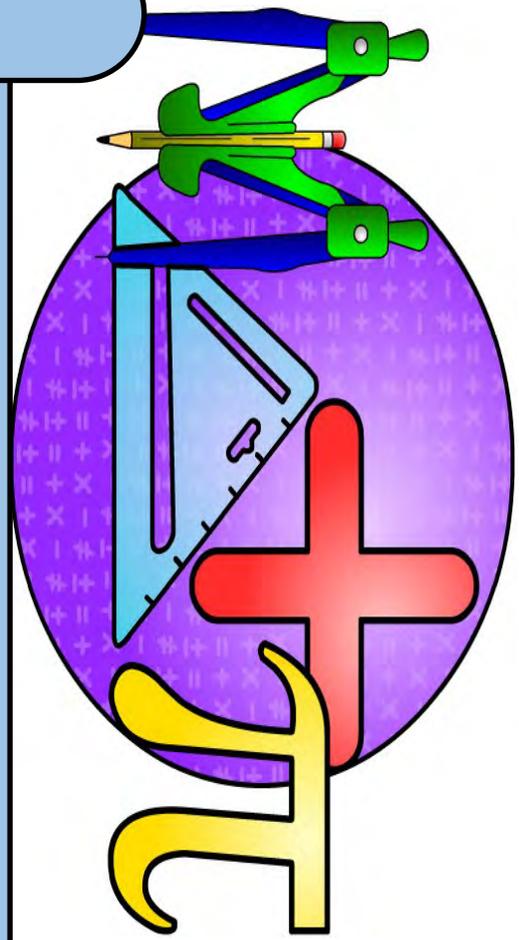




Upper East Tennessee Council of Teachers of Mathematics

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UPCOMING EVENTS

TMTA Annual Conference

Location: Middle Tennessee State University
Date: September 23-24 , 2016
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NCTM Regional Caucuses

Wednesday, April 13, 2016
2:30-4:30 p.m.

NCTM 67th Annual Delegate Assembly

Thursday, April 14, 2016
7:30-9:00 a.m.



## Using Technology in the Math Classroom

*By S. Heidi Porter*

**Morristown-Hamblen High School West, Tennessee**



There is a rising use of technology and initiatives for one-to-one computer classrooms, blended learning, and online learning in education. When technology is used effectively, it is a powerful tool for learning and assessment, but what determines ineffective versus effective use? In a staff meeting earlier this year, when deciding which classroom teachers would pilot one-to-one computers, the comment was made that the math classrooms were only using computers as calculators in the schools observed for implementation ideas. The talk of one-to-one computers seemed to center around use in language arts and social studies classrooms. This comment left me rather shocked, because I feel the use of computers in a math classroom could be very beneficial and effective to learning math. The capabilities of technology to present concepts dynamically, visually, and individually modified give it the potential for powerful instructional use in the math classroom. However, I feel there is a delicate balance to the use of technology, and there are times as math teachers that we need to also limit its use to aid the learning process. Just like we are observing in new state assessments, there is a need for calculator versus non-calculator portions of instruction and practice.

Technology provides the capability to use dynamic software applications such as Geogebra, Geometer's Sketchpad, Mathematica, and numerous applets available on the internet.

This technology to model and visualize mathematics gives students the ability to learn in a non-judgmental environment where they can experiment and develop their conceptual development. Technology can be used to show visual representations of mathematical concepts that are difficult to demonstrate with traditional two-dimensional paper and pencil, or whiteboard drawings. In addition, the dynamic nature of computer software allows us to easily manipulate the orientation of view, or the parameters of the problem to see cause and effect reactions. This makes the concepts more accessible and understandable to student learners. In a one-to-one computer environment, students also feel more comfortable experimenting with a trial and error process towards conceptual development that eliminates the intimidation of public failure in front of peers.

Technology should not be used to replace classroom discussions. Students should not be connected to computers to watch video lessons of direct instruction with "How to do" problem solving. Classroom discussions are one of the richest sources of constructivist learning that we have as teachers. As teachers, we need to guide the students with assessing and advancing questions to help them develop the process of solving a problem themselves. The traditional lecture of giving the process for solving a problem is what we observe in most of these video lessons. Blended learning combines computers into a setting where there is still classroom instruction. Where I think technology has the greatest benefit in the blended learning environment is the ability to individualize practice to the student. Instead of assigning the entire classroom the same set of 20 problems to solve, math software can adjust problems to the individual needs of the learner. Software can recognize when a topic has been answered correctly enough times to demonstrate mastery, and target learning to give more practice problems in areas of non-mastery. It also makes data analysis of this information efficiently available to the teacher. The negative side to this implementation is the cost involved to schools in obtaining the software.

*Continued on the next page*

There are still many advantages to having students “show their work,” and technology communication is limited when it comes to all the extra symbols and notations used in writing math. Math is its own language, and students often have to be shown how to use complicated math equation editors to be able to “show their work” as the teachers are used to seeing it in the paper and pencil environment. Much of the software still uses multiple choice to collect answers on problem solving sets. There is new development to incorporate drag and drop, and multiple select problems now, but it still does not really allow us to see the students’ actual problem solving process. As a teacher, one of the most valuable forms of feedback I have about my students is still grading papers. When technology takes the grading away from us, I feel we are losing valuable feedback and formative assessment information about our students’ level of understanding. Teachers cannot let the technology take away our means to formatively assess students any more than students should let the technology deny them the process of solving the problem on their own.

Online classrooms need the ability to promote discussion based learning, and not rely just on video tutorials to provide math instruction. The need to develop challenging tasks that students can solve in a community setting becomes more complicated. The use of social media exchanges provides the means for group learning, but these tools are often limited in presenting the math language and symbols we so often use to problem solve. There is also the dilemma that once there is online access, how do you limit the temptation to the readily available internet searches or apps that can solve math problems for you. The integrity of online learning is always in question, and as a teacher, how do you fairly assess what is a student’s genuine math work.

Technology has the potential to have a major impact on education and how we teach, but there are many areas that need to be addressed to achieve effective learning goals. Technology should not replace the teacher, but be adapted as a learning tool to aid the teacher. There are many cost deterrents that hinder school districts from attaining beneficial software.

Much of the technology and software still needs to be modified to be more user friendly to communicating in the language of mathematics. Technology should not restrict a teacher’s ability to collect formative assessment of an individual student’s reasoning and problem solving process. Technology needs to incorporate more math tasks that require group discussion to support constructivist learning. And finally, issues of integrity and accountability of student work need to be addressed when work is completed in an unmonitored environment. I foresee the use of technology in the next several years of education as having the potential to really impact the way we teach and learn, but educators must contribute to the process to use it effectively and efficiently for the benefit of student learning.



*“Teachers cannot let the technology take away our means to formatively assess students any more than students should let the technology deny them the process of solving the problem on their own”*

## Who's Responsible?

By Luci Creech

Sullivan South High School, Tennessee



Who's responsible for one's education? Many people are involved in the education process, but who benefits? In classrooms across the country, year after year, the education system is in motion. In a perfect world, there are no kinks in the process. Truth is, though, obstacles exist. I will focus at the classroom level in this writing. We all know many factors govern America's education.

My answer to the question above is that the students in your class are responsible for their education. I'll restate that. Your students *should* take responsibility for their education. They're the beneficiaries. What does that look like? The learners should show up, daily, prepared. Each child arrives with the necessary supplies and tools, well rested and well nourished. AND each should have his homework...completed. Am I right??? You and I both know that this often does not happen.

