## The

## IN This Issue:

$>$ The $\pi$ Project
> Students Tell the Story Best
$>$ Math Night at Voyager Academy
> 2010 NCCTM 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 http://www.ncpublicschools.org/curriculum/mathematics/grade_3.html
Perry, B. K. (2000). Patterns for giving change and using mental mathematics. Teaching Children Mathematics, 7, 196-199.
Ron, P. (1998). My family taught me this way. In L. J. Morrow \& M. J. Kenney (Eds.), The teaching and learning of algorithms in school mathematics: 1998 yearbook (pp. 115-119). Reston, VA: National Council of Teachers of Mathematics.

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

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


## Editorial Board

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## 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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## Contact Information

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## The

## Centroid

## Articles

$6 \begin{aligned} & \text { The п Project } \\ & \text { John Malokach }\end{aligned}$
9 Students Tell the Story Best: Creative Mathematics Storytelling Using
Narrative Software
Peter Eley and Kelly Hines
14 Problems to Ponder
Holly Hirst
18 Mini-grant Report
Math Night at Voyager Academy
Jenny Murray

## News \& Information

## 2 NCCTM Conference Information

3 Presidents' Messages
192010 NCCTM Logo Contest Winners
22 Puzzles

## From the Editors

The 2011 fall issue is finally here. We hope you enjoy the articles we have included. Keep those submissions coming. We are particularly interested in articles from classroom teachers who have found techniques that work to help their students learn mathematics!

- Debbie Crocker and Holly Hirst


## NCCTM 2011 Conference: October 27-28

## Koury Convention Center, Greensboro

## Strengthen Your Core Understanding: Mathematical Practices and Mathematical Content

The focus for this year's fall math conference will be the upcoming Common Core State Standards (CCSS) that will be implemented and tested in 2012-2013. Registration is now open, and the entire conference program can be viewed online.

## Conference Keynote Speaker: Dr. Jere Confrey

- Implementing the Common Core: Directions for Teachers in Grades K-5, Thursday, October 27, 2011, 8:30 a.m., Imperial D
- Implementing the Common Core: Directions for Teachers in Grades 6-12, Thursday, October 27, 2011, 10:30 a.m., Imperial D

Sponsored by Wireless Gen, Dr. Jere Confrey will provide insight into the Common Core State Mathematics Standards. Dr. Confrey has been greatly involved as a member of the national validation team, providing feedback to drafts of the Standards, as well as developing learning trajectories of the Standards across grade levels.

## LEADERSHIP SEMINAR - 9 AM TO 3 PM WEDNESDAY, OCTOBER 26, 2011 <br> Implementing the Common Core State Standards for Mathematics

Opening Speaker: Dr. James Williams is a senior mathematics specialist for Pearson, and he is leading the CCSS work that Pearson is doing with some school districts in North Carolina. Dr. Williams is also working on the development of programs and materials for the Common Core Standards. His presentation at the Leadership Seminar will focus on the mathematics content in the CCSS.

Afternoon Speaker: Dr. Juanita Copley is Professor, Emerita, College of Education, University of Houston. She is an author for Pearson's Common Core version of the enVision Mathematics Elementary Program, and she has written and edited five books about early childhood mathematics. She has also served as a trainer of math coaches in elementary and middle schools. She believes the primary Common Core focus/issue for everyone must be the Standards for Mathematical Practice. Thus, she will discuss what they mean for teachers and facilitating their use in her session at the Leadership Seminar.

# Presidents' Messages 

State President<br>Betty Long<br>longbb@appstate.edu

As I begin my two-year term as the NCCTM President, I am excited and looking forward to the tasks and challenges before me. For the past two years, NCCTM has thrived under the leadership of our Immediate Past President Wendy Rich. Wendy and her dedicated Board of Directors spent countless hours serving NCCTM and mathematics education as they worked toward expanding the ways NCCTM can better serve mathematics teachers and students. I feel very fortunate to have Wendy's guidance as well as the support of the hard-working members of the current NCCTM Board of Directors. They have helped me to make this transition as smoothly as possible, and having their support makes me believe that together you, I, and they can make a real difference in mathematics education in our great state.

Another group of folks that I want to recognize is the NCCTM committee chairs and committee members. NCCTM is run solely by our many wonderful members who are willing to volunteer their time and work. Currently, there are over 100 NCCTM members serving in some capacity on the various committees and doing a great job. However, we want (and need) more of you to get actively involved in NCCTM. The following are some of our activities and volunteer opportunities for you: Annual Fall Conference, Spring Regional Conferences, Math Contests, Math Fairs, Math Counts, Logo Contest, Mini-Grants, Trust Fund Scholarships, various awards and recognitions, The Centroid, regional and state offices on the Board of Directors, student affiliates, and various other committees and activities. NCCTM is a place where you can meet people who share your interest in mathematics education. Get involved and do your part in this important organization! Also, please encourage your colleagues to become members and make sure your membership is current by visiting our web site (NCCTM.org).

I hope you and your colleagues are making plans to attend the State Mathematics Conference on October 27-28 at the Koury Convention Center in Greensboro. The theme is "Strengthen Your Core Understanding: Mathematical Practices and Mathematical Content." You will find many sessions and workshops on a wide variety of topics for teachers and other school personnel at all levels. The keynote speaker will be Dr. Jere Confrey, and the featured speakers will include Greg Tang, Jeane Joyner, and Amy Scrinzi. With the implementation of the Common Core State Standards (CCSS) less than a year away, the program for this year's conference will include many informative sessions on the CCSS. The sessions will include content in the Common Core Standards and ideas for implementing the Standards for Mathematical Practice. This will be a wonderful opportunity for teachers and administrators to educate themselves on this new curriculum and the Standards for Mathematical Practice. I sincerely hope that every school in North Carolina will be represented at the State Mathematics Conference this year. If all teachers attending the conference would then share what they learned about the CCSS with other teachers in their school, then many more teachers would be better informed about the implementation and facilitation of the new Common Core State Standards for Mathematics. Please tell your colleagues about the 2011 State Mathematics Conference and encourage them to attend. To register, visit our web site at NCCTM.org.

