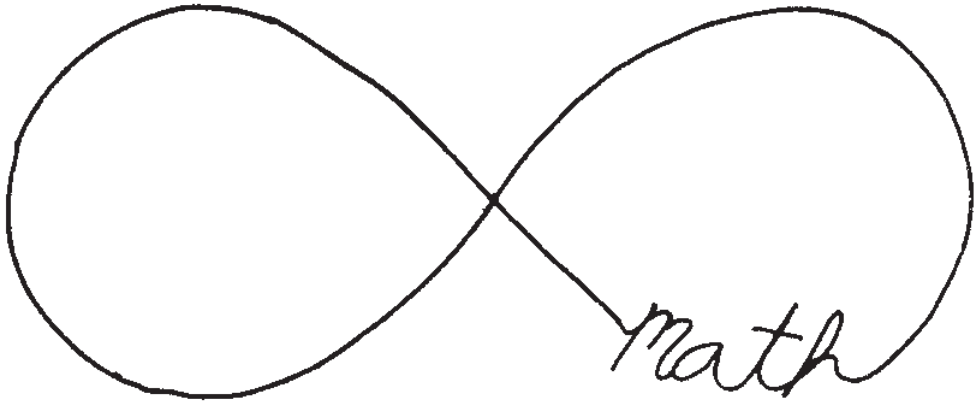
The Centroid



the possibilities are endless...

In This Issue:

OFFICIAL JOURNAL OF THE NORTH CAROLINA COUNCIL OF TEACHERS OT MATHEMATICS
VOLUME 39 • NUMBER 2 • FALL 2013

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

Submission of Manuscripts

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

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

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

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

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

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

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

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

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

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

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

Editorial Board

About the Cover

The featured logo is the current year's winning logo from the NCCTM Logo Contest; entrants are K-12 students.

Copyright

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Articles

News & Information

Common Core: The Journey Continues

NCCTM 2013 Conference: Oct 31-Nov 1

Koury Convention Center, Greensboro

Come and join the fun! The program is available on the NCCTM website. The keynote speakers this year:

Linda Gojak: President of the National Council of Teachers of Mathematics, author, and Director of the Center for Mathematics and Science Education, Teaching and Technology at John Carroll University

Doug Clements: Author and researcher, University of Denver, writer and member of the Common Core State Standards Committee of the National Governor's Association and the Council of Chief State School Officers

Stuart Murphy: Author of over 60 children's literature books including the well-known MathStarts series

Teruni Lamberg: Author of Whole Class Mathematics Discussions: Improving In-Depth Mathematical Thinking and Learning and faculty member at the University of Nevada Reno

Diane Schaefer: Consultant for the U. S. portion of the Mathematics Assessment Project (MAP) from the Shell Centre (London, UK)

<http://www.ncctm.org>

NCCTM Fall Leadership Seminar

Koury Convention Center
9:30 AM to 3:30 PM, Wednesday, October 30, 2013

Leadership Seminar Keynote Speakers

Linda Gojak
President of the National Council of Teachers of Mathematics
Title: Leading for Change in the Common Core Era

Diane Schaefer
Consultant for the U. S. portion of the Mathematics Assessment Project (MAP) from the Shell Centre (London, UK)
Title: Using Formative Assessment to Understand Student Thinking

To register, go to http://www.ncctm.org

Presidents' Messages

State President
Deborah Crocker
crockerda@appstate.edu

My first year as President of NCCTM has been busy and lots of fun so far! There have been a few challenges, but the Board of Directors of NCCTM and the members have been so supportive and helpful. I want to thank all of you. I enjoy serving as your President and representing our organization across the state. It takes all of us to improve the teaching and learning of mathematics in North Carolina.

I hope you are planning to attend the 43rd Annual State Mathematics Conference of the North Carolina Council of Teachers of Mathematics! The theme for the conference is "Common Core: The Journey Continues." This opportunity for professional development will provide you with a wealth of knowledge and information to take back to your district, school, and classroom and time to network with friends and colleagues to share ideas. Be sure to visit the exhibit hall and examine the materials and print resources available to enhance your Common Core classroom.

This year, we are trying a conference app, Grupio. We are also trying workshops with no tickets. The seating in workshops will still be limited to 40, but the seats will go to the first 40 participants at the workshop. You will not need to have a ticket for a workshop this year. The National Council of Teachers of Mathematics (NCTM) is offering a Learn-Reflect Strand, at our conference, consisting of a group of sessions with the theme "Number and Operations: Be Radical and Get Real". There are sessions in this Strand for every grade band.

We are continuing the CCSSM Product Showcase presentations at the back of the exhibit hall. Look for the signs with the topics and times as you enter the exhibit hall and at the back of the exhibit hall outside the Showcase area. We are also continuing the on line evaluation form for the conference. Be sure to fill out the evaluation at the end of the conference. It can be accessed at: http://tinyurl.com/ncctm2013eval.

Kathleen Lynch-Davis and Chrystal Dean, Conference Co-chairs; Sheila Brookshire and Kelly DeLong, Program Co-chairs; and Karen McPherson, Program Booklet Editing Chair, along with all of the conference committees and volunteers, have worked hard to provide you with this wonderful professional development experience!

Make plans to join us for the NCCTM Awards Celebration on Friday, November 1 from 7:00 a.m. – 8:30 a.m. in Guilford C. This is a change in day and time from past years. We will recognize Outstanding Elementary Teachers from across North Carolina, present the Outstanding Pre-service Teacher awards, the Innovator Award, and the Rankin Award, among others. Join us to congratulate all of the recipients.

Check the web site, ncctm.org, for information on NCCTM Spring activities. We will have regional conferences, regional and state math fairs, regional and state math contests, the spring Leadership Seminar, and more! Spring is a great time to involve yourself and your students in these mathematics opportunities. Look for information at ncctm.org on submitting proposals for next year's conference soon! Watch the web site for information on the Spring 2014 Leadership Seminar. It will be on Friday, March 28! You don't want to miss it!

Eastern Region President
Katie Schwartz
schwartzca@ecu.edu

Greetings from the Eastern Region! I am honored to be following Ron Preston as president of the NCCTM Eastern Region. We thank Ron for his excellent service over the past few years, leading our region during the transition to the Common Core State Standards. As we continue to implement the CCSS, mark your calendars now for the NCCTM Eastern Regional Conference on February 15, 2014 at UNC Wilmington. This year our theme will be Assessing the Common Core. We will be digging into ways to assess students' understanding of the CCSS. How do we know what our students know? We look forward to seeing you there!

Meanwhile, we have started back to school, and there is much work to be done. I hope you had some time to relax and rejuvenate this summer. I got a chance to visit with my family for a few days. In the midst of reminiscing, I was reminded how my nephew, Josh, who is now 22, went through a period in his toddler years where he would run up to people and say, "I'm going to give you 18 hugs!" He would also ask for 18 biscuits at supper or 18 more books to be read to him at bedtime. You see, 18 was the biggest number he knew. In his mind, if you had 18 of something, you had all you could ever want and more.

These days we find ourselves in an education climate where we are lucky to have one of everything, much less "18," so I want to take this opportunity to remind you of the opportunities from NCCTM to help you bridge the distance between one and 18! NCCTM awards mini-grants to classroom teachers each year to help fund special projects that enhance the teaching and learning of mathematics. Also, for those of you in graduate school, the NCCTM Trust Fund Committee semiannually accepts applications from NCCTM members who are elementary or secondary school teachers of mathematics and who are taking graduate courses in mathematics and/or mathematics education as part of a graduate program leading to a graduate degree. The scholarship is $600, and you are eligible to receive it up to two times.