The following is a list of "what-ifs" that came to mind as I wrote this essay. *What if...*the child has no food at home? *What if...*the family is not stable? *What if...*the student worked late last night? *What if...*the child had to work last night to help with the family's finances? *What if...*the student had to babysit siblings while parent(s)/guardians were at work? *What if...*he plays a sport? (I know. No excuse. But we hear it, don't we?) A few other obstacles could include drama at school, illness, student/teacher personality conflict, and family drama.

I'm thinking that most, if not all, of our students have difficulties that face them which cause them to make excuses or

have reasons for not performing well. That's where we, the teachers, come in. How do we respond? We often work harder for the child that doesn't work himself rather than uphold the class expectations. We accept late work. Maybe we let them sleep in class, just this once. Or we allow one more day to study for today's test that we've mentioned 520 times a day for the past week. I suggest we allow the student to suffer the consequences of his choices rather than protect him. Wait! What?? Allow the child to suffer? I'm saying yes! (Please note: I know there are many special cases for helping a child be successful. That is not the topic of this essay.)

Most adults know that we learn from our mistakes. So why do we prevent children from this valuable learning tool? I know. It's hard to watch them suffer. So we do what we can as teachers to prevent them from suffering and failing. When we accept excuses rather than uphold what's expected, I feel that we are hindering their growth into adulthood. The ability to overcome an obstacle is invaluable, and students should learn how to do that in the safety of the classroom.

We want our students to do well. But why? And at what expense? Their performance and growth reflect on us. So we do what we feel we should to help them grow and perform. But what about "learning"? I've come to believe that their education is most important and it is their responsibility. My goal is to produce young adults who can think for themselves, overcome obstacles and be successful without excuse. I'll do that one day at a time. One assignment at a time. One test at a time. And they'll be the ones to benefit.

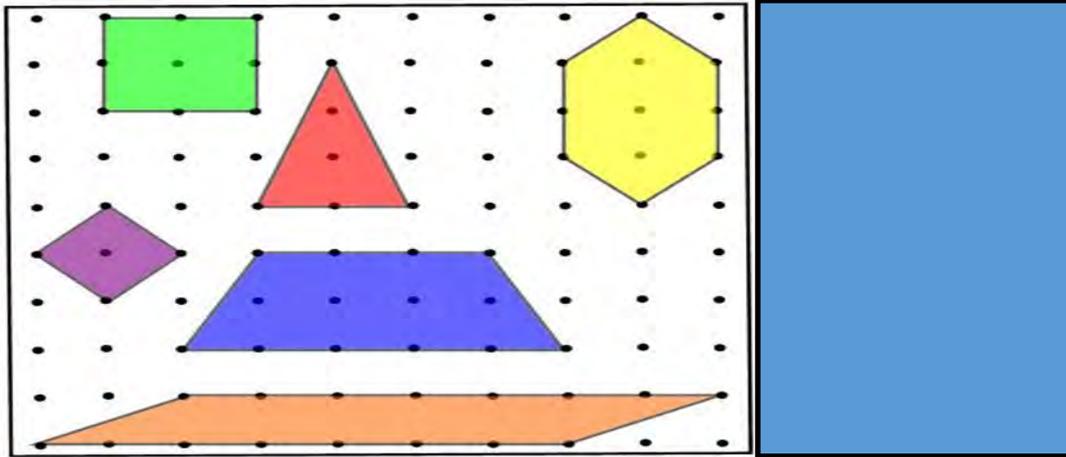


*"The ability to overcome an obstacle is invaluable, and students should learn how to do that in the safety of the classroom."*

# Geoboards: They're Not Just for Geometry

By Kristina Hill

Daniel Boone High School, Tennessee



The National Council of Supervisors of Mathematics (NCSM) encourages the use of manipulatives (NCSM, 2014) as a way to apply the fifth mathematical practice of the Common Core State Standards: “Use appropriate tools strategically” (<http://www.corestandards.org/Math/Practice/>). Manipulatives can be physical or virtual and can include algebra tiles, geoboards, pattern tiles, and cubes, to name a few. Geoboards are utilized by all grade levels mostly for area, volume, and shapes. Students place rubber bands around pegs to make shapes. But why limit yourself to geometry concepts? Here are two non-geometry activities that can be used with the geoboard.

## Activity 1

As an introduction to slope, the geoboard can be used to physically connect the coordinate pairs that make up the equation of a line. Using the sides of the geoboard as the x- and y-axis (you will be using the first quadrant), ask your students to place the rubber band from (1,1) to (5,5) (Figure 1). Discuss with your students what they observe using a technique such as think-pair-share. While there will be many answers, it is hoped that some of your students will notice that the rubber band stair-steps up one peg at a time.

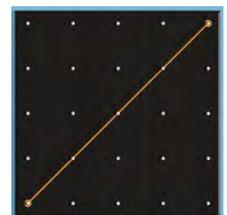


Figure 1

Ask your students if they can use the coordinate pairs to come up with the number 1 and discuss how they came up with their

answers. Can they discover the slope formula  $\left(m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - 1}{5 - 1} = \frac{4}{4} = 1\right)$  ?

But before you tell your students they discovered the slope formula, have your students move the rubber band so that one end is located at (2,3) and the other end is representing (3,5) (Figure 2). Have your stu-

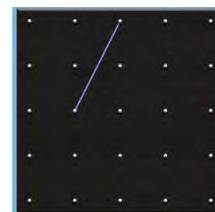


Figure 2

dents discuss this line and how it compared to the previous line. (If needed, remind your students the coord-

inate pairs from the first line so that they can put a rubber band on the geoboard to represent the first

line.) Can they discover the slope is 2? Continue with 2 or 3 more positive lines. Then turn around and give your students a positive slope. Can they place a rubber band on the geoboard that will represent a line with the given slope? Have your students discuss why they placed the rubbers bands the way they did. Give your students 3 or 4 more slopes followed by negative slopes.

**Activity 2**

A professor I had used geoboards in class to ask us to multiply fractions. Have your students create a 6x6 square.

With a second rubber band, have your students place the rubber band across half the square. Next, place a third rubber band across one-sixth of the half (Figure 3). What part of the whole square does the rectangle made with the two rubber bands represent?

Ask your students the relationship between 2, 6, and 12. Can they multiply  $\frac{1}{2} \cdot \frac{1}{6}$  ?

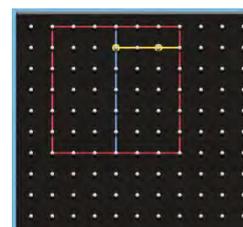


Figure 3

Using the same 6x6 square, let your students place rubber bands to divide the square into thirds followed by dividing one of the three sections into 4 sections (Figure 4). What part of the whole square is one of the small rectangles?

Once again, discuss with your students the relationship between 3, 4, and 12. What is  $\frac{1}{3} \cdot \frac{1}{4}$  ?