The 2011 Leadership Seminar will be held at the Koury Convention Center on Wednesday, October 26 (the day before the State Mathematics Conference). The theme is "Implementing the Common Core State Standards for Mathematics." The DPI will do an information session on the CCSS with updates and time for questions, and the keynote speakers will be Dr. James Williams and Dr. Juanita Copley. Dr. Williams is leading the CCSS work that Pearson Education is doing with some school districts in North Carolina, and he is also working on the development of programs and materials for the Common Core Standards. His presentation at the Leadership Seminar will focus on the mathematics content in the CCSS. Dr. Copley is an author for Pearson Education's Common Core version of the enVision Mathematics Elementary Program, and she has written and edited five books about early childhood mathematics. She will discuss what the Standards for Mathematical Practice mean for teachers and how to facilitate their use. I believe the Leadership Seminar will be another great
opportunity for teachers and administrators to educate themselves on this new curriculum and the Standards for Mathematical Practice. To register, go to our web site (NCCTM.org).

I look forward to seeing you at the State Mathematics Conference and the Leadership Seminar, and I hope you will consider becoming an NCCTM volunteer. If you have any questions about the Conference or Seminar or if you would like to become more involved in NCCTM, please contact me at longbb@appstate.edu or 828-262-2372.

## Eastern Region President Ron Preston <br> prestonr@ecu.edu

The leadership of the Eastern Region of NCCTM encourages all teachers of mathematics to strongly consider attending the 41st Annual NCCTM Conference in Greensboro this October 27-28. Further, we have made tentative plans for a spring conference to be held on 17 March 2012. The tentative title for the conference is "Math Madness" and plans are to emphasis Common Core State Standards, 21st Century Skills, and Teacher Evaluation, among other items from the membership. The conference is tentatively scheduled to run from 8:30$1: 30$ and carry 0.5 CEUs. The location is to be determined. Tony Thompson will be conference chair and Wayne Williams and Ron Preston will be program chairs. Be looking for information and emails from these three, along with the entire Eastern Region team, as they recruit and talk up the regional conference at the state conference.

Officers from the Eastern Region are

> Eastern President - Ron Preston
> Eastern Immediate Past President - Ray Jernigan
> Eastern VP for Colleges - Tony Thompson
> Eastern VP for Secondary Schools - Wayne Williams
> Eastern VP for Middle Schools - Lynnly Martin
> Eastern VP for Elementary Schools - Amy Janning
> Eastern Student Representative - Ryne Cooper

We would love to hear from you about thoughts, concerns or ideas for promoting mathematics in North Carolina - either through the spring conference or in general. As you think about promoting mathematics, consider adding one or more of the following (as appropriate) to your excellent day-to-day instruction: Math Fair, Math Logo Contest, MathCounts, Math Contest, American Mathematics Competitions, etc.

Finally, we encourage you to take advantage of NCCTM opportunities such as applying for the minigrant (we did not award all we could have awarded last year) and funds for graduate coursework in mathematics or mathematics education.

## Central Region President Pat Sickles <br> pat@sickles.org

Greetings to the members of the NCCTM Central Region. During the past year, I have had the great fortune as President-Elect of the Central Region, to work with Barbara McGill. Barbara has provided valuable leadership for the Central Region and the state in her tenure as Central Region President. As Past President she will continue to be an advisor for us for this year. So, thank you, Barbara, for all of your hard work in the past-and the future.

I look forward to working with the other Central Region officers who have already demonstrated their enthusiasm and organizational skills at the NCCTM Board Meeting in May. They are Melissa McKeown, Vice President for Elementary Schools; Amy Travis, Vice President for Middle Schools; Beth Layton, Vice President for Secondary Schools; and Holt Wilson, Vice President for Colleges. We have already begun planning for the
next spring regional mini-conference, which will again be held at UNCG either on February 18 or March 17, 2012, in their new School of Education building!

Our 2011 Central Regional Spring Mini-Conference, held at UNCG in March, was a great success, and was chaired by Kerri Richardson with help from Barbara McGill and Darlene Mason. With more than 100 attendees, most of whom were undergraduate elementary education majors, the title of the conference was Mathematical Thinking for the Future. Presenters included in-service teachers who were working on their master's degrees in elementary mathematics education at UNCG. In addition, Barbara Bissell presented an informative session regarding Common Core State Standards.

I want to encourage all of you to be involved in the NCCTM-especially during the next few years. With so many issues on the horizon that will affect all of the students and teachers in North Carolina, it is important that we, as teachers of mathematics, have a voice in the decisions that are being made. One very important way to do this is to be informed, and the best way to be informed is to be actively involved in our very own organization, NCCTM. Encourage fellow teachers to become members of NCCTM, and do plan to attend the NCCTM Leadership and Annual Conference October 26-28 in Greensboro, where we will have the opportunity to attend sessions on topics of interest including the Common Core State Standards.

Along with the other officers of the Central Region, I look forward to representing you on the board for the coming two years. Please let us know if you have ideas about how we can better serve you as a part of the NCCTM Central Region.

## Western Region President <br> Katie Mawhinney

mawhinneykj@appstate.edu
What an exciting time for mathematics education in North Carolina! With our state's transition to the Common Core State Standards of Mathematics, we are motivated to find more ways to collaborate with colleagues across every level of mathematics education and across district, county, region, and even state lines. One of the best opportunities to connect with colleagues is our statewide fall conference occurring this October on the $26^{\text {th }}$ through the $28^{\text {th }}$. This year's conference, entitled Strengthen Your Core Understanding: Mathematical Practices and Mathematical Content, begins with the Leadership Conference on the $26^{\text {th }}$ and continues on with the main conference days happening on the $27^{\text {th }}$ and $28^{\text {th }}$. Be sure to register online before October $21^{\text {st }}$ in order to access the less expensive, early registration fees.