We hope you will take advantage of these opportunities. You can find the details at http://www.ncctm.org. In the meantime, we wish you a wonderful year of mathematics learning with your students.

Central Region President
Vincent Snipes

snipesv@wssu.edu

It is an honor to be elected as the NCCTM Central Region President, which is my second elected position for the NCCTM Central Region. My newly elected regional officers and regional Past President, Pat Sickles (Past President), Melanie Burgess (Elementary Vice-President), Dawn Jenkins (Middle Grades Vice-President), Julie Riggins (Secondary Vice-President), C.E. Davis (College Vice-President), and I look forward to doing exciting things this year for our region.

We would like to get as much participation from the central region as possible for NCCTM activities this year. Help us spread the word about the quality NCCTM activities that take place during the year as well as assist us in recruiting new members to join or old members to rejoin the central region of NCCTM. We want more participants to support mathematics education in our region by joining the organization and have students participate in math fairs and math contests held in the region. The officers of the region are open to any suggestions that you may have. Please feel free to contact us at any time.

Western Region President
Kim Clark

kimberly.clark@bcsemail.org

Greetings from the West! The beginning of a new school year always holds great promise. I hope you are all off to a terrific start!

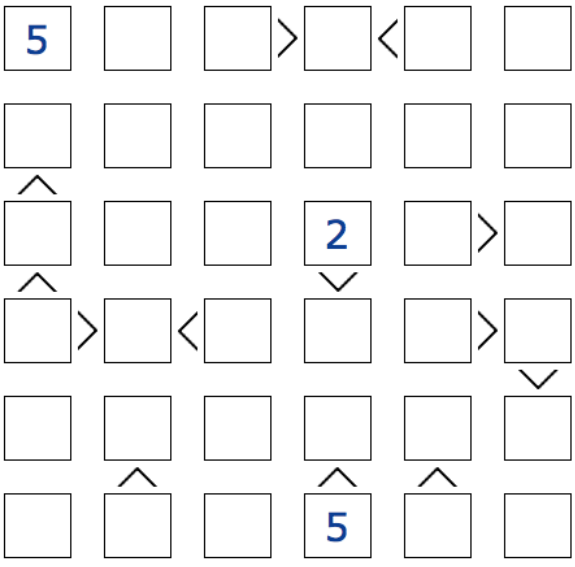
I would like to start by giving you a synopsis of our events from the past year. First, the Western Region Math Fair was held on Saturday, April 13, 2013 at Plemmons Student Union on the campus of Appalachian State University. Participation was great with 118 students, 127 projects, and 35 schools involved. A huge thank you goes to coordinators Sumer Inman and Holly Goforth for all of their hard work organizing the math fair! Additionally, a number of parents, teachers, Appalachian students, and other school personnel volunteered time to make the fair a huge success. Thanks to all who volunteered! Also, the Western Region Spring Conference was held on Saturday, April 20, 2013 at beautiful Charles D. Owen High School in Black Mountain. A special thanks to Katie Mawhinney and the rest of the committee who helped coordinate the conference as well as to all of the speakers who volunteered their time to make the conference a success! We are always looking for ways to better this conference to meet the needs of both pre-service and in-service teachers. If you have ideas, I would love to hear from you.

If you missed this year's events, following is information about next year's events. Mark your calendars! The next Western Region Math Fair will be on Saturday, March 22, 2014 at Plemmons Student Union on the campus of Appalachian State University. Get your students started on their projects, volunteer to be a judge, help in the student waiting rooms, do registration, and/or be a runner! The next Western Region Spring Conference will be at Charles D. Owen High School in Black Mountain. Look for more information about the date of the conference coming soon. We will focus on delivering professional development to both in-service teachers and pre-service teachers in the western region. Contact me if you would like to volunteer to speak. Also, don't forget the NCCTM State Math Conference on October 31 – November 1, 2013 at Koury Convention Center in Greensboro. The program promises to be another great one!

Good luck as you begin the new school year! I would encourage you to put the above NCCTM events on your calendar and get involved in all of the wonderful mathematics opportunities sponsored and supported by your professional organization. You can contact me at kimberly.clark@bcsemail.org with questions, concerns, or ideas.

Puzzle

Futoshiki: Also called "More or Less," the rules of the game are to place the numbers 1 through 7 once in each row and column so that the inequalities are met. Good luck!



Solutions are posted on the Centroid page.

Awards

North Carolina Students Place Second at ARML

Reported by Philip Rash
North Carolina School of Science and Mathematics, Durham, North Carolina

Thirty-five of North Carolina's sharpest high school mathematics students recently competed in the 38th Annual American Regions Mathematics League (ARML) Meet in Athens, Ga., the only on-site national mathematics competition. It included over 140 total teams from over 35 states in the U.S., as well as several international teams.

The North Carolina "A1" team took first place at their site **and placed second in the nation**. Furthermore, Calvin Deng, member of NC's "A1" team, earned a perfect score on the individual round and placed ninth nationally after the tiebreaker round.

North Carolina's team won the ARML meet in 2006 and 2012. Furthermore, NC is the only team in the nation to place in the top 10 every year since 2006. The two 2013 teams of 15 students each were chosen on the basis of their scores on the State High School Mathematics Contest and several national math exams.

Coaching this year's team were Archie Benton, North Buncombe High School, Weaverville; John Noland, Cary Academy; Ken Thwing, Freedom High School, Morganton; Philip Rash, North Carolina School of Science and Mathematics (NCSSM), Durham; Jeff Lucia, Providence Day School, Charlotte, and Kathy Hill, Athens Drive High School (retired), Raleigh. "These coaches, under the leadership of Archie Benton, have become an outstanding team at training and identifying the best math students in North Carolina," said John Goebel, past chair of the State Mathematics Competition.

North Carolina's "A1" Team included: Jeffrey An, NCSSM, Cary; Michael An, Green Hope High School, Cary; Franklin Chen, Enloe High School High School, Cary; Calvin Deng, NCSSM, Cary; Michael Gao, NCSSM, Chapel Hill; Kavi Jain, NCSSM, Charlotte; Tony Li, Raleigh Charter High School, Cary; Jason Liang, NCSSM, Raleigh; Justin Luo, Enloe High School, Cary; Sammy Luo, NCSSM, Winston-Salem; Peter Ruhm, The Early College at Guilford, Greensboro; Jonathan Siekierski, Chapel Hill High School, Chapel Hill; Tejas Sundaresan, NCSSM, Cary; Yu Wang, NCSSM, Chapel Hill; Constance Zhou, Charlotte Latin School, Charlotte.

The following students were on the "A2" Team or were alternates: Landon Carter, NCSSM, Cary; Derek Chan, Jack Britt High School, Fayetteville; Sam Chen, JH Rose High School, Greenville; Angela Deng, Carnage Middle School, Raleigh; Peter Eastwood, East Chapel Hill High School, Chapel Hill; Parker Garrison, Homeschool, Charlotte; Jay Iyer, The Early College at Guilford, Greensboro; Allan Jiang, NCSSM, Raleigh; Zack Lee, Randolph Middle School, Charlotte; Evan Liang, Enloe High School, Raleigh; Lloyd Liu, Randolph Middle School, Charlotte; Nikhil Reddy, Carnage Middle School, Cary; Sandeep Silwal, Freedom High School, Morganton; David Spencer, NCSSM, Charlotte; Yujian Tang, Enloe High School, Raleigh; Eric Wang, NCSSM, Greensboro; Jenny Wang, Enloe High School, Raleigh; Sarah Wu, Chapel Hill High School, Chapel Hill; Alvin Zhang, TC Roberson High School, Asheville; Matthew Zheng, Enloe High School, Cary.

