UPPER EAST TENNESSEE COUNCIL OF TEACHERS OF MATHEMATICS

Volume XVI, Issue 1 | NEWSLETTER | September 2015

Welcome 2015-2016 UETCTM Members!

It's a new school year, and we want to welcome all of our returning and new members! This year's newsletter will not only keep you up-to-date on UETCTM news and upcoming events, but also includes articles written directly by our members! In this issue, look for ideas for new teachers, useful iPad apps, thoughts on calculators in the classroom, and much more! Have a fantastic and math-filled year!

Interested in Strengthening your Approach to Teaching Statistics?

Consider taking the *Teaching Statistics Through Data Investigations MOOC-Ed Course.* September 28th-November 9th, 2015. For more info click here.

Upcoming UETCTM Meeting

Monday, September 21st from 4:00 to 6:00
@John Sevier Middle School
1200 Wateree Street
Kingsport, TN 37660
See flyer for more information –Pg. 2

"I want my students to know, it is not just my pen that holds the "one and only" algorithm that can ever be used to unlock the mysteries of mathematics. "

- ***Caitlin Tomski***

In This Issue

Upper East Tennessee Council of Teachers of Mathematics

You are invited to attend the next meeting of
UETCTM
on
Monday, September 21, 2015
4:00-6:00 P.M. at
John Sevier Middle School
1200 Wateree Street
Kingsport, TN 37660

Schedule

4:00-4:30 Mix and Mingle
(Refreshments Provided!)

4:30-4:45 Business Meeting & Announcements

4:45-6:00 Session of Choice
(See sessions listed to the right.)

UETCTM is the local affiliate of the National Council of Teachers of Mathematics. The organization hosts meetings each school year allowing the opportunity for teachers to network, to share best practices, and to enhance their teaching of mathematics. You do not have to be a member to attend!

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The following sessions are scheduled for this meeting:

Using Number Talks to Develop Number Sense

(For Grades K-2)

Presented by Suzanne Lewis and Carrie Murray– Kingsport City Schools

Number Talks provide an opportunity for students to reason about numbers and to defend and justify solutions. Participants will learn how to incorporate dot images, ten-frames and rekenreks into number talk routines specially designed for K-2 classrooms.

Number Talks: Helping Students Build Mental Math and Computation Strategies

(For Grades 3-5)

Presented by Amanda Cole and Ashley Carter—Kingsport City Schools

Learn a classroom routine that supports students' habits of mind using the eight mathematical practices. Number Talks support the development of number sense and help to build strong foundations to learn, do, and apply mathematics. Participants will learn to easily incorporate the accountable talk moves in classroom discussion.

Dilating Triangles: Using Measurement and Scale Factors to Investigate Area

(For Grades 6-8)

Presented by Dr. Ryan Nivens—East Tennessee State University

Participants will investigate the results of doubling & tripling the dimensions of triangles. Mathematical foci include measurement, area, perimeter, and similarity & congruence.