A second opportunity to work with colleagues within our region of North Carolina will be at the NCCTM Western Region Spring Conference that will occur on Saturday, March $24^{\text {th }}$, 2012. Look for more details about the spring conference at the statewide conference in October and online at the NCCTM website. If you are interested in sharing your ideas that connect the mathematics content in the Common Core to classroom practices or in sharing your teaching methods that highlight the Standards for Mathematical Practice with colleagues at our spring conference, please email me your information and ideas.

Also, our congratulations go to Amanda Northrup on being a 2010 recipient of a U.S. Presidential Award for Excellence in Mathematics and Science Teaching, and to Laurel Cobb for receiving NCCTM's Outstanding Mathematics Education Award. We have a plethora of effective, dedicated teachers in our region and it's wonderful to see these folks receive this recognition.

I am very excited about this opportunity to serve as your NCCTM Western Region President. I and the other NCCTM Board members hope to continue NCCTM's tradition of being an excellent resource for all mathematics educators in North Carolina. Please don't hesitate to contact me if you have any questions about the upcoming events and the many resources NCCTM provides.

## The $\pi$ Project <br> John Malokach Smithfield Selma High School, Smithfield North Carolina

Students learn about the mysterious number $\pi$ at a young age. Ask any sixth graders what $\pi$ is and they will undoubtedly say "3.14." Later in their study of mathematics, students learn more clearly that this number is the ratio of circumference and diameter in a circle. But how are the digits generated? Where do they come from?

This one or two day project aims to give one answer to that question. I originally created this activity for an honors geometry course and eventually used it in a precalculus course as well. The basic idea is that students find the areas of inscribed regular polygons in a unit circle. Students use the formula for the area of a triangle involving the sine function. The activity then leads them to discover that as the number of sides of the inscribed polygon increases, the area approaches that of the circumscribed circle, $\pi$.

Students will have the opportunity to learn a bit of history as well as the idea of infinite limits. The algorithm used to do this is similar to what Archimedes did over 2000 years ago. The difference is that we calculate areas rather than circumference. I do not teach limits formally in precalculus, but I encourage activities like this that have students think and talk about them. You may decide to adjust this activity to formalize the limit of the expression, even up to using l'Hopital's rule to calculate it. It is also worth noting that I am careful to use degrees as the unit of angle measure in this to avoid circularity.

## The Activity Sheet

An electronic version of this handout is located at http://goo.gl/EHw6I

## Notes:

- Each circle has a radius of 1 unit and divided into 12 equal regions.
- The area of a triangle, $A=\frac{1}{2} a b \sin C$, where $C$ is the included angle between sides with length $a$ and $b$.

Show your work on separate sheet of paper and attach this sheet to your work.

1. Use the first circle to find the area of an equilateral triangle.

2. Use the third circle to find the area of a regular hexagon.

3. Use the second circle to find the area of a square.

4. Use the fourth circle to find the area of a regular dodecagon.


Observe the patterns in your work above. Use this to find:
5. The area of a regular 24 -gon.
6. The area of a regular 48-gon.
7. The area of a regular 96-gon.
8. The area of a regular 192-gon.
9. The area of a regular 384-gon.
10. The area of a regular 10000 -gon.

What irrational number do your answers seem to be approaching? Explain why!
As the number of triangles increases, what happens to the measure of the included angle?
If there were an infinite number of triangles, what do you think the measure of each included angle would be? Explain why!

## The Lesson Plan

Purpose: To calculate the value of $\pi$ with the method of Archimedes, using trigonometric formula for triangle area, and the idea of limit. The activity is given to students to do in groups and then when the teacher reviews it the next day, the calculator is used to visually display the polygons Archimedes used and to calculate their areas.

Courses: Possibly Honors Geometry, ideally Pre-Calculus, AFM, or beginning Calculus.
Prerequisite knowledge: For the activity as written, students should know and be able to use the triangle area formula $A=\frac{1}{2} a b \sin C$, and be slightly familiar with parametric equations. Some knowledge of trigonometry is useful for students to understand the unit circle and the equations entered to generate the polygons.

Answers: (note: circumscribed polygons are optional and can be an extension exercise):

| $\mathbf{n}$ | area (inscribed) | area (circumscribed) |
| :---: | :---: | :---: |
| 3 | 1.299038106 | 5.196152423 |
| 4 | 2 | 4 |
| 6 | 2.598076211 | 3.464101615 |
| 12 | 3 | 3.215390309 |
| 24 | 3.105828541 | 3.159659942 |
| 48 | 3.132628613 | 3.146086215 |
| 96 | 3.139350203 | 3.1427146 |
| 192 | 3.141031951 | 3.14187305 |
| 384 | 3.141452472 | 3.141662747 |
| 10000 | 3.141592447 | 3.141592757 |
| $\pi$ | 3.141592654 | 3.141592654 |

## Calculator Directions:

1. Showing the polygons.
a. In parametric mode, press $Y=$. Enter $X_{1 T}=\sin (T) ; Y_{1 T}=\cos (T)$. This is to orient the polygon so one of its vertices is located at $(0,1)$. Also put your calculator in degree mode.
b. Use the following viewing window. $\operatorname{Tmin}=0 ; T \max =360 ; T s t e p=120 ; \mathrm{Xmin}=-3 ; \mathrm{X} \max =3$; $\mathrm{Xscl}=1 ; \mathrm{Ymin}=-2 ; \mathrm{Ymax}=2 ; \mathrm{Yscl}=1$.
c. Press Graph. You will notice the graph of an equilateral triangle. To get the other inscribed polygons, change Tstep $=360 / n$ where $n$ is the number of sides.
d. Optional - as an extension, you can enter in $\mathrm{Y}=, \mathrm{X}_{2 \mathrm{~T}}=\sin (\mathrm{T}) / \cos (\mathrm{Tstep} / 2) ; \mathrm{Y}_{2 \mathrm{~T}}=$ $\cos (\mathrm{T}) / \cos (\mathrm{Tstep} / 2)$. (Note: Tstep is found under Vars, Window, $\mathrm{T} / \theta, \# 3)$. This will show on the graph the circumscribed polygons.
2. Calculating the areas.
a. In Stat, Edit, enter the following values in $\mathrm{L}_{1}: 3,4,6,12,24,48,96,192,384$, and 10000. In $\mathrm{L}_{2}$, define $L_{2}=L_{1} * 0.5 \sin \left(360 / \mathrm{L}_{1}\right)$. Students should be able to see their answers from the previous day automatically fill in $\mathrm{L}_{2}$.
b. Optional - define $\mathrm{L}_{3}=\mathrm{L}_{1} * 0.5 /\left(\cos \left(180 / \mathrm{L}_{1}\right)^{2} * \sin \left(360 / \mathrm{L}_{1}\right)\right.$. Students should be able to see the areas of the circumscribed polygons automatically fill in $\mathrm{L}_{3}$.