The "A2" Team consists of younger, less-experienced students and who would normally compete in the "B" Division; however, since the North Carolina "B" Team has done so well in recent years, it was required to compete in the A-Division this year, placing 33rd nationally in the "A" division.

The ARML Meet, which originated in the New England states, has grown to include four sites across the nation: Penn State University, The University of Iowa, the University of Nevada, Las Vegas, and the University of Georgia. The meet, which consists of four rounds, is conducted simultaneously at all four sites. Three of the rounds are team rounds, including a Power Question, the Team Questions, and Relays. There is one Individual Round. Awards are given for each site and for overall national winners. For more information on the contest, see http://www.arml.com.

The North Carolina ARML Teams are sponsored by
The North Carolina Council of Teachers of Mathematics.

Visualizing the States

Alfinio Flores
University of Delaware, Newark, Delaware

This article describes an activity in which participants estimate the areas of other states in relation to North Carolina three times. The resources available to participants increase each time. First they use only their individual mental images of the sizes of the states, second they compare their estimates with that of other participants and explain their reasoning behind their estimates, and finally, they have access to a map of the states. Each estimate is recorded in a table for comparison and discussion.

Mental maps: People constantly create and keep mental images. People carry mental pictures and maps in their minds. Why do you think people need these mental maps? Can you picture a map of the United States in your mind? Picture the location and size of different states, such as North Carolina, Virginia, South Carolina, Arizona, Alaska, California, Texas, Delaware, Florida. Would you like to know how accurate your picture is? Visualize how big is North Carolina in relationship to other states. How does it compare to Virginia or California? How about Alaska?

First estimation.

Let's use the area of North Carolina as the unit of measurement. Write in the first column of Table 1 what you think the ratios are for the sizes of the other states compared with North Carolina, that is, the ratio area of other state to area of North Carolina. If the other state is bigger than North Carolina, the ratio will be bigger than 1. If the other state is smaller, the ratio will be smaller than 1. In other words, estimate how many North Carolinas will fit into each of the other states on the list.

Second estimation. Discussion and possible revision.

Compare and discuss your estimate with your neighbors. Explain the reasoning behind your estimate. If you wish to change your estimate, write a new estimate in column two of Table 1.

Table 1. Recording the estimation of ratios of areas

State	Guess 1	Guess 2	Guess 3	Actual area	Ratio
North Carolina	1				1
Virginia					
South Carolina					
Georgia					
Arizona					
Alaska					
California					
Texas					
Delaware					
Florida					

Third estimation. Using a map.

Now look at a map of all 48 contiguous states (Figure 1). How does it compare with your mental image? Do you still think your second estimate is accurate? When you see the actual map it makes you wonder how your mental image could be so far off. If you want to revise your estimates, write them in column 3 of Table 1.

Figure 1. 48 contiguous states with Alaska and Hawaii at different scales

Map obtained from the National Atlas of the United States, which is in the public domain. Available: http://en.wikipedia.org/wiki/File:National-atlas-blank-state-outlines.png

Notice that the map displays Alaska and Hawaii, like many school maps, in the lower left corner of the map and with a different scale, making Alaska look much smaller than it really is. Even when the difference in scale is made explicit, it is very hard to form a mental image of how big Alaska really is. If we would display Alaska at the same scale, we would see how big it is compared to the 48 contiguous states (Figure 2). When comparing Alaska to Texas, people often do not realize that the area of Alaska is more than twice the area of Texas. Or as one Alaskan explained to a Texan, if you would cut Alaska in half to make two states, Texas would be the *third* biggest state.

Figure 2. Alaska compared to the 48 contiguous states.

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Using the actual areas to compute the ratios

At the end, students can use the actual area values given in Table 2 to estimate the ratios of areas of other states to area of North Carolina. The value for each state, taken from the Census Bureau, represents the total area which includes land area and water area. The water area includes inland, coastal, Great Lakes, and territorial waters. The remark above about the relative size of Alaska and Texas still holds if we consider only land area, 572 for Alaska and 262 for Texas (in thousands of square miles). Other sources report total areas for states in different ways, for example, including inland waters, but excluding coastal waters.

Table 2. Total areas of states

Available from: http://en.wikipedia.org/wiki/List_of_U.S._states_and_territories_by_area

Rank	State	Area (1000 km^2)	Area (1000 sq mi)
1	Alaska	1718	663
2	Texas	696	269
3	California	424	164
4	Montana	381	147
5	New Mexico	315	122
6	Arizona	295	114
7	Nevada	286	111
8	Colorado	270	104
9	Oregon	255	98
10	Wyoming	253	98
11	Utah	220	85
13	Idaho	216	84
22	Florida	170	66
24	Georgia	154	59
27	New York	141	55
28	North Carolina	139	54
29	Arkansas	138	53
35	Virginia	111	43
40	South Carolina	83	32
44	Massachusetts	27	11
49	Delaware	6.4	2.5
50	Rhode Island	4.0	1.5

Concluding remarks

We adapted this activity from one about Australia's states (Lovitt & Clarke, 1988). The activity can be adapted in turn for other area comparisons, such as comparing the area of the school building to the school stadium, to the total area of the school, or to the areas of houses or other facilities or buildings in the city.

References

Lovitt, C., & Clarke, D. (1988). Map of Australia. In C. Lovitt & D. Clarke, *Mathematics curriculum and teaching program activity bank, volume 1* (pp. 317-322). Carlton, Vic.: Curriculum Corporation.

A Tactile Learning Group Activity for Conceptualization of Function Transformations in Algebra

Sarah Swartzel and John Wagaman*
Western Carolina University, Cullowhee, North Carolina

Introduction

There is an abundance of literature that suggests the importance of active learning within mathematics courses of all levels. This is a new idea for many mathematics instructors and professors in colleges and universities. Throughout this study we have outlined an activity that incorporates group work and active learning along with techniques for visual and kinesthetic learners to better conceptualize function transformations in algebra. We hope that this activity can be a first step towards making an algebra class more engaging for the students.

Background Information

Before active learning is discussed, it should be defined. Some authors say that active learning is more of a student's mindset (Petress, 2008), where other authors believe active learning is how material is presented to the students. For example, active learning could be board work, group work, or an activity that requires actual movement around the classroom (Barnes & Jaqua, 2011). For the purposes of this study, we will consider active learning to be the way material is presented within a class. Some authors argue that attendance and attitude are the most critical parts of a student's success in a mathematics class (Thomas & Higbee, 2000). These two things can be difficult for college students, especially when they come straight from high school. This is because the mentality to succeed in a high school, and the mentality to succeed in a college are quite different (Gavalcova, 2008). In college, students must realize that they must learn on their own outside of the classroom. In high school, most learning is done in school with the teacher accompanying students.

In college, students only see the instructor for a few hours each week depending on the course, and, in the majority of courses, much of that time is usually in a lecture setting. Lecture is the traditional way to teach; and is what most instructors and professors do in higher education. Morrell (1999) argues that active learning is helpful for the students, and teaching students should be a priority for instructors and professors. Morrell admits that it can be a difficult transition from a lecture-based class to an active learning-based class, but the author provides ideas on how to take small steps in the direction of active learning. Some of these changes include having students keep journals and to have class discussions whenever possible. Also, having students talk to each other on the first day of class so they are accustomed to talking from the beginning of the course (Morrell, 1999). Before this change can be completed successfully, Katsap (2003) says that the teacher must realize that it is a necessary change.