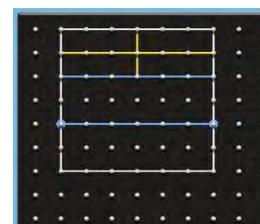


Figure 4

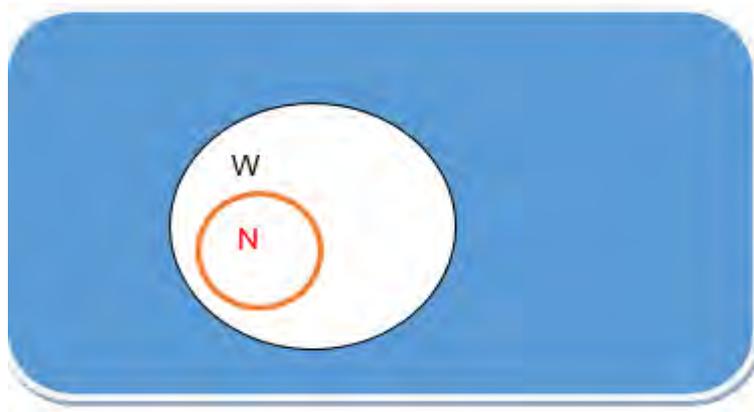


## Are Number Sets Similar To Sets Of People?

By Amy Rigsby

Daniel Boone High School, Tennessee

Number sets are similar to the types of people in our world. Let me explain this peculiar concept. When teaching my high school students about number sets, I like to start with the smallest set first, the Natural set. Natural numbers are the numbers first learned when parents are teaching their young toddlers how to count. For example, the game Hide and Seek introduces them to count and say, "1, 2, 3... 10, ready or not hear I come". This is the set N for Natural numbers. Soon around this age, children learn about astronauts in space and rockets. In playing, they may say, "5, 4, 3, 2, 1, Blast Off". The number 0 is representing the expression, "Blast Off". They have now learned about a number before the number 1. Now we have the set of numbers called W, for Whole numbers. This set of numbers is stated as  $\{0, 1, 2, 3, \dots\}$ . I have displayed a Venn diagram throughout the article for visual exploration.

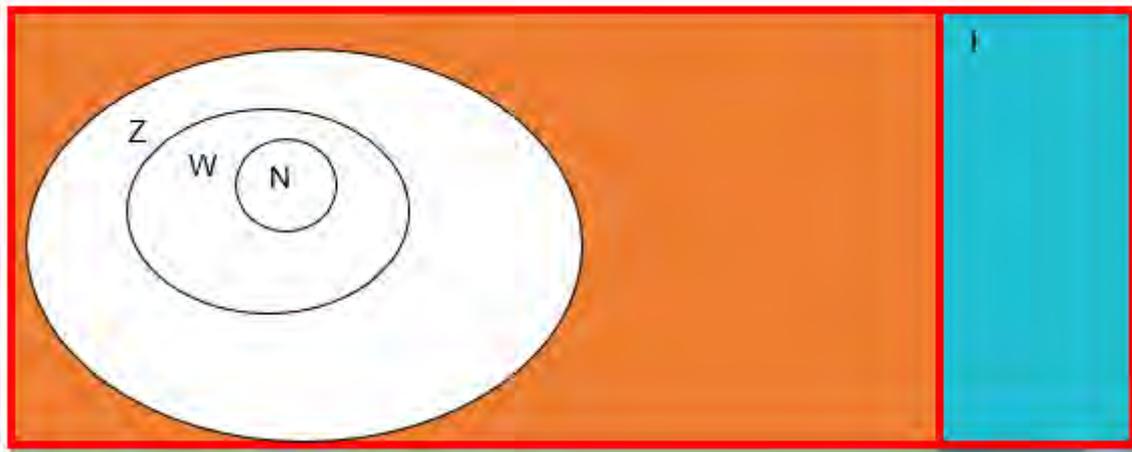


The next set of numbers including the Natural and Whole number sets is the Integer set, Z. Elementary or pre-school students learn that a thermometer reads  $-2^\circ$  outside when it's winter. They may also hear on the news about Minnesota's blistering  $-30^\circ$  wind chill. At this time, young minds realize that numbers go below zero. All Whole and Natural numbers and their Additive Inverses are part of the Integer set of numbers (ex. numbers displayed on a number line). The variable Z represents the Integer set  $\{\dots-3, -2, -1, 0, 1, 2, 3, \dots\}$  because I is already representing a larger set.

Now let us learn the next set of numbers introduced to young learners. The set which includes fractions, repeating decimals, and terminating decimals, of the form  $b/d$ ,  $d \neq 0$ , is called Rational numbers, Q. Again, R was already assigned to represent a larger set called Real numbers. I now begin thinking of Rational numbers like I think *rational* people. The word "rational" in Webster's dictionary means to be agreeable to reasoning, sound judgment, and sensible. A person who has these characteristics is what I perceive as *rational*. Just like Rational numbers, the number terminates or you can tell what the next decimal will be (ex. 2.3333... and 7.25).

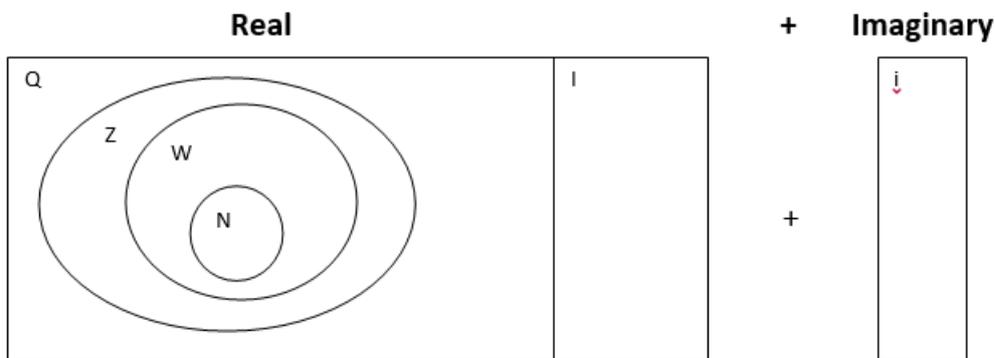
Unlike rational people (numbers), they never stop talking or giving out their opinions and they are hard to deal with. This set of numbers is the Irrational set. Since this set of numbers, I, have an *ir-* as its prefix which means "not" then we can concur that this set of numbers, the irrational set does not stop or terminate and you can't see a pattern for the next number. Of course, not arguing the fact of how important irrational numbers are to mathematics, but the characteristics are not predictable.

Irrational people are similar in meaning to the irrational definition of the number set, because irrational people characterize in the same manner. People of this type are hard to deal with and mostly will never stop talking or dishing out their thoughts and opinions. The Venn diagram shows the irrational set as a sliver all alone. Don't irrational people often find themselves reclusive with their opinions and thoughts?



With the number sets learned thus far, the number sets (people) make up MOST of the world we live in, and this is ultimately the Real numbers (people). The Real number set encloses both Rational and Irrational numbers in its set. Above, the word MOST is capitalized because as students go into high school and take Algebra 2, they learn about a new set of numbers called the Imaginary set (Im). The Imaginary set of numbers is unseen on a graph, but still can be a possible solution to the function. Imaginary numbers are not part of the Real number set, but a set of its own.

### Complex Numbers



You may be wondering how the analogy of “Number VS People” could possibly include the Imaginary set. Well, I will let you use your imagination for yourself, but the next sentence should sum it up for us all. Real numbers/ people plus Imaginary numbers /people equals the Complex Number set.

I will leave you with one last thought:

In the Real world, which consist of Rational and Irrational people adding to this the Imaginary defines our world, most definitely, as a COMPLEX society.



VS

*By Kevin Sluder**Washington County Schools*

In 2007, I had purchased a mobile phone from AT&T. I told them I wanted the best phone they had that could also access the Internet. So I got a BlackBerry and wasn't really all that satisfied with it. The Internet was difficult to read and the phone itself was awkward to operate. I had it for less than a week when I took a trip to the nearest Apple Store, which is about an hour and a half away, and saw the new iPhone that had just become available. I must have played with it for a couple of hours while standing in the store. It was MUCH better than the BlackBerry that I had with me. The Internet was much better and easier to read. And the phone itself was MUCH simpler to operate. So, I wanted to get the new iPhone.