## Additional Information

History of Archimedes. An excellent summary of the method Archimedes used can be found on Dr. Chuck Lindsey's website (1997):

The method of Archimedes involves approximating pi by the perimeters of polygons inscribed and circumscribed about a given circle. Rather than trying to measure the polygons one at a time, Archimedes uses a theorem of Euclid to develop a numerical procedure for calculating the perimeter of a circumscribing polygon of $2 n$ sides, once the perimeter of the polygon of $n$ sides is known. Then, beginning with a circumscribing hexagon, he uses his formula to calculate the perimeters of circumscribing polygons of $12,24,48$, and finally 96 sides. He then repeats the process using inscribing polygons (after developing the corresponding formula). The truly unique aspect of Archimedes' procedure is that he has eliminated the geometry and reduced it to a completely arithmetical procedure, something that probably would have horrified Plato but was actually common practice in Eastern cultures, particularly among the Chinese scholars. . . .The specific statement of Archimedes is Proposition 3 of his treatise Measurement of a Circle: The ratio of the circumference of any circle to its diameter is less than $3^{1 / 7}$ but greater than $3^{10} / 71$.

Interactive Java Applet. There is a neat applet due to Dr. Peter Alfeld (1999) that allows users to explore Archimedes' method of calculating $\pi$, using circumscribed and inscribed polygons areas and perimeters.

## References

## NEW: NCTM Online Course Packs

Need to provide a set of articles from NCTM journals to your mathematics education students? Check out the new "Course Pack" option. Select the NCTM articles you wish to use in your class, and NCTM will collect them and make them available to your students on line-all for a fraction of the price of what it would cost to purchase the articles individually.

If you would be interested in submitting a course pack request, please fill out the online form at http://www.nctm.org/catalog/forms.aspx?ekfrm=27091. As an incentive to use this program, NCTM is offering $25 \%$ off of one order of NCTM books from the NCTM website.

# Students Tell the Story Best: Creative Mathematics Storytelling Using Narrative Software Peter M. Eley <br> Fayetteville State University, Fayetteville North Carolina Kelly Wade Hines <br> Cherokee Elementary School, Cherokee North Carolina 

"In the future, how we educate our children may prove to be more important than how much we educate them" (Friedman, 2005, p.302). Technology is second nature to students and they accept and use it without question; it is schools that lag behind (Solomon \& Schrum, 2007). The No Child Left Behind Act of 2001 was developed in response to the breadth of literacy skills necessary for students to be successful in the $21^{\text {st }}$ century workforce as well as the increasing need for technology literacy. The primary goal of Title II, Part D of the No Child Left Behind Act of 2001 is the improvement of "student academic achievement through the use of technology in elementary schools and secondary schools" (Butler, Chavez, \& Corbeil, 2007).

Education has started to recognize the vast possibilities of the digital age for changing how students learn, how teachers present materials, and how the various segments of the educational system fit together. Rapid technological innovations are forcing reform that is bringing changes undreamt of even five years ago and unparalleled in the nation's history (U. S. Department of Education, 2005). Due to great advances in technology, students today are exposed to unlimited resources that can be adapted for mathematics learning. Students are only limited by their own creative abilities. The advances in technology have opened the door for students to explore mathematics content from real world situations, in real-time. Using teacher creativity, simple computer software can easily be adapted to function in a traditional classroom situation.

Interdisciplinary learning can be a complex task to conquer. Answering questions about how to integrate science, history, and reading into mathematics instruction is not very easy. It requires a high level of creativity in lesson planning and experimentation to find the right mixture. In this article we suggest an innovative way to reach students and to help continued intellectual stimulation. Digital storytelling has proven to be a solution to the search for a rich technology-integrated form of teaching (Robin \& Pierson, 2005). Through the digital storytelling process, we have attempted to demonstrate how much more powerful technology can be when it is used to support compelling, authentic content (Butler, Chavez, \& Corbeil, 2007). Research has provided evidence that technology has been known to keep students motivated (Eley, 2008). Every opportunity teachers have to use technology should be incorporated into the classroom (National Council of Teachers of Mathematics, 2000).

As educators, it is important to understand that our role as chief instructor is changing; students are now taking control of their education. The infusion of Web 2.0 is changing how students learn and receive their information. Web 2.0 is a web application that promotes collaboration and information sharing among users (i.e., wikis). The role of teacher is changing from instructor of information to facilitator of information (Solomon \& Schrum, 2007). For example, students can receive news as soon as it happens with Twitter and Facebook on their mobile phones before teachers get home to watch the evening news. Other countries, such as Japan, have already started making changes in their curriculum to take advantage of the opportunities that technology provides. For example, Japan is making changes to its curriculum to foster greater creativity, artistry, and play (Solomon \& Schrum, 2007).

Keeping students engaged in the learning process can be one of the toughest tasks for teachers. Teachers must come up with ways to evaluate students and encourage critical thinking and analytical skills. Technology can easily lend itself to accomplishing this task. In Robin and Pierson’s (2005) work, teachers were interested in learning to use technology in the classroom to promote project-based information gathering, personal reflection, and authentic problem solving. As a result of their work, the mathematics and science teachers found ways to use digital storytelling to create stories that would interest their students and encourage them to explore topics in their fields.