Purpose

The purpose of this activity is to help students conceptualize function transformations through active learning. The activity was created with the use of pipe cleaners, since they can easily be molded into various shapes and stay in that molded position. In addition, pipe cleaners help visual and kinesthetic learners because they are easily seen, and the students have to physically move the pipe cleaner to model the function. The idea also started as small groups working on various transformations with straight lines, parabolas, and zig-zag functions. After writing a draft of the activity sheet, the activity sheet was sent to several professors for review. Through this review, it was apparent that completing the activity within the 50-minute time constraint of the class would be challenging. Since it was desirable to complete a pre-test and post-test during the 50-minute period, the decision was made to remove the transformations of straight lines, and focus on the transformations of the parabolic function and the zig-zag function. Drafts of the pre-test and post-test were sent out to the same professors for review. After review, some of the questions were removed since they used unnecessarily complicated transformations and other questions were changed. These changes also made the activity shorter and more reasonable for a 50-minute time constraint.

Materials

The activity sheet is provided at the end of this article. Materials needed: One activity sheet per student; one pipe cleaner per student; one evaluation sheet per evaluator.

At the top of the activity sheet are directions for the students. On the activity sheet are two graph: a parabola and a zig-zag function. At the bottom of each graph are three columns each with four related transformations; the first column includes four vertical shifts, the second column includes four horizontal shifts, etc. There is also a box beside each transformation in each column for the students to indicate if they responded correctly for each transformation.

The evaluation sheet for the instructor is also in the appendix. The purpose of the evaluation sheet is to record which transformations were completed successfully, and consists of four tables identical to the one at the bottom of the activity sheet, assuming four groups per evaluator are used with a table for each group.

Participants

The participants in this study were undergraduate students at Western Carolina University enrolled in College Algebra. There were a total of 13 males and 9 females present on the day of the activity. The table below represents the mean and standard deviation of various measures of the participants.

Measure	Mean (Std. Dev.)	Number of students
Math SAT Score	493.5 (48.4)	20
Cumulative GPA	2.61 (0.60)	18
Homework Grade	73.9 (17.7)	22
Quiz Grade	75.6 (14.0)	22
Test Grade	81.6 (14.2)	22
Number of Absences	3.1 (2.1)	22

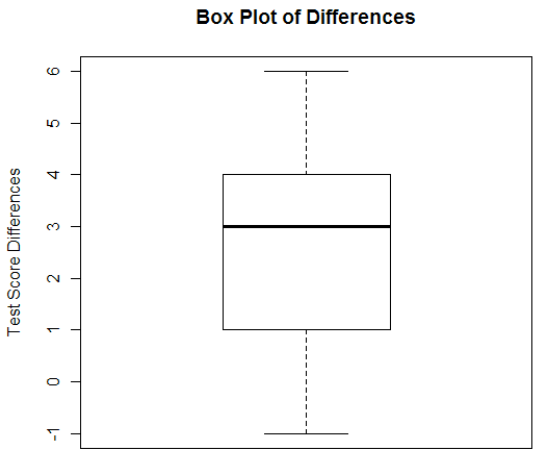
Procedure

In the period before the activity was implemented, one of the evaluators gave a lecture on function transformations. The lecture was focused on linear function transformations, but some parabolic transformations were discussed. There was also a homework assignment for the lecture that was due at the beginning of the next class. On the day of the activity, each participant first took a pre-test individually, which consisted of eight multiple choice questions. When the students were done, they placed their pre-test on a table, and picked up the activity worksheet and read the directions. After everyone had completed the pre-test, an evaluator explained the instructions verbally, and allowed the participants to ask any questions about the activity. The participants were then split into groups. The two students who were not present during the previous class were put into one group, while the rest of the participants could pick their group of four people. This yielded five groups of four and one group of two. There were two evaluators who were each responsible for monitoring the progress of three groups.

Once the activity started, the participants were not allowed to ask for help from the evaluators. Students then worked together to describe each transformation, since the evaluators would randomly select a member to perform each transformation. When a group was ready to demonstrate the first column of transformations, a group member raised their hand to notify their respective evaluator. An evaluator then randomly asked someone in the group to perform one of the four transformations in the column. Each group had six visits from an evaluator; there were three evaluations of transformations applied to the parabolas and three evaluations of transformations applied to the zig-zag function. After all of the groups had completed the activity, each participant individually completed a post-test; the post-test had the same questions as the pre-test.

Results

A boxplot of the test score differences appears below; the differences were computed as difference = post-test score – pre-test score, so a positive difference indicates an improvement from pre-test to post-test.



We assessed the activity effectiveness using a paired *t*-test to compare the pre-test and post-test scores. The samples were dependent, because the same students took both the pre-test and post-test. Here, we let μ_1 represent the mean score of the pre-test for a respective population and μ_2 represent the mean score of the post-test for a respective population. The null and alternative hypotheses are as follows:

$$H_0: \mu_1 = \mu_2$$
$$H_1: \mu_1 < \mu_2.$$

The mean and standard deviation of the 22 post-test and pre-test differences were 2.73 and 1.96, respectively, which yields $t_{21} = 6.54$ ($p < .001$). From these results, we conclude that the activity is helpful in answering questions on the test, on average. In order for the probability statement to apply, the differences of the two test scores must come from a normal distribution. The Shapiro-Wilk test statistic indicates whether it is reasonable that the data come from a normal distribution, where the null hypothesis is that the sample of differences are a random sample from a normal distribution. The *p*-value of this test is .55, which indicates that the hypothesis that the sample differences are a random sample from a normal distribution is not an unreasonable assumption.

Conclusion

We have found using the paired *t*-test for dependent samples that the proposed activity is helpful using the pre-test and post-test. This is important because as stated at the beginning of the study, active learning is become popular in colleges and universities, so the development of just a single successful active learning idea is a step in the right direction. The activity has similarities to a typical worksheet, but is designed to encourage group work and uses student manipulation of pipe cleaners as the main vehicle of conceptualization.

The limitations in this study were the small sample size and that our conclusion is only helpful for the types of questions that were asked in the pre-test and post-test. In addition, the activity was not compared to traditional lecture or other teaching method, so no conclusion can be made to say whether this particular activity is better than a traditional lecture or other teaching method.

References

Barnes, J., & Jaqua, K. (2011). Algebra aerobics. *Mathematics Teacher*, *105*(2), 96-101.

Gavalcova, T. (2008). On strategies contributing to active learning. *Teaching Mathematics and its Applications*, *27*(3), 116-122.

Katsap, A. (September 2003). Empowerment of teachers as learners: Active learning in the college mathematics classroom. *Proceedings of The International Conference of the Mathematics Education into the 21st Century Project: The Decidable and the Undecidable in Mathematics Education*. Brno, Czech Republic.

McFarland, J. (2010). Teaching and assessing graphing using active learning. *MathAMATYC Educator, 1*(2), 32-39.