The issue was that the iPhone was \$600 and the BlackBerry was \$250. However, the data plan for the iPhone was cheaper. It was \$20/month and the BlackBerry data plan was \$35/month. So, there arose a question — Since they both require a 2-year contract (remember... this is 2007), what would each one's total cost be after 2 years?

I borrowed a piece of paper and pen from a worker at the Apple Store and proceeded to find out. After all, my wife and I BOTH had to agree that the iPhone was worth the difference in price. Here is what I wrote:

$$C = 600 + 20m$$

$$C = 250 + 35m$$

Now, this being a system of equations, I used substitution to solve it and found that after about 2 years, the cost of owning either one was almost the same. So I discussed the results with my wife and we BOTH decided that I would get the iPhone and return the BlackBerry to AT&T (they had a 14-day return policy at the time). I'm glad I did. The iPhone was a MUCH better "fit" for me than the BlackBerry. And I've had an iPhone ever since.

So what's the point of this story? Ha! Glad you asked. It is just one example that helps to answer the question, "When will we ever use this stuff?" I usually answer that with, "If you know how to do the math, then you might be surprised when you'll use it in your daily life. But if you don't know how to do it, then you'll never use it." And I use this as an example of using math in my daily life.

## MathElites Essay

By Laura Rees, Greene County Schools

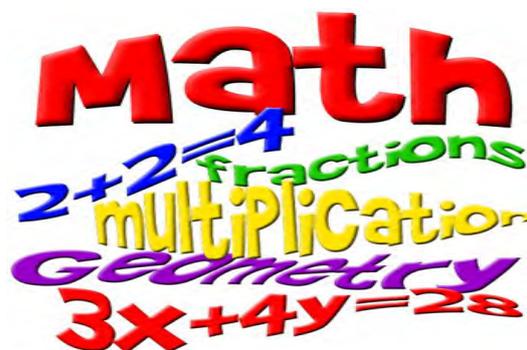


Mathematics has always made sense to me. You find a formula or pattern; you stick to it; you can solve any problem. That was true until my junior year of college in Calculus 1, 2, and 3. My professor did not enjoy teaching Calculus because he believed it was below his level of knowledge, which it probably was. This professor would ramble on about anything and everything except Calculus; then he would expect us to figure everything out on our own. I made it through Calculus with the help of my classmates and my math advisor, but it never clicked with me. I knew just enough to make it through the classes. I knew all the points on the unit circle, but I did not know that they were not just random numbers that someone more intelligent than me decided worked. It was not until Tara Peters talked about where each part of the unit circle and trig functions came from that it all clicked. This is something that I will remember when talking to my students.

There are so many times that we expect our students to just remember formulas or rules without giving them an understanding of why those formulas and rules worked. The easy response when questioned about something is to say because someone more intelligent than you and I decided that it should be that way. If someone had explained Calculus to me better and helped me understand where it all began, I would not have struggled like I did. To me Algebra is an incredibly easy subject to understand, but that is not the case for every student. Being a part of

Mathletes has made me want to do better for my students by explaining concepts in more depth to make sure that they fully understand why we do something.

Mathletes also showed me how to effectively use Algebra tiles to help my students see different properties instead of just talking about them. I believe that my students will now understand the distributive property and multiplying variables instead of just talking about them. I believe that my students will now will now understand the distributive property and multiplying variables better because I can show them why it works with physical tools. This is an aspect of my teaching that has been missing the past two years. I have not been able to physically show my students why certain properties work. The answer has always been well that is just the way it works. I hope that Mathletes will continue for years to come because I know that as a third year teacher I have many more things to learn. I also know that the connections I made at Mathletes with teachers from my own county and surrounding counties will give me many more resources to make my classroom a better learning environment.



*“Being a part of Mathletes has made me want to do better for my students by explaining concepts in more depth to make sure that they fully understand why we do something.”*

# Communication: How to Make Everyone in the Know

By Hillary Wampler

Chuckey -Doak High School, Tennessee



The one thing I wish I was taught in a college education class was how to deal with parents. All types of parents: the hovering ones, the needy ones, the “you’re always wrong” ones, the “what are you going to do for my child” ones, and even the “I don’t care about my kids” ones. You always encounter some type of parent year after year that you wonder “why wasn’t I taught to handle this?!” Then you realize it is life lessons that you encounter daily that form who you are as a person and as a teacher and you push through the difficult conversations.

The conversations most often had between parents and teachers are about student grades. It always boils down to lower than expected performance based on the previous years. I struggle to know exactly what to say to the parents as I usually have no prior knowledge of student achievement other than standardized test scores that are not a predictor of what a student actually knows. Usually the conversation ends with both parties promising to stay in touch with the status of grades and completeness of assignments. Although the promises are made, time takes a toll and we both end up losing track of the time and the beginning conversation takes place all over again.

Personal goals should be set each year to be open with parents and fully disclose any concerns immediately so everyone is on the same page and know where we all stand. I have tried to find several ways to eliminate the need for face to face conversations, not that they are bad things, over the

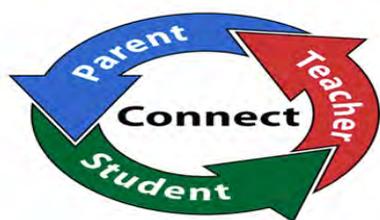
past couple years, but I still want parents to know how their child is performing on homework assignments, projects, tests, etc. It is their right to know.

Sending out weekly printed progress reports is one way to communicate between teachers and parents. The parents can see how many assignments have been given and can put a feel to the amount of work that is expected in each class. The printouts can also communicate the student’s overall grade at the end of the week so when the report cards come out there is not an initial shock to a student’s unfortunate low performance. There are a few setbacks to sending home the progress reports weekly. For one, a teacher will have to be diligent and record grades in a timely manner. If the report only shows one assignment, it does not give a parent enough information to really know where their child is struggling or succeeding. Teachers will need to enter at least the most important assignments of the week to show growth and improvement of students. Another setback could occur if a student does not take the report home to the parents in fear of being punished or reprimanded for not up to par grades. Having a parent signature required the following school day for a homework grade could help eliminate the hiding of these reports, and parents will be up to date on their child’s progress through this communication from the teacher.

Another form of communication that could be used is giving parents access to the students grades online. I used an online gradebook, Engrade, which gave students and parents 24/7 access to their grades and missing assignments. There was some positive feedback from parents liking that they could see the students grade anytime they wanted. However, there was some negative feedback as well as the grades were not instantaneously uploaded to the website. Major test or big projects were uploaded as soon as they were graded, but when there are numerous class loads, it was hard to update daily.

*Continued on Page 13*

Also, since it was not a universal practice in schools, many parents did not know the website was being used as some students did not deliver the take home letter to their parents. This year our school system is fully implementing an online grade book through Skyward. Parents will again have real time access to grades, attendances, assignments, as well as many other things. All parents will know about the availability of continuous grades and attendance records so it should eliminate the “I didn’t know” statement. This change to an online grade book will help the parent become more involved in their child’s academics and place less pressure on the teachers to send out updates whenever they feel a student is in trouble. Unfortunately, there is another slight set back to having the parents with full time accessibility to student grades. If the teacher does not update the gradebook in a timely manner, there could be some strife towards the teacher. This could be handled before the school year even begins by stating the gradebook expectations in a letter home to parents. Going to an online system will benefit both parties and alleviate some of the face to face stress of setting up a conference between teacher and parents by simply writing a short email instead. If the conflict does escalate to something bigger, then a conference should be held so everyone is on the same page.