We want to introduce you to the Microsoft Photostory 3 computer program. This program is very user friendly and can help students engage in learning. Mostly importantly, it is a free download, if it is not already on your Microsoft Windows based computer.

Using technology, such as Photostory, fosters an environment of collaboraton and communication. Stories created using this software can be framed as project-based learning activities. The skills that are obtained can be used across disciplines. Students continually acquire the information and technology literacy that is required to be competitive in the $21^{\text {st }}$ century. Students are provided the opportunity to become globally aware, financially literate, civically literate, and health aware depending on the project and how students decide to creatively tell their story. This idea of digital story telling is also known as a digital mathematical performance (Gadanidis, 2006). Digital storytelling can be used to encourage learning at a deep level because it combines intellect with emotion (Butler, Chavez, \& Corbeil, 2007).

Pre-service and in-service teachers were introduced to the Photostory 3 program at a professional development workshop held at Fayetteville State University (FSU), sponsored by the Fayetteville State University North Carolina Mathematics, Science and Education Network (NC-MSEN). The teachers in the workshop were given an assignment with a focus of properly identifying, mathematically, geometric shapes in our natural world. Each pair was challenged to do the following:

- Take three different pictures of triangles around the campus.
- Take three different pictures of circles around campus.
- Take one picture of an octagon.

Each pair was given 20 minutes to walk around the school. When the in-service/pre-service teachers returned they uploaded their pictures to the PhotoStory 3 program.


Figure 1. Screenshot of the Photostory Interface with a Triangle Picture Loaded; note the text "triangle" added to the image.

The program allows the user to verbally narrate pictures and tell a story about each picture. Once this process is completed, the pictures are transformed into a video that can be shared in a variety of formats. The in-service/pre-service teachers narrated each picture that was put into the program. They had to explain how they identified each geometric shape through recognizing appropriate geometric properties. For example, they stated that the Figure 1 shape has three sides that meet at points called vertices. They were also able to include text on the pictures (Figure $1 \&$ Figure 2). Then they moved to the next group of pictures and created narration for them (Figure 3).

|  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |

Narrate your pictures and customize motion


Figure 2. Screenshot of the Photostory Interface with a Square Picture Loaded; note the text "square" added to the image.



Figure 3. A Screenshot of the Photostory Interface Showing the Record Feature; music or narration can be added to the picture show.

The in-service/pre-service teachers enjoyed the process. It allowed several things to happen for the students, and it fostered positive collaboration between students, as seen in Figure 4.


Figure 4. Screenshot of the Photostory Interface Showing Student Generated Images.
This activity demonstrated mathematics in context. The students were able to find the shapes as they naturally occur in their surroundings. Students reinforced the properties of these shapes by explaining them in their story. Students got to demonstrate their knowledge of the properties of the shapes and how they were used to identify the geometric shape. Students enhanced their technology skills and built confidence in their mathematical abilities. Giving the students an opportunity to share their work with peers and publish it to a wider audience offered them the chance for deeper conversation about their work and ideas. Additionally, it provided an opportunity for personal reflection on their learning content and learning process.

Students were able to utilize creativity and express themselves throughout the story telling assignment. Each of the pictures was discussed and properties checked by the students, providing evidence of their existence mathematically. Furthermore, Childers (2010) wrote that students can use innovative technology to improve their knowledge of math concepts, skills, and vocabulary when they learn the math standards and then teach those standards to their peers.

An assignment like this benefits students who learn better in a social setting. It forces the students to compromise and make decisions as to what should be included and what should be omitted and why. This also helps students to make logical connections as they begin to write formal proofs. This software can be used easily in a school computer lab.

As an extension, this software can be used on family night at a school as a parent/child activity. Students enjoy using the digital camera to take pictures and using the computer. Students get to hear their voices and they get to produce a product that they can use and upload to a wiki, blog, classroom website, or other social media account to share. The format is also downloadable onto a CD or DVD for parents to take home and share.

Other activities could take on a more interdisciplinary approach, including aspects of science, social studies, and mathematics. For example, students could search the web and calculate the distances and steps that the Native Americans had to travel on the Trail of Tears. During this journey, the students could include the animals that were found along that trail, as well as how geographical regions changed. Students could also calculate the weather patterns and other things. The possibilities are endless. This can be a more powerful tool for class presentations than the static powerpoint presentations to which students are now accustomed.

Digital storytelling clearly demonstrates the whole as greater than the sum of its parts. The ability for students to use basic technologies, like a digital camera, a microphone, and a computer, make digital story telling with Microsoft's Photostory 3 an accessible learning opportunity for all classrooms. As the students' development of digital stories in Photostory 3 become more complex, they are learning and enhancing their own
skills of content creation that will be valuable to them in their future learning. These specific technologies may not be around for the duration of our students' educational careers, but the process and creation skills that are fostered through them will be invaluable as the technology changes.

## References

Butler, J. W., Chavez, J. \& Corbeil, J. R. (2007). The effect of one-day training in digital storytelling on inservice teachers’ anxiety toward computers. TCEA Educational Technology Research Symposium, 1, 8-15.
Childers, M. (2010). Podcasting mathematicians. Welcome to our classroom. Retrieved November 23, 2010, from web.me.com/mchilders/Site/Welcome.html
Eley, P. M. (2008). Does using computer software make a difference in learning geometric and probability concepts? Unpublished master's thesis, North Carolina State University, Raleigh, NC
Friedman, T. L. (2005). The world is flat: A brief history of the twenty-first century. New York: Farrar, Straus and Giroux.
Gadanidis, G. (2006). Exploring digital mathematical performance in an online teacher education setting. In C. Crawford et al. (Eds.), Proceedings of Society for Information Technology \& Teacher Education International Conference 2006 (pp. 3726-3731). Chesapeake, VA: AACE.
National Council of Teachers of Mathematics. (2000). Principles and standards for school mathematics. Retrieved November 22, 2010, from http://www.nctm.org/fullstandards/document/chapter2/techn.asp
Robin, B., \& Pierson, M. (2005). A multilevel approach to using digital storytelling in the classroom. Retrieved November 22, 2010, from retapedia.pbworks.com/f/Using+Digital+Storytelling+in+the+Classroom.pdf
Solomon, G., \& Schrum, L. (2007). Web 2.0: New tools, new schools. Eugene, Or.: International Society for Technology in Education.
U.S. Department of Education, Office of Educational Technology. (2005). Toward a new golden age in American education: How the internet, the law and today's students are revolutionizing expectations. Washington, DC: U.S. Government Printing Office.