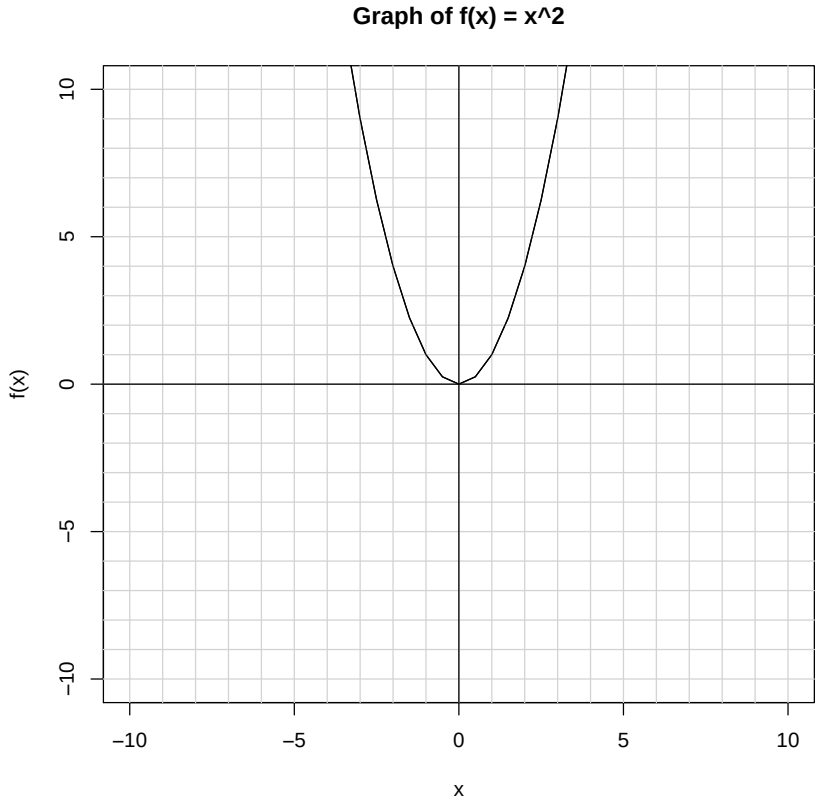
Morrell, J. (1999). Why Lecture? Using alternatives to teach college mathematics. In A. Robertson & B. Smith (Eds.), *Teaching in the 21st century: Adapting writing pedagogies to the college curriculum* (pp. 29-48). New York, NY: Falmer Press.

Petress, K. (2008). What is meant by "Active Learning"? *Education*, *128*(4), 566-569.

Thomas, P., & Higbee. J. (2000). The relationship between involvement and success in developmental algebra. *Journal of College Reading and Learning*, *30*(2), 222-232.

Activity: Parabola Transformations

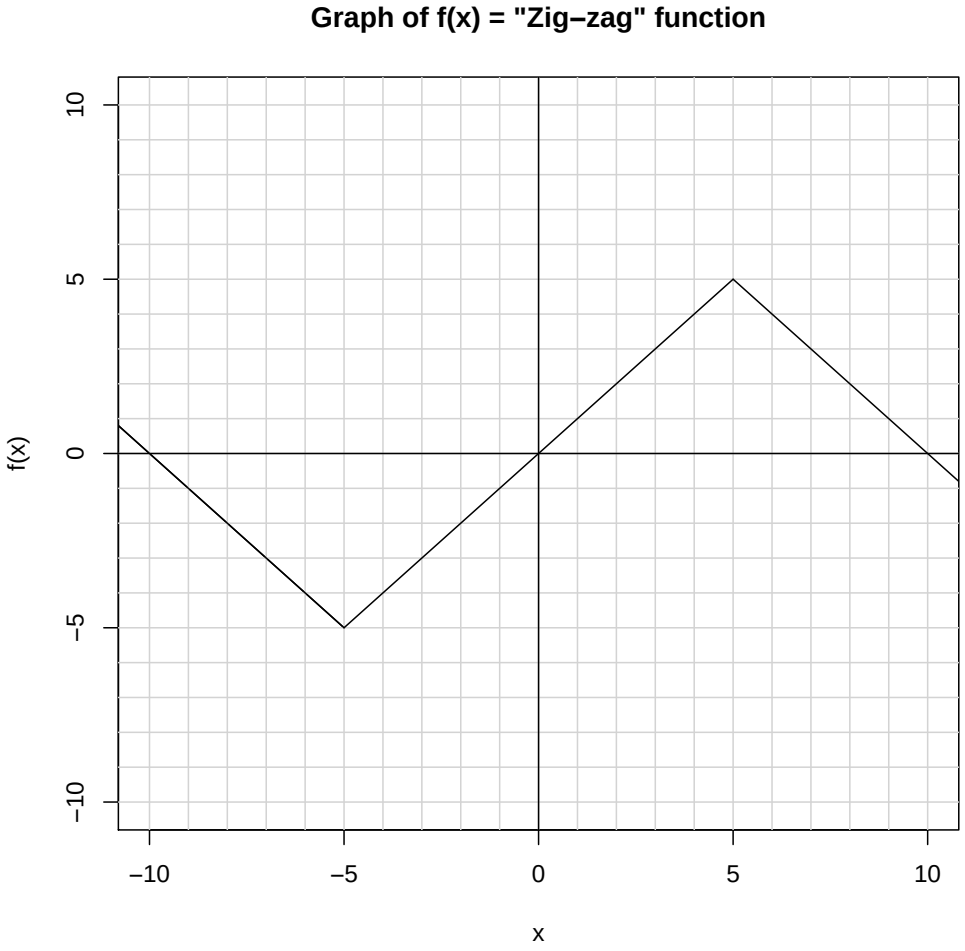
1. Form a pipe cleaner into a parabola and overlay the pipe cleaner to cover the function $f(x) = x^2$.
2. Move the pipe cleaner to make each of the functions displayed in the table below and describe the physical movement you are making in words in moving from $f(x) = x^2$ to each function in the table, i.e., "upward vertical shift of 3 units"; "a parabola that is 4 times narrower"; or a combination of several movements.
3. Once everyone in your group understands all four functions in each column, have someone in your group raise their hand, and an evaluator will come and check off the ones that are done correctly. Make sure you can do all four functions, because the evaluators will randomly assign which one you do when they come to your group.



✓	Parabola 1	✓	Parabola 2	✓	Parabola 3
	$f(x) + 2$		$f(2x)$		$f(x + 2)$
	$f(x) - 4$		$-f(2x)$		$f(x - 2)$
	$-f(x) + 2$		$f(x/2)$		$f(x/2) + 1$
	$-f(x) - 4$		$-f(x/2)$		$-f(2x) + 1$

Activity: "Zig-Zag" Function Transformations

1. Form pipe cleaner into the "zig-zag" function and overlay the pipe cleaner to cover the function $f(x)$.
2. Move the pipe cleaner to make each of the functions displayed in the table below and describe the physical movement you are making in words in moving from f(x) to each function in the table, i.e., "upward vertical shift of 3 units"; "a function that is 4 times narrower"; or a combination of several movements.
3. Once everyone in your group understands all four functions in each column, have someone in your group raise their hand, and an evaluator will come and check off the ones that are done correctly. Make sure you can do all four functions, because the evaluators will randomly assign which one you do when they come to your group.