One last forms of communication that can be used for teachers, parents, and students is through a teacher’s personal websites. Many sites are offered free of charge to teachers and have their own benefits. The three top choices are ClassJump, Schoology, and Edmodo. ClassJump is your basic webpage for teachers to upload class schedules, documents, assignments, and the basic “getting to know me” of a class. It is a great site for teachers to send parents to if they ever have any questions about their class or any materials that a student may have missed if they were absent a particular day. The down side is that material is a little difficult to find as the documents do become bunched up together the more you add to the site, but it is user friendly for even the non tech savvy person.

It is also not a private site, so anyone can see what is posted at any time which is a downfall in some cases.

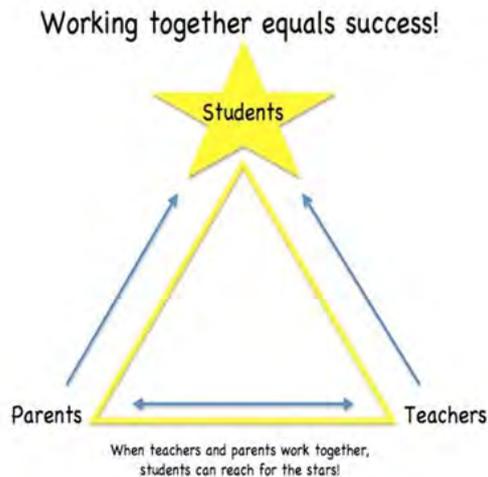
Schoology is a site that is very useful to teachers but could be difficult to manage if one is beginning out due to it being a platform for a digital classroom. Teachers can put multiple choice tests on the site and it will grade them instantaneously, which takes off some of the workload so teachers can upload grades faster. It also is compatible with Remind 101, a text message communication device, and acts very similar to Facebook. Students are able to communicate with the teacher by sending messages at any time and teachers can respond to where only individual students can see the message instead of an entire group of people, so it is one-on-one. Students are also able to turn in assignments such as essays and projects as soon as they are finished so there is less chance of them being lost on the way to school.

Edmodo is the last site that is very user friendly for both parents and students alike. The interface is similar to that of Facebook which most everyone is aware of how to use. Teachers are able to communicate with students’ daily assignments, worksheets, lesson notes, etc. just by uploading the materials to the site. It is a private group setting meaning anyone who wants to join has to have the class code in order to be a part of the group talks, discussions, and have access to class materials. Parents can also be given the code to the site so they will be in the loop with what is being assigned in class without having to ask their child or child’s teacher. Edmodo is a good communication device for students wanting helpful tips and a way to ask questions without being in a classroom.

Using technology as a communication device is very helpful when trying to relay messages back and forth between parents and students. For teachers, there is a paper trail that shows your attempts at communicating and for parents there is a way to find out everything your child may or may not be fully explaining. Because face it, kids are kids, but we all want them to be successful. Communication is the key for the success of a student in any classroom.

*Continued on Page 14*

The conversations may be hard to have and all parties may not agree, but they must be had in order to be on the same page. There is no magical way to communicate and you cannot be taught how to communicate from taking a class. It is learned from real life experiences and trial and errors. One must find the best way that works for them and is successful and willing to look for new ways to communicate when it is not successful.



## ANNOUNCEMENT !!

### TMTA Annual Conference Information

Be Transformed!

Sponsored by: Middle Tennessee Mathematics Teachers

Location: Middle Tennessee State University

September 23-24, 2016

Speaker Proposals are currently being accepted. To apply to speak, complete your speaker proposal form at <http://goo.gl/forms/ljnU6MtBnb>. If you have questions about the form or submission process, please contact Lea Keith at [lea.keith@rcstn.net](mailto:lea.keith@rcstn.net). If you have general questions about the conference, please contact Dovie Kimmins at [dkimmins@mtsu.edu](mailto:dkimmins@mtsu.edu).

## Bridge Math in Tennessee?

By Keith Vannoy

Morristown-Hamblen High School East, Tennessee



Several years ago Bridge math was introduced to high schools, but what was it? Was this some kind of math that can be used to design and model bridge construction? All the questions arose when I was hired to start teaching high school math. With a little inquiry and research I discovered that Bridge math was nothing, so extravagant. Meaning that it had nothing with a new profound method for doing mathematics and the entire world was supposed to start teaching this new method, basically it was nothing new at all.

Bridge math was designed to help students with all the math skills that they had learned through their school career. High school seniors now have a class that would help them refresh, remediate and become proficient at all the skills that they would need for college and life after high school. Most schools in Tennessee used the State benchmarks as guidelines for which seniors would need this help to transition. As a high school math teacher this would pose a challenge, you now have an entire class of students who in some way need help improving math skills. Where would you start, because not every student would need the same skills reviewed? These challenging questions and many more were answered by Chattanooga State in 2012.

Chattanooga State proposed the idea that if these high school seniors needed help, why not let them take college remedial math in the senior year. This idea would help solve college graduation and truly bridge math between high school and college.

By working in local community colleges, students would be able to take the college level remedial math and receive high school math credit at the same time. This was a win for all parties involved: seniors received the remediation, saved money on classes and community colleges could improve graduation rates among students needing remediation.

I was fortunate to be one of the first teachers in Tennessee to work on this program. My students worked through the same remedial math class as someone enrolled at Walters State would, without the expense and waste of financial aid funds. I will have to admit the first year was difficult as we all learned and worked through all the kinks in implementing new programs. We found that this class is not for everyone, but works well for those students who are planning on attending college and are disciplined enough to manage their time and work independently. The program we use is entirely online, as the teacher I do a lot more tutoring and working with individuals than anything else. I have found that for this group of students this method works best, since most of them did not get concepts the first time through or were afraid to ask questions in front of the whole class. I also feel that this program helps prepare students for what college classes will be like, while still giving them the safety net of the high school environment.

## Teachers as Students – MathElites

By Julie Vibbart

Morristown-Hamblen High School East, Tennessee



The last time I was a student in a classroom was five years ago. While I have been to different professional development sessions over the years, I never felt like a student because I did not feel challenged. For the past two weeks, I have felt like a student. I attended the Niswonger/Eastman MathElite Class and it was the best professional development experience I have ever been to.

By being back in the student seat, I gained so much more knowledge. When I was struggling with trigonometric functions, something I have not seen in at least eight years, I immediately related that feeling to what my students must feel when they do not understand a concept. I wanted to give up, but my teacher helped me by explaining it in a different way, which made so much more sense. My teacher had the class do a hands-on activity with spaghetti noodles to map out the sine and cosine graphs. The hands-on element made my understanding go through the roof! After enjoying all the hands-on activities we did in class, I am definitely implementing them into my own classroom. I never had a teacher in middle school and beyond that used math manipulatives or other

hands-on methods. I grew up taking notes and being told “this is how it works” and not even questioning it. In my own classroom, I tended to lean that way, because that is all I have ever really known.

Starting now, that has changed! I will be using manipulatives and other hands-on activities in my classroom because I want my students to question and learn how something works.

Another reason why teachers should be students is that so they can collaborate with their classmates who are teachers from outside their school or school district. Without this opportunity, I would have never met my classmates, nor would I have learned so many great ideas from them, including assigning weekly problem sets and using algebra tiles. I have learned so much these past two weeks while being a student and MathElites has truly intensified my passion for teaching mathematics.