## NCTM National Meeting

## Philadelphia, Pennsylvania, April 25-28, 2012

From the NCTM website: Join NCTM in the city of brotherly love to network with peers from across the nation and hear from renowned experts in education. The program will offer more than 750 presentations, including Learn-Reflect Strand sessions dedicated to technology. And you won't want to miss the Annual Meeting exhibit hall with cutting-edge vendors who bring the latest and greatest innovations to your classroom. In a competitive job market this is one event math educators can't afford to miss.


## Award

## Presidential Awards for Excellence in Mathematics and Science Teaching (PAEMST) 2010 Recipient: Amanda Northrup

Congratulations to Amanda Northrup, recipient of the 2010 Presidential Award for Excellence. Amanda is a fifth grade teacher at Riverbend Elementary School in Clyde. She is joined by 103 K-6 mathematics and science teachers from each of the 50 states and four U.S. jurisdictions. According to the White House Press Release, "The Presidential Award for Excellence in Mathematics and Science Teaching (PAEMST) is the highest recognition that a kindergarten through 12 th-grade mathematics or science teacher may receive for outstanding teaching in the United States. . . .The teachers are recognized for their contributions to teaching and learning and their ability to help students make progress in mathematics and science."

## Problems to Ponder $\Omega$

## Fall 2011 Problems <br> Holly Hirst, Appalachian State University

Grades K-2: You participate in a bike race, in which you win 75 cents for every half of a mile that you ride. If you have won $\$ 3.75$, how far did you ride?

Grades 3-5: Twelve cubes are used to create the shape pictured. How many of the cubes' faces canNOT be seen from outside of the shape?


Grades 6-8: You have earned five grades so far in your math class, and you have one more major test remaining. Your grades are $87,92,75,68$, and 77 . You want to receive a final grade of 80 (B) and the final test counts twice in your average. What grade to do you need to make on the final test?

Grades 9-12: In the rectangle below, the segment $A B$ divides the rectangle into two pieces. What is the maximum number of pieces that can be produced with four line segments drawn through the rectangle?


## 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.

Proper acknowledgement is contingent on legible information and solutions.

## Send solutions by 30 November 2011 to:

Problems to Ponder, c/o Dr. Holly Hirst
BOX 32068
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 2011 Issue

You have twenty-five cents in nickels and your friend, Jordan, has forty cents in nickels. How many more nickels does Jordan have?

## Example Correct Solution by Jada Pickering (First Grade at Poplin Elementary School (Mrs. Ruby)).

Note: All of the students who submitted solutions understood that 40 cents was 15 cents more than 25 cents. Those listed below correctly gave the number of nickels rather than the amount of money.

## Other Correct Solutions were submitted by

- Benton Heights Elementary School (Miss Groft): A'Marion Abyia, Adriana Meltan, Bryan Sanchez, Pranjal Gite, Shaliyah Griffin, Tyrique Cureton, Wendy Flores
- New Salem Elementary School (Mrs. Batten): Dylan Little
- Poplin Elementary School (Mrs. Ruby): Chloe Smith, Emilo Villasenor, Jada Pickering, James Lyons, Kamerin Staton, Kaydance Maynard, Leprentis Massey, Lukas Bassey, Makachi Howell, Masan
 Clark, Nicholas Jones, Shane Gregory, Stacy Vassilski, Ty Mincey
- Ravenscroft School (Mrs. Byrne and Miss Crumple): Adrianna Kerner, Annie Brown, Caitlyn Hankins, Hale Roberts, Kelly Davis, Matt Presson, Nick Watson
- Sardis Elementary School (Mrs. Bilbro): Blake Efird, Brandon Reynolds, Brooklyn Hullinger, Luis Morales, Melina Leadenham, Ryan Murphy, Yasmin Bailey; (Mrs. Huntley): Jastin Farmer; (Mrs. Matysek): Gabriel Hepka; (Ms. Mote): A J Albrecht, Rodney Jackson; (Ms. McMackin): Matthew Nanny, William Rose


## SOLUTION: Grades 3-5 Spring 2011 Issue

Trace ate half of a pizza for lunch. Then Shekama ate one third of what was left when Trace was finished. How much of the pizza is left for you?

## Example Correct Solution by Heather Pressley (New Salem Elementary School (Dr. Little)).

Note: Many of the students reported the number of slices left as two, but did not indicate how many slices there were in the pie total. Two is correct for a six slice pie, but not for other numbers of slices.

## Other Correct Solutions were submitted by:

- Benton Heights Elementary School (Ms. Groft): Pranjal Gite; (Ms. Lorenz): Felecia Simmons, Kehiry Yosilin Capote
- Marvin Elementary School (Mr. Hazel): Hannah Rose, Jordan Meewes, Noah Matthews; (Ms. Melton): Abigail Tadeo, Elijah, John Grayson, Makenna Melchor, McKenzye Smalls, Peyton Hoover, Will Snuggs; (Mrs. Stephano): Ethan Robinson, Jacob, Jake Long, Jillian Bailey, Marcus Robitaille, Nicholas Sheets, Riya Defazio, Skylar Lane