✓	Zig-Zag 1	✓	Zig-Zag 2	✓	Zig-Zag 3
	$f(x)$ + 2		$f(2x)$		$f(x+2)$
	$f(x)$ - 4		-$f(2x)$		$f(x-2)$
	-$f(x)$ + 2		$f(x/2)$		$f(x/2)$ + 1
	-$f(x)$ - 4		-$f(x/2)$		-$f(2x)$ + 1

Evaluator Sheet

GROUP 1:

✓	Parabola 1	✓	Parabola 2	✓	Parabola 3
	$f(x)$ + 2		$f(2x)$		$f(x+2)$
	$f(x)$ - 4		$-f(2x)$		$f(x-2)$
	$-f(x)$ + 2		$f(x/2)$		$f(x/2)$ + 1
	$-f(x)$ - 4		$-f(x/2)$		$-f(2x)$ + 1

✓	Zig-Zag 1	✓	Zig-Zag 2	✓	Zig-Zag 3
	$f(x)$ + 2		$f(2x)$		$f(x+2)$
	$f(x)$ - 4		$-f(2x)$		$f(x-2)$
	$-f(x)$ + 2		$f(x/2)$		$f(x/2)$ + 1
	$-f(x)$ - 4		$-f(x/2)$		$-f(2x)$ + 1

GROUP 2:

✓	Parabola 1	✓	Parabola 2	✓	Parabola 3
	$f(x)$ + 2		$f(2x)$		$f(x+2)$
	$f(x)$ - 4		$-f(2x)$		$f(x-2)$
	$-f(x)$ + 2		$f(x/2)$		$f(x/2)$ + 1
	$-f(x)$ - 4		$-f(x/2)$		$-f(2x)$ + 1

✓	Zig-Zag 1	✓	Zig-Zag 2	✓	Zig-Zag 3
	$f(x)$ + 2		$f(2x)$		$f(x+2)$
	$f(x)$ - 4		$-f(2x)$		$f(x-2)$
	$-f(x)$ + 2		$f(x/2)$		$f(x/2)$ + 1
	$-f(x)$ - 4		$-f(x/2)$		$-f(2x)$ + 1

GROUP 3:

✓	Parabola 1	✓	Parabola 2	✓	Parabola 3
	$f(x)$ + 2		$f(2x)$		$f(x+2)$
	$f(x)$ - 4		$-f(2x)$		$f(x-2)$
	$-f(x)$ + 2		$f(x/2)$		$f(x/2)$ + 1
	$-f(x)$ - 4		$-f(x/2)$		$-f(2x)$ + 1

✓	Zig-Zag 1	✓	Zig-Zag 2	✓	Zig-Zag 3
	$f(x)$ + 2		$f(2x)$		$f(x+2)$
	$f(x)$ - 4		$-f(2x)$		$f(x-2)$
	$-f(x)$ + 2		$f(x/2)$		$f(x/2)$ + 1
	$-f(x)$ - 4		$-f(x/2)$		$-f(2x)$ + 1

GROUP 4:

✓	Parabola 1	✓	Parabola 2	✓	Parabola 3
	$f(x)$ + 2		$f(2x)$		$f(x+2)$
	$f(x)$ - 4		$-f(2x)$		$f(x-2)$
	$-f(x)$ + 2		$f(x/2)$		$f(x/2)$ + 1
	$-f(x)$ - 4		$-f(x/2)$		$-f(2x)$ + 1

✓	Zig-Zag 1	✓	Zig-Zag 2	✓	Zig-Zag 3
	$f(x)$ + 2		$f(2x)$		$f(x+2)$
	$f(x)$ - 4		$-f(2x)$		$f(x-2)$
	$-f(x)$ + 2		$f(x/2)$		$f(x/2)$ + 1
	$-f(x)$ - 4		$-f(x/2)$		$-f(2x)$ + 1

Mini-grant Report

Flatten the Middle Math

April Coggins
North Davidson High School, Lexington, North Carolina

When training to teach the common core in the summer of 2012, I began to get anxious about getting my room prepared for the 2012-13 school year. I realized that the traditional rows of desks would not be sufficient in the new Math 1 curriculum. I needed to emphasize teamwork and discovery learning with hands-on activities. I tried sliding desks together, but it was impossible to have a flat surface for students to work on when their desks are slanted. I could see it now. There would be books, calculators, pencils, papers, white boards, markers, erasers, and manipulatives hitting the floor throughout the day. Where would it all go? I knew that when we worked on building triangles with spaghetti, I would be cleaning up spaghetti for months. There had to be a better way.

I tried a card table between four desks, but there was no way I could get six in my room and still have room to move around in the classroom. After drawing out ideas, asking for suggestions from colleagues, and moving things around, I finally came up with an idea. I drew out the plans for a frame and found a guy who would weld one of the frames so I could see if it was going to work before I applied for the grant. I was so excited when I read the email I received from NCCTM. It read, "Congratulations! You have been selected to receive a NCCTM mini grant. Your request for $728.64 was fully funded." The project name is "Flatten the Middle Math." The eight frames I proposed would allow students to have a flat surface between them during class, when needed.

Description of the frames

The 2' by 2' aluminum frame will fit between four desks. It is just like putting a table between the students, but there are no legs and it has some added benefits. It takes only two desks to hold the frame in place, but six could work around it if necessary. The piece allows space on the top for a 2' x 2' white board to fit securely into place. This allows the students to put all their materials on their desk and the manipulatives on the flat surface in the middle of all of them. It allows them to work out solutions together with a marker and the white board at the same time they are engaged in hands-on activities to learn. The white boards can be lifted out of the frame quickly and used to present things to the class. They are sturdy, light weight, and will last for years and years. They are easy to transport from class to class and store in a classroom. I was able to purchase eight frames and eight white boards to utilize in my classroom. I have them with the markers and erasers in a wooden box with compartments and wheels. It can just roll from class to class.

The frames have worked out well. I am still able to separate students to work on quizzes, tests or other activities individually when the need arises. There are a few things that I need to continue to develop. I have a few students who cannot sit still. Imagine that! We have only had a frame fall twice, but I need to find a way to keep the frames from slipping off. If the students jump around or slide the desks, the frames could fall. I am considering adding something to the sides of the frames to help. It also takes a few minutes to get the frames set up. It will be much easier next year, if I am teaching common core all day. Then I could leave them set up most of the time. I realized that I needed to spend some more time explaining how to set them up with my students. Now that I have assigned a student to handle the materials for each group, it saves a lot of time.

The students have really liked the frames. The first time we used them, I asked the students to let me know what they thought. Here are a few of the comments I heard mentioned in class.

- Cool
- Awesome!
- We now have plenty of room, and we don't have to sit in the floor.
- Maybe my calculator won't fall all the time.
- The white board as the table is cool. It just comes right out and we can use it for other things.

Figure 1: Students Working on the Tables
pictures courtesy of the author and printed with permission of the parents

I would encourage teachers to apply for a mini grant through NCCTM. The instructions are on the website, and they are always willing to help you with any questions you may have. As stated on the website, "NCCTM provides funding for NC teachers as they develop activities to enhance mathematics education. There is no preconceived criterion for projects except that students should receive an on-going benefit from the grant." I have used the frames several times, but I hope to use them even more when I get further into the course. We have only been in the semester a couple of weeks. I am excited about the project and I am so thankful I was given the opportunity to have the frames built and utilized in my classroom. Thank you NCCTM!

Applying for NCCTM 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>. 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.

Problems to Ponder

Fall 2013 Problems

Holly Hirst, Appalachian State University

Grades K–2: Mrs. Kline's class was given the task of measuring the width of the door to the classroom with a ruler. Katie reported that her measurement was 42 inches; Josie reported that her measurement was 20 centimeters; Trina reported that her measurement was 5 yards. Explain which student was correct and why the other two must have made a mistake.

Grades 3–5: Steve and Kemal have offered to bring fruit salad to class as a snack to celebrate the end of the school year. Steve's recipe calls for 3 cups of strawberries and 2 cups of melon. Kemal's recipe calls for 5 cups of strawberries to 3 cups of melon. Susan likes strawberries a lot more than melon; which recipe has a higher ratio of strawberries to melon?

Grades 6–8: Frank is going to send some flowers to his wife. Lexington Florist charges $3 per rose, plus $14 for the vase. Jaclyn's Flowers, in contrast, charges $2 per rose and $41 for the vase. If Frank orders the bouquet with a certain number of roses, the cost will be the same with either flower shop. How many roses would there be? What would the total cost be?