## What's Really In There?

### Exploring Angle Measures in Polygons

By Leanne Barbour, 8<sup>th</sup> Grade Geometry

Martinsville Middle School

Martinsville, Virginia



Many students in Geometry class struggle to remember all the “rules” on test day. Knowing how to find out how many degrees are inside a particular polygon can lead a student to either the right answer or the wrong one. As teachers, we can use exploration tasks in our classrooms to help students recreate these “rules” in their own words and formulas.

One way to encourage students to make formulas their own is to have them to find the formula for themselves. By using the following prompt on the first day of our unit on polygons, students can explore and create their own method for finding the sum of the interior angles of any polygon:

Create a method for finding the number of degrees inside any polygon. You may use any materials from the craft cabinet to model your work. For each polygon, create a model and determine the number of degrees inside that polygon. You must organize your information in a table. By the end of today’s class period, you must be able to present and defend your method for finding the number of degrees inside any polygon.

Consider the following questions in preparing your presentation:

For each polygon, how do you know you have found the degrees inside that polygon?

Can you expand your method to a polygon with a large number of sides (more than 10)? A polygon with an unknown number of sides?

Can you explain your method to another group? To a student who will take the class next year?

Students are expected to create a presentation of their exploration and method. They are also expected to present their method to the class. This task is usually completed with shoulder partners and the students have about 5 minutes to gather the materials they want to use and get started. Most students choose to use craft sticks or pipe cleaners and graph paper to create their models and tables. Each group is given a large piece of chart paper to use to present their method. Students are given 45 minutes to complete the task and prepare their presentation before the Gallery Walk begins. After a 10 minute Gallery Walk, each group is given 3 minutes to explain their method to the class and respond to any questions their classmates may have.

After giving the prompt and getting the groups settled into the task, monitor the groups as they work and ask the following questions as students work through the task:

What is the smallest possible polygon you can begin with?

Can the polygon you are working with be created from other polygons?

Is it possible to use only one polygon to create all your other polygons?

What do you notice when you put all your information into a table?

Can you use these toothpicks (craft sticks, pipe cleaners, etc.) to show me what a triangle (quadrilateral, pentagon, etc.) looks like?

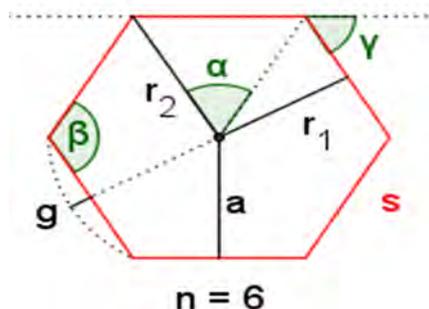
By asking these questions, the teacher can help students wrap their minds around what the task is actually asking and give struggling students a place to start.

As students work through the task, a variety of approaches take shape. Most solution paths tend to follow one of two methods. Some students will start with a triangle because they know the sum of the interior angles is 180 degrees. They then add triangles to create new polygons and find the measure of the angles inside the new polygon. Others will start with a square because they know a square is a special type of quadrilateral and squares have four right angles so the sum of the interior angles is 360 degrees.

Groups that start from a square tend to backtrack to triangles by creating a diagonal in the square to show a triangle has 180 degrees and then divide new polygons into a combination of triangle and quadrilaterals. For students who start with triangles, creating a table of their information will lead quickly to a method for finding the angles inside any polygon. For students who use a combination of quadrilaterals and triangles, creating a table of their information does not show an easy pattern and those groups may have to be redirected towards using only one polygon to create all their polygons.

No matter what path the students start out on, they should all end up at the same place, a formula that describes how to find the sum of the interior angles of any polygon. The way the students choose to express the formula is completely up to them, but every group's formula should be similar.

The hardest part of this whole task is task is the final presentation and defense. Because each group must create a visual presentation (think GIANT post-it notes on the walls), the final results are a combination of creativity and mathematics. The task prompt requires a visual representation, a table of data, and a final "formula" in an understandable format. Using a "silent" Gallery Walk and allowing students to leave warm and cool feedback on separate pieces of paper near each group's "poster" lets the students see other people's approaches to the problem and their solutions.



A 10 minute revision period allows the students to look over their feedback and make changes or corrections to their presentations before they have to defend their solution before the entire class. Each group is given 2 minutes to explain and defend their work and solution after their revision period.

Most students make minor changes to their posters before they "defend" their work and formula. Several groups have been surprised at how similar solutions are between their groups especially when the starting points of models are very different. At the end of the class period, the students have decided on a formula they can use as a class and have a greater understanding of the mechanics of finding the sum of interior angles of a triangle.

Every class has that group of students that finishes early and needs something more to do to keep them out of trouble. With this task, the extension also advances the lesson. At the bottom of the task prompt is the following challenge:

Extension:

Can you find the sum of the exterior angles of any polygon? Explain your conclusion.

Can you find the number of sides of a regular polygon if you are given a single interior angle? Explain your conclusion.

Can you find the number of sides of a regular polygon if you are given a single exterior angle? Explain your conclusion.

*Continued on Page 19*

These extending questions push the students to use what they know about different types of angles to come up with a defensible solution. It also helps students to see the connections between types of angles and their applications in other figures in Geometry.

This task can be adapted to other classes and grade levels. The task can be used in an elementary class as an introduction to extending and repeating pattern and finding a rule from a pattern. In middle grades math, the task can go from pattern recognition to writing rules for patterns. The task can even be extended to classes beyond Geometry as a way to move into sequences and series in Algebra 2 or higher. Not every solution has to be “ $(n-2)(180) = \text{sum of interior angles of a triangle}$ ”. A 4<sup>th</sup> grader may notice that making a polygon with one more side than the previous polygon is just attaching another triangle to the old polygon. A 6<sup>th</sup> grader may notice that there are two less triangles than sides on the polygon so they have to subtract two from the number of sides of their polygon to get the number of triangles and then multiply that number by 180 degrees to find out how many degrees are inside the polygon. A Pre-Calculus student may remember the formula but may not struggle with proving why it works with a model. Using this task at a variety of levels also helps students to see the building blocks and extensions in mathematics.

Not every student sees every concept the same way. But every student is expected to answer questions based on those concepts in a standardized testing setting. By using tasks like this one, teachers give students a chance to explore how a formula is created and make it their own.

### TMTA Teacher / Scholar Scholarship

#### Criteria:

- Applicants must be a TMTA member currently teaching in Tennessee and pursuing either a Masters, Ed.S., or doctoral degree to improve their mathematics teaching

**A completed application must include the following:**

[Scholarship Application Form \(PDF File\)](#)

#### Application Deadline:

**Deadline for Application is normally JUNE 1 each year!**

#### Past winners:

**2011:** Sarah Hacker (Huntsville Middle School, Scott County)

**2014:** Kathryn Taylor

**2016:** Now taking applications

For more information visit:

<https://tmta.wildapricot.org/page-18062>

## The Impact MathElites Had on Me

By David Gefellers

West Pines Elementary School, Tennessee



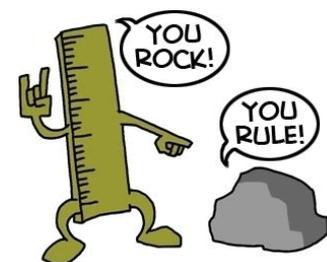
After attending the Niswonger/Eastman MathElites program, I realized how important it is to have my students ready for the next level. As I am sitting in class, Drs. Nivens and Poole are providing strategies for teaching these high school concepts. I started wondering, “Am I using strategies that will help my students be successful?” I suddenly knew the answer. No. I am not preparing my students to the best of my ability. Don’t get me wrong. I do prepare them for the next level, but do I do it with the best strategies available?