- New Salem Elementary School (Mrs. Harris): Andrew Driver, Hannah Locklear, Jake White, Lauren Quick, Parker Sullivan; (Dr. Little): Abrey Austin, Alex Gaura, Anna Medlin, Gracie Croasman, Heather Pressley, Jacob Mosley, Jared Smith, Jonathan Wallace, Karis Brooks, Kelly James, Kira Small, Maggie Thomas, Taylor Holt, Tyler Owen, Zach Savery
- Porter Ridge Elementary School (Mrs. Andrews): Brandon Blakeborough; (Mrs. Hoover): Mason Acker; (Mrs. Kraftson): Anita Tishchenko, Asare Brown, Daniel Rumley, Desiree Bain, Devin Ledbetter, Diana Grubnyak, Evan Tibbetts, Gage Sutton, Jeffrey Scott, Mackenzie Root, Megan O'Neill, Peyton Wade, Victoria Yercheck; (Ms. Lokash): Anastasia Boyarkin
- Sardis Elementary School (Mrs. Sutton): Samantha Argo
- Sun Valley Elementary School (Mrs. Stevenson): Sidney Cline
- Waxhaw Elementary School (Ms. Conner): Adam Mason, Armando Paguaga, Bethany Davis, Jaime Stegall, Marc Crimmins, Olivia Elgin, Remington Blansett, Tristan Twitty, Rack
- Western Union Elementary School (Mrs. Underwood): Briana Catalano, Marlee Lapinsky, Will Elrod


## SOLUTION: Grades 6-8 Spring 2011 issue

José's mom is 42 years old. She had José's brother, who is three years less than twice as old as José, when she was 19 . How old is José?

## Example Correct Solution by Matthew R. Lee (Seventh Grade at Bertie Middle School (Mrs. Mizzelle))

Note: Many students had the (wrong) answer 10, because they did not correctly handle the "three years less than" part of the problem, which requires that the student think about "undoing" the process. Determining that the brother was 23 and subtracting 3 instead of adding 3 yields the (wrong) answer 10.


## Correct Solutions were received from

- Bertie Middle School (Mrs. Carlton): Gavin Artino; (Mrs. Jefferson): Imunique Mann, Ricardo Rodriguez; (Mrs. Mizzelle): Matthew Lee; (Mr. Orbita): Aaron Belch, Bailey Mizell, Haley Belangia, Isaiah Leary, Jason Cowan, Sha'Nidra, Tauheeah Jawharah; (Mrs. Sails): Bria Moore, Cody Burton, Tyrik Stephenson; (Mrs. Tyson): Nashyra Shade
- Cuthbertson Middle School (Ms. Hamp): Alex Reynolds, Blake Miller, Brent Schepel, Brianne Goebel, Brie Mullan, Brooke Pascale, Caleb Sloop, Claire Falleson, Elizabeth Karp, Jesse Mays, Josh Geiger, Nick Abbaticchio, Rheece Hilliard, Samantha LaRossa, Zane Bernard
- Marvin Elementary School (Mrs. Stefano): Gabriella Chiarenza, Jillian Bailey, Katie Deville, Marcus Robitaille, Nicholas Sheets,
- Marvin Ridge Middle School (Mrs. Harpham): Abby Moulton, Alex, Allie Randall, Anna Redford, Ashley Riley, Austin Ries, Ben Cook, Ben Shelley, Benjamin, Cayla Hashe, Chris Graveline, Cole Curran, Colleen Cabugason, Corey Davis, Drew Keth, Emily Every, Emma Hennessey, Griff Myers, Hanna Gannett, Hannah Scott, Joanna Nixon, Joey Franzaglia, Josh Cardwell, Lauren Helmers, Lea Hoevas, Leah Meissner, Leah Shelton, Mack Despard, Mason Bhatia, Michael Kronovet, Neil Palkar, Noah Minsk, Rachel Tavolacci, Steven Fracasso, Zac Curtis; (Mr. Myers): Cedric Cosma, Haley Rose, Hannah Henderson, Katie Mueller, Kodi Obika, Liam Florian, Mary Rothenberger, Rosie Cortelli, Samuel Graham, Skyler MacLeod, Sydney Schwai
- Piedmont Middle School (Mrs. Lueallen): Drew Little
- Porter Ridge Middle School (Mrs. Stewart): Abigail Hiley, Amanda Conti, Casey Huntley, Chris Verrill, Hayden Pitero, Christian Montoya, Connor Johnson, Dennis O'Neil, Ellie Thompson, Federico Pereira, Gabriel Horne, Grant Morgan, Grayson Henley, Greyson Rath, Jonathan Hiley, Joshua Berger, Madeline Farris, Marc Duemmler, Rebecca Komer, Robert Lair, Sarah Welch, Tierney Love Edwards
- South Asheboro Middle School (Mr. Hynd): Abbie Worsham, Alexia Gallegos, Alicia Peterson, Angelica Talley, Bailey Allgood, Canna Aguier, Connor Criscoe, Elizabeth Rodriguez, Haley Henderson, Hannah Ferguson, Josiah Clark, Katy Cernava, Lindsey Farmer, Mackenzie Hammer, Maria Castro, Meredith Priest, Nataly Unansaca, Parris Brown, Sam Wilson, Tristan Vance, Wesley Chilton, William Moon, Wilson Kidd, Zoe Greeley; (Mrs. Runnfeldt): Alex Elliott, Alexis Dilldine, Brianna Reynolds, Maci Bunting, Matthew Swaney, Molly Wells, Moses Speight, Parker Clayton, Ryan Hughes; (Mrs. Salamone): Allison K., Amar S., Amber Moon, Aranza Gallegos, Ayana Davis, Benjamin Clauser, Carter Hurley, Dawron McDonald, Dylan Hoffman, Emily Johnson, Gleisy Cruz, Jonathan Hendershot, Joseph Purnell, Maegan Fontana, Matthew White, Michael Payne, Preston Russell, Savannah Lambeth, William Kearns
- Waxhaw Elementary School (Ms. Conner): Christopher Caracos, Jaimee Stegall, Olivia Elgin


## SOLUTION: Grades 9-12 Spring 2011 Issue

In Soixante-Dix land, there are 70 pennies ( P ) in one Franck ( F ), the main unit of currency. A burger, one order of fries, and 2 soft drinks cost 2 F and 49P. A burger, two orders of fries, and a soft drink cost 3 F . Two burgers, one order of fries, and a soft drink cost 3 F and 67 P . What is the cost of a soda, a burger, and one order of fries?