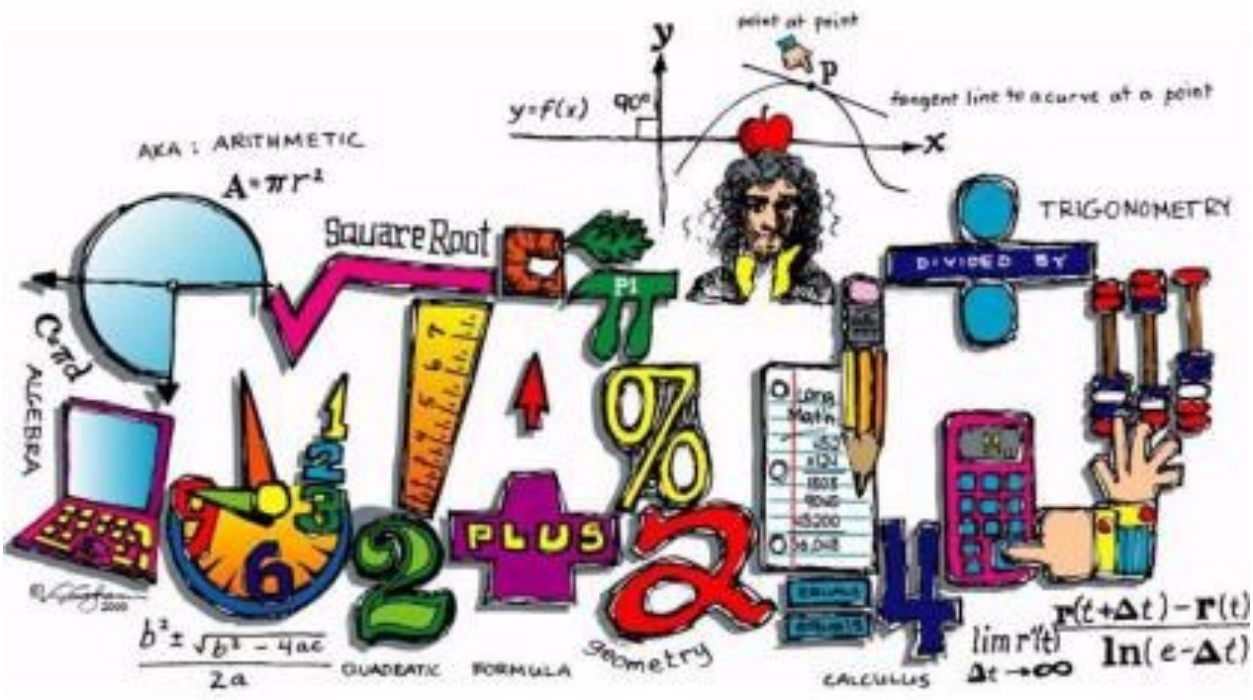
Exploring the Definition of a Parabola/Reflective Properties Using a Wax Paper Folding Activity

(For grades 9-12)

Presented by Tara Peters—Sullivan County Schools

Dr. George Poole—ETSU

This activity will allow teachers and students to explore the definition of the parabola using a hands-on activity that involves folding wax paper. Afterwards, participants will utilize what they have learned to understand why a parabolic mirror reflects light emanating from its focus. We will utilize geometry, algebra, and calculus to understand this reflective property of parabolic curves.



"Being given a rigorous problem beyond the math skills I am used to teaching and enough time to wrestle with my ideas were the two conditions that forced me to be creative and allowed me to really understand the math behind the question."

- Jennifer Cassell on her Summer Mathletes Experience

Monster Mash

By: Katy Hardison

I hear it in the classroom…I see it on Facebook and Pinterest…I hear it from my own adult friends…"I hate Algebra because they mix letters with math!" So many people seem to have an aversion to solving algebra equations simply because they don't like letters and numbers mixed together. This was never more evident to me than the first year that I taught an Algebra 1-Inclusion class.

Lucky for me during my first two years teaching Algebra 1-Inclusion, I had the privilege of working with an extraordinary veteran special education teacher. One of the many things I gleaned from my time with her was what I would like to call "Monster Math". When teaching her students how to solve basic equations or reinforcing that skill, she used a little story that fittingly characterized the variable as "the monster." The equal sign separated the "safe space" from the "danger zone." She taught her students to "run away from the monster".

At first, I thought this monster story wouldn't go over well with high school students, but most of them were very receptive to the scenario, it grew on the others, and many students who previously had great difficulty solving equations found success using "Monster Math", so I took the idea and ran with it. I began to teach struggling students how to solve equations by making the process a story about monsters. I'm not saying this method is for every student, but for some, it's spooky how well they learn Monster Math.

Now for some fun, enjoy this little song to the tune of Monster Mash. I found a nice instrumental version to sing along with at https://www.youtube.com/watch?v=kXRiC2gsV-o. Of course, if you are not familiar with the song, check out Bobby Pickett's original version (https://www.youtube.com/watch?v=vNuVifA7DSU) sung on American Bandstand in 1964.

“Monster Math” by Katy Hardison

I was working on my homework late one night
When my eyes beheld a terrible sight.
Letters mixed with numbers scare me to death,
But then I remembered what my teacher said.

She did the math.
She did the Monster Math (the Monster Math)
It was an Algebra smash (she did the math)
We caught on in a flash (she did the math)
She did the Monster Math!

It’s easy to see what needs to be done.
I have to get the variable monster all alone.
Opposite operations to eliminate.
Do the same to both sides so they still equate.

I’ll do the math.
I’ll do the Monster Math (the Monster Math)
It is an Algebra smash (I’ll do the math)
I’ll catch on in a flash (I’ll do the math)
I’ll do the Monster Math!