Last year was my first year teaching math, second year teaching anything. I knew how to do math, but teaching it was a new area for me. Learning that each of us sees a math problem differently was a struggle for me. I see a math problem and for the most part I can solve it in my head. Some students cannot process it the same way that I did. I tried using some videos from Khan Academy, but it only helped a few.

One day I saw one of my students drawing out the problem. That is when I had the ah-ha moment. I need to model not only the numbers, but also the pictures/illustrations as well as

words. I contacted a teacher from another school in my district to see what she does in the classroom. I spent the day with her observing. I found that I was doing some of the things that she was but she took it a step or two farther. She used math manipulatives and math stations to build student confidence. It was also more engaging.

I took these ideas back to my classroom and implemented them. I admit it was a struggle to get started but well worth the time and effort. My students started seeing math in different ways and became more successful. Even with the success, I see that I can build upon where I ended the school year. Thanks to the MathElites program, I see a direction that will be beneficial to my students as well as myself. I will be adding more manipulatives to my modeling and teaching. I will create a station that reinforces this modeling. Drs. Nivens and Poole provided me with encouragement and a sense of direction for the upcoming year. I took these ideas back to my classroom and implemented them. I admit it was a struggle to get started but well worth the time and effort, you guys, and Tara as well, thank you.



## A Note From Your NCTM Affiliate Services Committee (ASC) Region Representative

Hello NCTM Southern 2 Regional Affiliates,

We will have a "Cove Chat" at the NCTM Annual Meeting in San Francisco on Thursday, April 14, from 12:30 to 1:30 at Cove 2. This is an opportunity for you to meet and network with others in your Southern 2 Region attending the NCTM annual meeting. So bring a friend, colleagues in your affiliate, and any information or materials that you may want to share at the cove. See you there!

Please circulate this Affiliate News among your membership.

-Jeremy Zelkowski, Southern 2 Rep

## Information for Affiliate Leaders

March 2016

### Update Your Affiliate Info

Make sure to update your Affiliate charter information, giving us contact information, Web link, and the dates of your next Affiliate conference, as well as paying your affiliation annual dues. Please visit [www.nctm.org/Affiliates/](http://www.nctm.org/Affiliates/) for Form and Downloads.

### Save the Date: 2016 Regional Conferences

Join us to connect face-to-face with your peers in education and to focus on the learning and resources that promote the mathematical habits of mind that will lead your students to college and career success. Whether you're a classroom teacher, math coach, administrator, math teacher educator, teacher-in-training, or math specialist, there's something for you at the NCTM Regional Conferences & Expositions.

2016 Locations and Dates:

Phoenix, Oct 26-28, 2016

Philadelphia, Oct 31-Nov 2, 2016

### NCTM Unveils New Innov8 Conference.

**St. Louis, November 16-18, 2016** **Innov8 Conference: Engaging the Struggling Learner** [www.nctm.org/innov8/](http://www.nctm.org/innov8/)

Bring your team and engage in a hands-on, interactive, and new learning experience for mathematics education. While focusing on "Engaging the Struggling Learner," become part of a team environment and navigate through three different pathways:

- Response to Intervention (RtI)
- Supporting productive struggle
- Motivating the struggling learner

While collaborating with your team, create your own learning experience, using your choice of format:

- Keynote and expert presentations
- Activities in the Learning Lounge – ranging from one-on-one time with speakers and mathematical innovators, to book discussions, to problem sharing with peers, and more
- Team time to map your strategies and share ideas
- New technologies and solutions from industry partners

### **MET Grants Build Membership and Revenue**

Do you want to implement an innovative project in your Affiliate? Apply for an Affiliate Mathematics Education Trust (MET) grant! Grants are available for \$2000, \$2500, and \$3500 to help your Affiliate build membership and revenues, promote creative projects that help make NCTM and its Affiliates more visible to the public and educational partners, and support the strategic priorities of NCTM. Based on the recommendation of the NCTM Affiliate Services Committee (ASC), the MET Board of Trustees may award the appropriate grant to a Partner Affiliate, Associate Affiliate, and Student Affiliate. The deadline for submitting a 2016–2017 grant application is June 1, 2016. All applications must be postmarked no later than June 1, 2016. Start planning your project now. [www.nctm.org/Affiliates/Resources/MET-Grants-to-Affiliates/](http://www.nctm.org/Affiliates/Resources/MET-Grants-to-Affiliates/)

### **NCTM Unveils New Innov8 Conference**

St. Louis, November 16-18, 2016

**2016 Innov8 Conference: Engaging the Struggling Learner** [www.nctm.org/innov8/](http://www.nctm.org/innov8/)

### **Get Ready for the NCTM Annual Meeting in San Francisco!**

### **NCTM Mathematics Education Trust (MET) Wine Tasting**

**Affiliate Presidents' and NCTM Representatives' Breakfast**

Saturday, April 16, 2016

Invitations will be sent to all Affiliates' presidents and NCTM representatives and RSVPs are requested.

**Affiliate Services Committee (ASC) Session**

Thursday, April 14, 2016

11:00 a.m. -12:00 p.m.

Yerba Buena 8 (Marriott)

Transforming Professional Learning in a Technology-Rich World

Looking for exciting ways to engage members of your organization in professional learning while leveraging available technology? This interactive session will discuss innovative ideas for professional learning using NCTM resources. Explore a model that can support your efforts to grow your leadership and engage all members of your organization.

**Regional Caucuses**

Wednesday, April 13, 2016

2:30-4:30 p.m.

Caucuses allow NCTM Affiliate leaders to meet by area of interest and region to discuss submitted proposed recommendations and responses, introduce new recommendations, network with other leaders, and get information on new initiatives in mathematics education. These caucuses are held every year at the NCTM Annual Meeting and Exposition.

**67<sup>th</sup> Annual Delegate Assembly**

Thursday, April 14, 2016

7:30-9:00 a.m.

The Delegate Assembly is NCTM's formal structure for Affiliates to make recommendations to NCTM about mathematics education issues or Council operational issues. The Delegate Assembly is preceded by regional caucuses, which are held every year at the NCTM Annual Meeting and Exposition.

**Delegates**

The Call for Delegates was sent out in January. Only someone officially designated as the

Delegate by the Affiliate's NCTM representative or president can vote on behalf of the Affiliate at the Delegate Assembly. NCTM Affiliates in good standing are eligible to register two delegates, a delegate and alternate, to represent the Affiliate at the

## Reflection Coves

New this year! Highlighted and invited speakers will be assigned coves in the Moscone West Building on the 2<sup>nd</sup> and 3<sup>rd</sup> floors to continue the conversation from their sessions in an informal setting. However, you have to be present at their session to receive the information regarding their reflection time and space. Board members, Affiliates Services Committee members, as well as the President and President-Elect will also spend time in the Reflection Coves participating in discussions with attendees on topics of interest or stop by just to say hi or for a photo op. There will also be two Math Teachers' Circle coves, one dedicated for K-8 mathematics and another for 9-16 mathematics.

## Bridging the Gap between Research and Practice in Today's Mathematics Classroom

More [Lessons Learned from Research](http://www.nctm.org/Store/Products/More-Lessons-Learned-from-Research,-Volume-1/), Volume 1, *Edited by Edward A. Silver and Patricia Ann Kenney* [www.nctm.org/Store/Products/More-Lessons-Learned-from-Research,-Volume-1/](http://www.nctm.org/Store/Products/More-Lessons-Learned-from-Research,-Volume-1/)

What we discover in research should influence how we teach in our classrooms. This book's 28 chapters are adapted and updated from articles published in NCTM's *Journal for Research in Mathematics Education* between 2000 and 2010. The authors have rewritten and revised their work to make it clear, understandable, and—most of all—useful for mathematics teachers today.