## Example Correct Solution by Sara Doster (Eleventh Grade at Ragsdale High School (Mrs. Marshall))

Note: Other than Sara, all of the students used elimination to find the costs of individual items (rather than just the sum of the items), some in the form of systems of equations and some using matrix format.

## Correct Solutions were received from

- Ragsdale High School (Mrs. Marshall): Sara Doster, Bonnie Ertel, Emily Forrest, Clay Guernier, Chelsea Gunter, Brodie Loman, Jack MacDonald, Matt Martin, Zach Owings



## Mini-grant Report

Math Night at Voyager Academy Jenny Murray, Voyager Academy

Teachers at Voyager Academy planned math night with the goal of demystifying $21^{\text {st }}$ century math for many of our families. As teachers, we often hear that math today looks unfamiliar to parents who may have been used to more traditional ways of calculating and thinking about mathematical concepts. We wanted to highlight the strengths of our math program and help parents understand that perhaps it's not quite as different after all.

Our first step in planning a family math night was to apply for the necessary funding. We wrote and received an NCCTM mini-grant that allowed us to purchase reusable math manipulatives. Next, we surveyed teachers to find out where they saw the needs of our families. From that information, we planned stations based on five of the strands of mathematics: Number and Operations; Algebra; Geometry; Measurement; and Data and Probability. We also added a math and literature station. We wanted to meet the needs of families with both younger and older students, so we made sure that each strand was represented with at least four activities aimed at a range of ages. With our grant funding, we purchased materials for each station including geo solids, scales and balance materials, attribute blocks, books, trundle wheels, and pattern blocks.

We found two books to be very helpful in planning our activities: Family Math Night, Math Standards in Action (2005) and Family Math Night, Middle School Math Standards in Action (2006) both proved to be invaluable resources. From these books, we had our choice of games, reproducibles, and materials lists, and each activity was linked back to standards! Parent volunteers created display boards, made recording folders for each child, and manned our stations so that teachers were available to interact with children and answer questions. The evening was well received by parents, students, and teachers!

## References

Taylor-Cox, J. (2005). Family math night: Math standards in action. Larchmont, NY: Eye on Education.
Taylor-Cox, J., \& Oberdorf, C. (2006). Family math night: Middle school math standards in action. Larchmont, NY: Eye on Education.

## Applying for Mini-grants

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. 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 $\$ 800$.

## Directions

The application is available on the NCCTM website [http://www.ncctm.org](http://www.ncctm.org). 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. Grant proposals must be postmarked or emailed by September 15, and proposals selected for funding will receive funds in early November. You will receive an email confirmation of receipt of your proposal. If you do not receive a confirmation within one week, follow up with the Mini-grant Coordinator. Be sure that your NCCTM membership is current and active for the upcoming year! Each year we have applications that cannot be considered because of the membership requirement.

## Awards

## 2011 NCCTM Math Logo Contest Winners

State Winner<br>Jonathan Schwartz<br>$9^{\text {th }}$ grade, East Chapel Hill High School<br>Teacher: Beth Neill



Finalists
Caroline Li
$8^{\text {th }}$ grade, Hanes Magnet School, Winston Salem
Teacher: Monika Vasili
Kelsey Lattimer
$7^{\text {th }}$ grade, Elizabeth City Middle School, Elizabeth City
Teacher: Avery Jennings
McKenzie Quattlebaum
$11^{\text {th }}$ grade, Ridgecroft School, Ahoskie
Teacher: Jenks Johnson
Macy Cardwell
$4^{\text {th }}$ grade, New Vision Magnet School, Madison
Teacher: Jill Daniel

Trevor Moody
$2^{\text {nd }}$ grade, Liberty Elementary School, Liberty
Teacher: Lindy Kirkman
Lucas Kelly
$6^{\text {th }}$ grade, Startown Elementary School, Newton
Teacher: Teresa Costner
Nova Cunningham
$4^{\text {th }}$ grade, Norris S. Childers Elementary School, Lincolnton Teacher: Denise Smith

Lindsey Ebaugh
$12^{\text {th }}$ grade, Tuscola High School, Waynesville
Teacher: Randy Pressley

## Awards

## 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: Lee V. Stiff
326-D Poe Hall, Box 7801
North Carolina State University
Raleigh, NC 27695-7801
Sending information in the form of emails is okay: lee_stiff@ncsu.edu

## NCTM on Facebook

Already a facebook user and want to keep up with activities that "illuminate" the mathematics principles and standards? Check out "NCTM- National Council of Teachers of Mathematics" and "NCTM Illuminations" on Facebook.


## 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 Robert Joyner, Trust Fund Chair.

## Puzzles

Futoshiki: Place the digits 1 through 6 in the cells so that each row and column contains each digit once, and all of the inequality symbols are satisfied. Here is a challenging one for you to try.


Sudoku: Place the digits 1 through 9 in the cells so that each row and column lists each digit only once, and so that each outlined block contains the digits 1 through 9 only once.

|  |  |  |  | 6 | 4 | 9 |  | 1 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |  | 2 | 4 | 6 |
|  |  | 4 |  |  | 9 |  |  | 8 |
| 2 | 7 |  | 5 |  |  | 1 |  |  |
|  |  | 9 |  |  |  | 6 |  |  |
|  |  | 6 |  |  | 7 |  | 2 | 5 |
| 3 |  |  | 8 |  |  | 5 |  |  |
| 8 | 9 | 7 |  |  |  |  |  |  |
| 1 |  | 5 | 2 | 7 |  |  |  |  |

Solutions are posted on the Centroid page.

## 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:

NCCTM Trust Fund Chair 1302 Oakview Dr.
Greenville, NC 27858

Direct inquiries to:
Robert Joyner, Chair
phone: (252) 756-6803
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: $\qquad$

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.

## NCCTM Board

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## Becoming a Member

Follow the "Membership Information" link on the ncctm.org website, or go directly to: http://www.ncctm.org/members/register.cfm



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