Two X plus three is nine
Subtract three from both sides
Now the rest is simple to do
Divide both sides by two

In the term 2x, x had a hold of the two,
Which means 2 had to be the last one to move.
The 3 was the first who could get away.
She ran to the other side where it was safe.

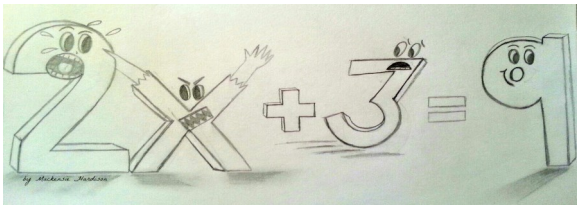
Let’s do the math
Let’s do the Monster Math (the Monster Math)
It is an Algebra smash (Let’s do the math)
You’ll catch on in a flash (Let’s do the math)
Let’s do the Monster Math!

After 3 was safe, it was 2’s turn to flee.
But what opposite operation did we need?
Since 2 and x were side by side
They were multiplying so we had to divide

Let’s do the math
Let’s do the Monster Math (the Monster Math)
It is an Algebra smash (Let’s do the math)
You’ll catch on in a flash (Let’s do the math)
Let’s do the Monster Math!

Now 2 and 3 are safe together with nine
Monster X is isolated; everything is fine
Congratulations, you can solve an equation
Let’s do the Monster Math all across the nation!

You did the math
You did the Monster Math (the Monster Math)
It is an Algebra smash (You did the math)
You caught on in a flash (You did the math)
You did the Monster Math!



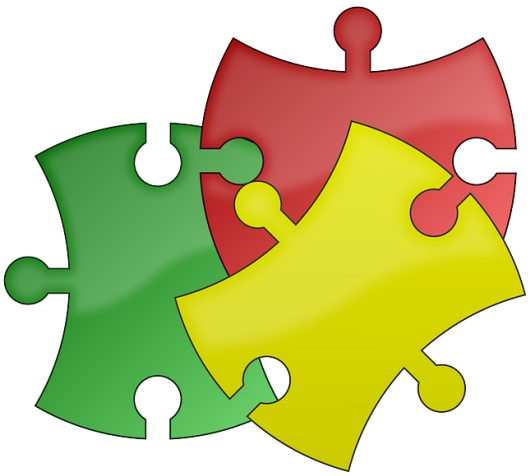
Fun with the Challenge

By: Jennifer Cassell

I have discovered that looking at something through a child's perspective has often helped me to be a better teacher; such was the case in my Math Elites experience. Throughout the two-week course our instructor provided many math brain-teasers. These daily riddles left a lasting impression on my view of math instruction for young children. At first I believed the only purpose of the puzzles was to model how we should structure our math block: start off with a word problem to get the kids thinking. Sometimes our instructor provided tasks he knew were not designed for second or third grade but would instead challenge us as adult math students. When we first received these problems, I felt irritated and sometimes even embarrassed that I did not immediately know the answers. Many joked, "Well, now you know what kind of math person I am!" Because I could not remember the "right" way to solve these math problems, I had to become creative. As we received more tasks, I became more comfortable not knowing something right away. Arriving at an incorrect solution no longer bothered me—I just narrowed down the possibilities and continued to work until I figured it out. As time passed, I began to expect the difficulty, and I began to *trust* my ability to figure out the problem. In fact, the riddles became some of my favorite activities because the problem-solving felt fun!

Throughout our training the instructors emphasized that learning does not occur unless there is some amount of struggle. Children are challenged when they receive tasks that are grade-level appropriate and engaging. We reviewed summaries of research that explained how teachers' expectations can influence the types of assignments students receive. It was argued that if teachers have low expectations based on students' past test performance, then they will give work through the school year that is less challenging. This in turn can lead to low performance on future assessments. This connection between teacher expectations, difficulty of student work, and children's achievement further emphasized my need to be intentional and frequent in giving children opportunities to "work out" their brains like I did during my MathElites riddles.

Feeling that transformation from discomfort to trust in my problem-solving ability was very empowering as a math student. Listening to research about expectations and assignments was very eye-opening as a teacher. Both experiences reinforced to me that students deserve and can enjoy fun challenges. It is the problem-solving opportunities, not just strategies, which are the heart of math instruction. Being given a rigorous problem beyond the math skills I am used to teaching and enough time to wrestle with my ideas were the two conditions that forced me to be creative and allowed me to really understand the math behind the question. I am refocused on how I give my children age-appropriate math tasks. I want them to feel comfortable when they receive a hard problem, develop perseverance, and experience that same satisfaction of hard work.