Grades 9–12: The terms of a sequence of positive integers satisfy $a_{n+3} = a_{n+2}(a_{n+1} + a_n)$, for n = 1, 2, 3, ... If $a_6 = 8820$, what is a_7?

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 15 December 2013 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 2013 Issue

Sha'Nica has beads to string on a necklace. There are 7 green beads. There are 3 fewer yellow beads than green beads. There are 2 more red beads than yellow beads. How many beads are there of all colors combined?

Editor's Note: No correct solutions were submitted. The solution for this problem: 7 green + 4 yellow + 6 red = 17 of all colors.

SOLUTION: Grades 3-5 Spring 2013 Issue

The average of 4 numbers is 32. What would the fifth number in the average have to be to bring the average down to 30?

Editor's Note: No correct solutions were submitted. The solution for this problem: The average of 4 numbers being 32 implies that the four numbers sum to 128. Five numbers averaging 30 implies that the 5 numbers sum to 150. So the fifth number must be 22.

SOLUTION: Grades 6-8 Spring 2013 issue

Replace each blank with an operation to make the following statement true:

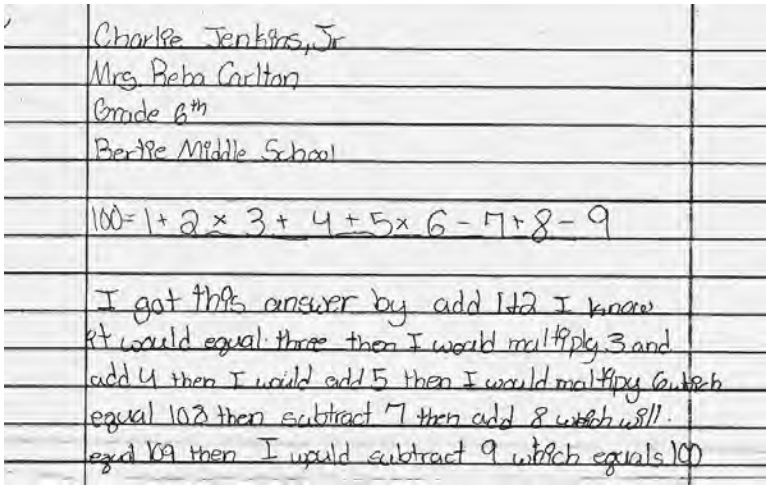
100 = 1 _ 2 _ 3 _ 4 _ 5 _ 6 _ 7 _ 8 _ 9

The students listed below under "correct solutions" submitted the solution 1+2+3+4+5+6+7+8x9, which requires no parentheses to change the order of operations. A number of students submitted different solutions, which would have relied on careful use of parentheses. None of the students showed the parentheses in their final answers, but a few described their order of operations correctly and so I list them here:

(1+2+3+4+5)x6 -7+8+9: Caleb Mayo and Darius Roscoe (Mrs. Ruffin's class at Bertie Middle School); Horatia Poteat and Tanner York (Mr. Hynd's class at South Asheboro Middle School).

((1+2)x3+4+5)x6-7+8-9: Charlie Jenkins (Mrs. Carlton's class at Bertie Middle School).

((1x2)+3)x4x5+6-7-8+9: Garrett (Mrs. Ruffin's class at South Asheboro Middle School)


Charlie Jenkins, Jr
Mrs. Beba Carlton
Grade 6th
Bertie Middle School

100 = 1 + 2 x 3 + 4 + 5 x 6 - 7 + 8 - 9

I got this answer by add 1+2 I know it would equal three then I would multiply 3 and add 4 then I would add 5 then I would multiply 6 which equal 108 then subtract 7 then add 8 which will equ 109 then I would subtract 9 which equals 100

Correct Solutions were received from

Bertie Middle School

Mrs. Carlton: Aaliyah Askew, Ajzell Cannon, Akyia King, Austin Medford, Brittany Cobb, Dajah Lugo, Dallas Lee, DazshaQa Coleman, Deandra Simpson, Demetrice Futrell, Deoya Jordan, DeQuante Watford, Destiny Clark, Jahleel Veale, Jamya Jones, Jordan Norris, Jy'Keith Walton, Kentrell Jenkins, Keyonie Rankins, Kimora Miles, Kwame Askew, Nakiya Smith, Naudia Spivey, Norman Razor, Quenton White, Shania Balmer, Shavonda Williams, Shy'ste Barnes, Tahjania Boone, Tevon Askew, Trejon Watford, Tyrese Harris, Wesley Bandy, Zhakyiia Spivey; **Ms. Eley:** Catarina Paiz-Raymundo, Courtney Pugh, Dajhoir Smith, Jer'Tashia

Gaynor, Mendrice Cooper, Nassil Brown, Quantaris Blanding, Rokiyah Gatling, Tyree Cherry; **Mrs. Lee:** Chyna S., Dashea Lee, Dawon Jones, Dezmond H., Isaiah Vargas, JaQuila Cherry, Jaylin McDaniels, Jaylynn Damo, Kyasia Swain, La'Quanda Perry, Latavia Coffield, Lauren Zagless, Lauryn Tann, Lionel Bond, Lizzie Munos, Marcus Elliott, Montaus Brown, Natural Brown, Nyasia Barnes, Savon Outlaw, Shanique Demery, Tatyana Taylor, Tristen Hoggard, Tykel Clark; **Ms. Jefferson:** Angel Baker, Ashton Earls, Elijah White; **Ms. Jobe:** Angel Speller, Kha'Preshea Smith, Raekwon Askew, Sabrina Smith; **Ms. Miller:** Amiluah Puller, Beyonce Williams, Fontayja Sanderlin, Jasiah Freeman, Jayson Jones, Jqunia Williams, Jumonte Gilliam, Kaelyn Sutton, Keyvonda Holley, Ky'Asia Sukin, Marqueze Clark, Patience Nichols, Rakym Vaughan, Santee Boone, Shanitra Spivey, Shaniya Bond, Shauntrell Gilliam; **Ms. Nixon:** Aaliyah Bush, Cameron Williams, Destiny Rankins, Erick Speight, O'Bryan Moore, Raekwon Gilliam, Shenyia Jenkins, Timothy Pearson; **Mrs. Orbita:** Andre Winslow, Jarkyle Faison, Shamara Edwards, Shia Hawkins, Sydney Cowand; **Mrs. Ruffin:** Ashley Bell, Azjanay Taylor, Monaja Dakes, Nadeya Gilliam, Shaylene Andino; **Mrs. Sauls:** DeJanay McCord, Jamiqua Heckstall, Raven Stokes; **Mrs. Tyson:** Ahmaudre Outlaw, Daveon Outlaw, DetanJ Smallwood, Ernest Strawther, Hunter Cobb, Jamel Morris, James Simmons, Jania Leary, Jordan Simmons, Ky'Un Taylor, Sequoyah Swain, Sha'Quesha Richardson, Taylor Scott, Zackias Williams.

