full-time Student: | $\$ 5.00$ |

Dues Subtotal:
Trust Fund Donation: \$ \$ (Donations are Tax Deductible)
Total Amount Enclosed: \$

PAID BY
$\square$ Check $\square$ Credit Card $\square$ Visa MasterCard Account\# $\qquad$
Expires ________ Signature $\qquad$

For more information, send e-mail to membership@ncctm.org or call (704) 642-1933.

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[^0]:    ${ }^{1}$ Professor Willis teaches in the Department of Mathematics and Computer Science at Western Carolina University and has been instrumental in advancing the State Mathematics Contest since its inception.

[^1]:    ${ }^{1}$ Ms. Embree is a third grade teacher at Bluff City Elementary School and teaches reading classes at East Tennessee State University.

[^2]:    ${ }^{1}$ Dr. Greenwald teaches math at Appalachian and does research in Riemannian geometry.
    ${ }^{2}$ Dr. Ksir teaches math at the Naval Academy and does research in algebraic geometry and mathematical physics.
    ${ }^{3}$ Dr. Shirley teaches the history of math and is Associate Dean of the Graduate College at Towson; he is also President of the North American Study Group on Ethnomathematics.