To help teachers even more, these articles have been chosen for their relevance to the eight Standards for Mathematical Practice in the Common Core State Standards. The book's three sections present chapters that relate to reasoning and proving; communicating, sense making, and using tools strategically; and modeling and problem solving. Teachers who are seeking to help students develop these mathematical practices will find insights and support in this survey of research.

Mathematics teachers at all levels will find examples of research that is relevant to the challenges they face. This book, along with its forthcoming second volume, enables researchers and teachers to meet on common ground to improve mathematics education for all students.

## 2016 Affiliate Leaders Conference

July 18-20, 2016 • Las Vegas, Nevada

### **Leadership: Inspire Affiliates & Individuals to Take Action**

Successful change comes down to three basic ideas: the WHY, the HOW, and the WHAT. Come and learn about how attending to these three basic ideas in a strategic way will help your Affiliate and Individuals to Take Action. How might your Affiliate transform to inspire individuals to actively participate to become the next generation of leaders? Why and how might your Affiliate attract new leadership? Why does your Affiliate exist? What activities does your Affiliate plan and why does it do those activities? Those who start with the Why never manipulate—they inspire.

## Student Affiliate Webinar

[Register now](#) to join us Tuesday, March 29, 2016, at 4:00 p.m. Eastern Time, the Affiliates Services Committee (ASC) will present a webinar that focuses on how to create a student affiliate and student affiliate resources. Save the date.

## Start a Student NCTM Affiliate

Starting Student Affiliates is one of the initiatives of NCTM and the Affiliate Services Committee. NCTM members who are faculty in higher education are encouraged to work with preservice teacher leaders to establish and sustain an NCTM Student Affiliate. In the spring, the Affiliates Services Committee plans to offer two webinars. One will examine how to create a Student Affiliate, and the other will focus on Student Affiliate resources. Student-members of a NCTM Student Affiliate receive a complimentary NCTM student e-membership with access to member-only resources at [NCTM.org](http://NCTM.org).

[www.nctm.org/Affiliates/Join/Starting-a-Student-Affiliate/](http://www.nctm.org/Affiliates/Join/Starting-a-Student-Affiliate/)

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## Write or Referee for NCTM Publications

The NCTM publishing program looks to the mathematics education community for expertise, insights, and accurate content. Our authors, who include some of the most respected professionals in the field from the classroom, academia, coaching, and administration, develop professional materials for our teachers, administrators, counselors, and parent members. Covering pre-K–14, NCTM publishes approximately 15 books and 5 journals over the course of a year.

Why referee manuscripts? The answer is simple—you always learn something. As a **referee**, you learn something about writing, pedagogy, and mathematics—every single time.

Why write a manuscript? The reasons are many. For example, teachers and other professionals with excellent lessons, assessments, or ideas about classroom research and practice can share them with everyone in the mathematics education community.

Learn about writing or refereeing for NCTM publications [here](#).

## Nominations Sought for NCTM Board of Directors

Do you know someone who would bring valuable experience, perspective, and judgment to the NCTM Board of Directors? The Board needs a broad representation of NCTM membership to enrich its discussions, inquiries, and decisions. Help the Nominations and Elections Committee identify talented, energetic individuals who are qualified to assume leadership roles in the Council, and nominate them to-day. Get complete details on the process, procedures, qualifications and responsibilities, and school incentives.

<http://www.nctm.org/nominations/>

**MET Grants to Individuals**

Apply for NCTM's Mathematics Education Trust grants, scholarships, and awards. Funding ranges from \$1,200 to \$24,000 and is available to help math teachers, prospective teachers, and other math educators improve the teaching and learning of mathematics. For more information, go to [www.nctm.org/MET/](http://www.nctm.org/MET/) and [www.nctm.org/Grants/](http://www.nctm.org/Grants/)

**Opportunities to Join NCTM Affiliates-at-Large**

Most NCTM Affiliates are organized by geographic area, and each Affiliate is assigned an NCTM Affiliate Services Committee representative. However, some ***NCTM Affiliates are organized around a specific topic in mathematics education***. These groups are called Affiliates-at-Large. Some listings include a link to the Affiliate's Web site. Consider reviewing these important Affiliates-at-Large topics in mathematics education and joining their cause and mission to improve mathematics education for all.

Search for the Affiliates-at-Large here: [www.nctm.org/Affiliates/Directory/](http://www.nctm.org/Affiliates/Directory/)

**2017 Call for Speaker Proposals**

Share your teaching ideas and practices by presenting at the upcoming 2017 NCTM Annual Meeting and Exposition that will be held in San Antonio, Texas, April 5-8, 2017. Call for speaker proposals for the 2017 annual meeting opens on March 1, 2016. Submit your proposal by the May 1, 2016, deadline.

Future Meeting	Location	Date	Annual Dates
	San Francisco, California	April 13-16, 2016	
San Antonio, Texas	April 5-8, 2017		
Washington, D.C.	April 25-28, 2018		
San Diego, California	April 3-6, 2019		
NCTM Centennial Conference	April 2020 (date TBD)		
St. Louis, Missouri	October 21-24, 2020		

**Future NCTM Regional Conferences****2016****Phoenix, AZ**

Oct 26-28

**Philadelphia, PA****Oct 31-Nov 2****2017****Orlando, FL**

Oct 18-20

**Las Vegas, NV****Nov 15-17****Chicago, IL**

Nov 29-Dec 1

**Future NCTM Annual Meetings****2016****San Francisco, CA**

Apr 13-16

**2017****San Antonio, TX**

Apr 5-8

**2018****Washington, D.C.**

Apr 25-28

**2019****San Diego, CA**

Apr 3-6

**Innov8 Conference****2016****St. Louis, MO**

Nov 16-18

**2016****NCTM Affiliate Leaders Conference****Las Vegas, NV**

Jul 18-20

The *Affiliate News* is now developed by the NCTM Affiliate Services Committee (ASC) and will replace the E-Blast messages. The information is provided in two parts: information about NCTM's benefits, services, and events that are relevant to you as an Affiliate officer and a brief message from the ASC region representative. We would appreciate your sharing the information with your Affiliate's membership. Articles from the *Affiliate News* can be reprinted without permission as long as the original source is clearly cited. Feel free to contact your ASC region representative directly. We welcome your feedback at [affiliates@nctm.org](mailto:affiliates@nctm.org) regarding this new format.

## Officers of UETCTM 2016-2017

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MEMBERSHIP APPLICATION

Mail completed form to:

Jerry Whitaker  
Mathematics Curriculum Coordinator  
Washington County Schools  
3089 Highway 11W  
Blountville, TN 37617

Membership Fee \$10  
Payable to: UETCTM

Name: \_\_\_\_\_

Home Address: \_\_\_\_\_

\_\_\_\_\_

Phone: (    ) \_\_\_\_\_

School: \_\_\_\_\_

School Phone: (    ) \_\_\_\_\_

School Address: \_\_\_\_\_

\_\_\_\_\_

Email Address: \_\_\_\_\_

*The Upper East Tennessee Council for Teachers of Mathematics is an organization for anyone involved in mathematics education from pre-school through college in the greater Tri-Cities region. The purpose of UETCTM is to promote excellence in teaching mathematics and to share best practices among mathematics educators.*