Next-Level White-boarding

By: Kevin Leonard

One of the most beneficial forms of formative assessment I use in the classroom, in my opinion, is the use of individual whiteboards. Any time I have my students practice skills, solve problems, or work on tasks among other things I have my students use individual whiteboards. Each student has his or her own dry erase board and is showing me what they he or she is doing mathematically at the time. This allows me to see very quickly who understands, who is struggling, or those who might be completely lost. Another benefit is more, albeit in my opinion small, engagement. My students will solve problems working on whiteboards all day if I ask them, compared to using pencil/paper where there is more of reluctance sometimes.

How am I taking this to the next level you might ask? By going vertical. Let me explain.

Earlier this year, I came across a tweet (Twitter for education, math specifically, has been so amazingly helpful; seriously if nothing else, Google #mtbos and dive in) from Alex Overwijk on the benefit of using vertical non-permanent surfaces (VNPs). There are several benefits that immediately caught my attention that I think will be a great addition to my classroom.

- Improves visibility: can better see what students are doing, who is on the right track, who is stuck, etc.
- Allows for transfer of knowledge around the room: can strategically place certain students side by side to allow for peer-to-peer help, cooperative problem solving, competition or other motivational methods; can also direct students' attention to certain students' boards to show alternate or additional solution paths.
- Non-permanent removes fear of writing: put statistic where non permanence shows quicker attempting and starting
- Formative assessment by teacher at all times: self explanatory.

Giving credit to Peter Liljedahl for performing a study on permanence vs. non-permanence and horizontal vs. vertical surfaces when solving problems, Alex shows data collected by Peter during the study that I will highlight now. Basically, students using vertical, non-permanent surfaces are quicker to begin the task, make their first notation (by a wide margin compared to permanent surfaces; 20 seconds on non-permanent compared to 2+ minutes on a permanent surface), and have higher marks on discussion, eagerness, participation, persistence, mobility, and non-linearity. What does this mean for me? Well, I already know the benefits of using individual whiteboards and how they have benefitted my classroom, so now I am going to hang more whiteboards on my walls and incorporate them into my classroom.

Overwijk, Alex. "Vertical Non-Permanent Surfaces and Visible Random Groupings." Slam Dunk Math: Vertical Non-Permanent Surfaces and Visible Random Groupings. 1 Aug. 2014. Web. 24 July 2015. <http://slamdunkmath.blogspot.com/2014/08/vertical-non-permanent-surfaces-and.html>.

Who Is Doing The Thinking?

By: Deanna Mattaliano

How often do we give our students a task or example problem and, because we want them to be successful almost immediately, we guide them to the answer? We, as teachers, need to really understand what the word guide means because it could mean something different to many teachers. Therefore, I would like to take a closer look at the different mathematical proficiency strands and how, as math teachers, we can let the students do the thinking to optimize their ability to problem solve and comprehend mathematical skills.

The first strand of mathematical proficiency is conceptual understanding. Students must understand the math concepts that they are learning about. For students to understand these skills, a teacher must tap into their understanding and observations of how the students learn. Learning styles are various in number; but to name a few would be auditory, visual, hands-on, and kinesthetic. Therefore, as math teachers, we must provide opportunities for our students to explore mathematics. Teachers can use manipulatives, singing, videos, student research, practice, hands-on explorations, etc. This works for all ages, therefore if you have created a safe learning environment for your students to be successful then it shouldn't matter if you can't sing or dance because it's the conceptual understanding that matters. In addition, your students will most likely retain the information better when their teacher steps outside their comfort zone. What it really comes to is…who is doing the thinking?

The second strand of mathematical proficiency is procedural fluency. This strand has students carry out the actual mathematical procedure. For as diverse as our students' learning styles are, we must also understand and know that students will not learn the skills the same way every time. Students may learn through hands-on exploration for one skill and learn another skill through auditory practices. This is what makes students and teaching students so unique. Procedural fluency requires students to carry out the mathematical procedure accurately and correctly. This means that the procedure they use must be a legit process. Students can explore concepts, make a conjecture, and if the conjecture is proven true for that particular practice problem they will think it works every time. That is why it is important for students to explore the skill they are learning. If students are provided with an activity where they can make conjectures then they can experiment to see if their conjecture works every time. Students should be looking for relationships from previously learned skills to skills they recently learned and see how they connect to the new task at hand. This guides the students to exercise a large amount of thinking. Who is doing the thinking?