South Asheboro Middle School
Mr. Hynd: Alejandra Guerrero, Alejandro Ramirez, Alize Header, Amy, Andrew Cox, Antony Sem, Bianca Torres, Bradon Bunner, Caroline Hinesley, Catie Ficquette, Coby Johnson, Daniel Ruiz, Devon, Emma Ferree, Gavin McQueen, Isaiah Ridley, Jacquazha Nettles, Janette Freshwater, Katie Davis, Kendall Allen, Khamsey Williams, Larry Britt, Linda Sepulveda, Logan Hamilton, Luis Hernandez, Luke Lamason, Madison Stickler, Mariia Naves, Nancy Tejeda, Nate Holland, Ny'Laijah Artice, Prem Patel, Preston King, Randy Posadas, Rebecca Southern, Roger Jaimes, Rosa, Sadie Richau, Tanner Roberts, Taylor Godshall, Tazia Prater, Tyrek Little, Yadira Guerrero; **Mrs. Myers:** Alvis Adames, Ana Pasillas, Austin Rowell, Cade Lebow, Casha Jock, Chloe Smith, Crew Allred, Daniel Cardenas-Rodriguez, Daniel Nance, Danna Moreno, Dylan Bailey, Edith Mata, Emma Trotler, Estafania Landeros, Grayson Armstrong, Irving Borja-Penaloza, Isaac Diaz, Jacob Bolick, Jacob Lawrence, Jacob Rollins, Jacqueline Escalante, Jamar Maye, Jocelyn Cordova, Kari Rice, Karla Bravo-Joachin, Kila Langford, Kordell Foland, Laney Cooper, Luke Davidson, Madelyn Ramirez-Vallente, Mason Simmons, Monty Moody, Morgan Brower, Peyton Dunker, Sierra Winters, Skyler King, Star Comer, Taylor Humble, Thomas Gawf, Tyler Toomes, Tysean Freshwater, Will Clauser; **Mrs. Runnfeldt:** Adam Callahan, Ally Hannon, Angel Zheng, Audrey Havens, Austin Callicutt, Cameron Headen, Daicee Davis, Davin Rammani, E'Iela Lilly, Gage Burlingame, Genesis Naua, Hayden Greene, Janelle Arnau, Joana Martinez, John Cernaver, Julie Blakely, Kalyn Alverez, Laura Gomez, Makayla Hunter, Michael Cornelisa, Nathan Otero, Nautica Scarboro, Taylor Phillips.

SOLUTION: Grades 9-12 Spring 2013 Issue

In Zona-Lata Land, each married couple is expected to continue having children until they have either one child of each sex or a total of four children. What is the average number of children born to each couple in Zona-Lata Land?

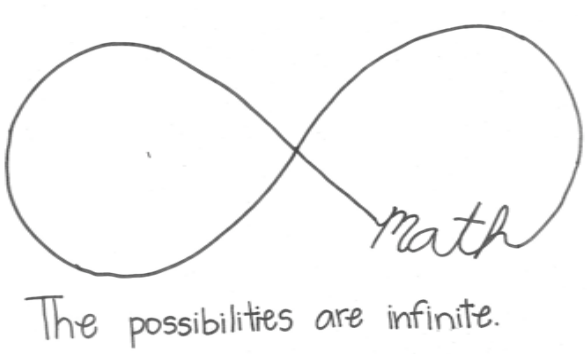
Editor's Note: No correct solutions were received; I leave the solution to this problem unprinted as a challenge.

Awards

2013 Logo Contest Winners

Reported by Tracie Salinas, Appalachian State University

This year's winner
Vivian Scimone
East Chapel Hill High School
Teacher: Beth Neill.



	Eastern Region	
Ashton Earls	Bertie Middle School	Ganell Tyson
Jackson Neely	Rock Ridge Elementary	Kim Eatman
Madison Davis	Rock Ridge Elementary	Kim Eatman
Maggie Mulik	Magellan Charter School	Wanda Sutton
Caroline Lewis	Magellan Charter School	Wanda Sutton
Tanja Sauermann	Ridgecroft School	Jenks Johnson
Mary-joe Harrell	Ridgecroft School	Jenks Johnson
Leah Mundie	White Oak Elementary School	Paula Rinehart
	Central Region	
Angel Gonzalez Olloqui	Charles England Elem.	Ella Frazier
Kevin Brown	Charles England Elem.	Ella Frazier
Joseph Turner	Seagrove Elementary	Kim Gillispie
Chloe Osborne	Elkin Elementary	Holly Richardson Simmons
Autumn Steed	Liberty Elementary School	Lindy Kirkman
Jesenia Ortiz-Ruiz	Pine Forest Middle	Lenora Chandler
Alex Ho	East Chapel Hill High School	Beth Neill
Vivian Scimone	East Chapel Hill High School	Beth Neill
	Western Region	
Leah Matney	Norris S. Childers Elem.	Denise Smith
Cade McConnell	Union Elementary	Denise Smith
Mady Gilbert	Apple Valley Middle	Kylie Corn
Hannah Taylor	Parkway Middle School	Stephen Schmal
Leah Smith	S. Caldwell High School	Angie Poteat
Maggie Hopper	East Rutherford High	Amy Ownes

Nominations for NCCTM 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.

The nomination form can be obtained from the "awards" area of the NCCTM Website (http://www.ncctm.org). more information can be obtained from: Lee V. Stiff, lee_stiff@ncsu.edu.

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.

The nomination form can be obtained from the "awards" area of the NCCTM Website (http://www.ncctm.org). more information can be obtained from: Bampia Bangura, babangur@ncat.edu.

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:

Joette Midgett
North Carolina Council of Teachers of Mathematics
P. O. Box 33313
Raleigh, NC 27636

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

NCCTM Trust Fund Scholarship

North Carolina Council of Teachers of Mathematics

$600 scholarships are available from NCCTM to financially support North Carolina teachers who are enrolled in graduate degree programs or graduate add-on mathematics certification 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;
- Enrolled in an accredited graduate degree or graduate add-on mathematics certification program in North Carolina at the time of course completion;
- Seeking support for a mathematics or mathematics education course completed within the six months prior to the application deadline.

Applications will be reviewed bi-annually and must be postmarked by:

- **March 1 for courses completed in a Fall term**
- **October 1 for courses completed in a Spring or Summer term**

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: _____

Home address: _____
Street

_____, NC _____
City Zip

Home phone: _____ Home e-mail: _____

NCCTM membership number: _____

EMPLOYMENT INFORMATION:

How many years of teaching experience? _____

Currently employed in what school system? _____

School name: _____

School address: _____

School phone: _____ School e-mail: _____

Current teaching assignment: _____

Principal's name: _____

COURSE INFORMATION: (One course only)

Institution of higher education: _____

Graduate degree program: _____

Course name: _____ Course number: _____

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

Name of course instructor: _____

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

BRIEF STATEMENT OF FUTURE PROFESSIONAL GOALS:

REQUIRED SIGNATURES:

Applicant signature: _____ Date: _____

Principal's signature: _____ Date: _____

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

REQUIRED ATTACHMENTS:

Please attach a copy of

1. A letter of acceptance to an accredited graduate program in North Carolina;
2. Official transcript containing the grade awarded to the applicant for the course described in the COURSE INFORMATION above.

NOTE: Applications must be complete to be considered. An applicant can receive a maximum of two awards.

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

NCCTM Board

contact information can be found at ncctm.org

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Math Contest, Philip Rash
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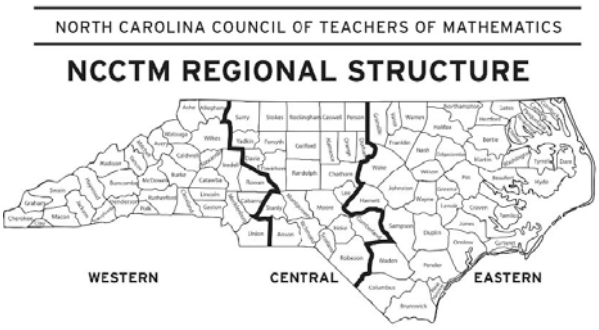
Becoming a Member

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



NORTH CAROLINA COUNCIL OF
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