The third mathematical proficiency skill is strategic competence. Math tasks and activities should drive students to observe and create various strategies to solve the task. For example, if a student is given a triangle, a ruler, and a protractor have them create a similar triangle. This gives students the freedom to explore side lengths, angle measurements, identifying the kind of triangle and following the criteria for that triangle to be isosceles, equilateral, right, etc. Another exploring activity would be to have students create a square using 4 toothpicks and then ask them to create more squares, but they can only use 3 toothpicks for each square. How would they extend the pattern? Can students create an algebraic expression? How many expressions can they create? Students should be able to conclude these types of activities with conjectures that are true, expressions that will be accurate to the n^{th} power. When students are given opportunities to explore mathematical skills, their problem solving and critical thinking skills will be at work. It's ok to let students struggle. It is part of the learning process because in the end who is doing the thinking?

The fourth strand of mathematical proficiently skills is adaptive reasoning. Students need to have the opportunity to think about and reflect on what they have discovered in their activity or task. Its not just about giving them a task and letting them work completely on their own without assessing and advancing them in the activity. It's not about giving

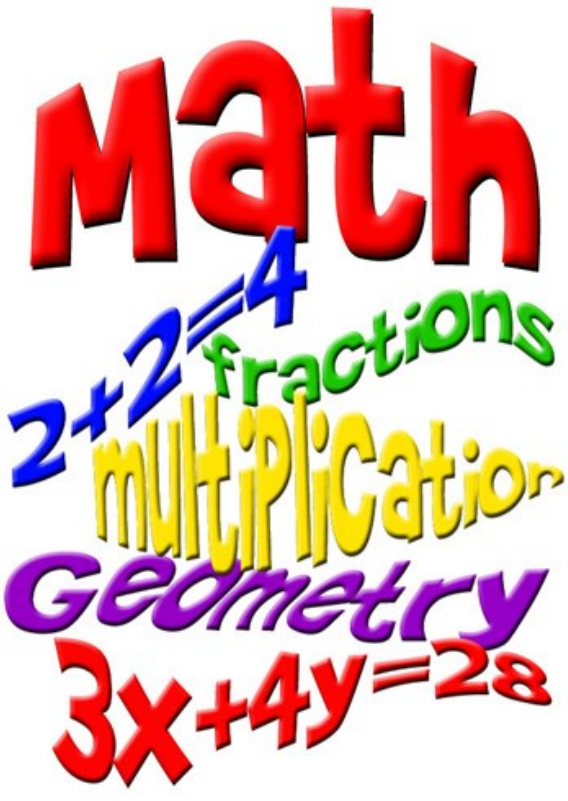
them a task and working it out for them. The ultimate goal is to get them to do the thinking, to get them to reflect on their discovery, and to get them to extend their learning. As they work on a task or activity, teachers need to assess and advance the students. Students will get stuck so it is important to ask assessing questions to get them back on track, but the key is not to give them the answer. If students have accomplished what needs to be discovered in the task, advance the students. This can be in the form of a reflection, give them an additional scenario, ask "what if" questions, and have the students represent what they discovered in a different way (written format). What are you, as the teacher, going to do to get the students to justify their way of thinking? Who is doing the thinking?

The fifth strand of mathematical proficiency is productive disposition. When placing the responsibility of thinking on the student and having the students practice with this responsibility often, students will hopefully become conditioned to think, to reflect, and develop an appreciation of mathematical discoveries. The goal is also to help students develop an appreciation for math, for discoveries, and see how math is useful in their life. When students can think about the math, when students can make the connections among concepts and real life scenarios, when the light bulb to comprehension comes on; that is when you know that the student has done all the thinking.

In conclusion, I have highlighted the 5 mathematical proficiency strands and how to get students to do the thinking. This does not mean that teachers sit back and let students do it all alone, but it is a guide that teachers should use to optimize the learning environment so that students can take charge of their thinking. When used properly, these strands can help students develop an appreciation and love for discovery. This is a pathway we can use to get students to like math and to feel successful. It's ok to let students struggle, as long as the teacher can use the struggle to lead them on the pathway to discovery, comprehension, and success.

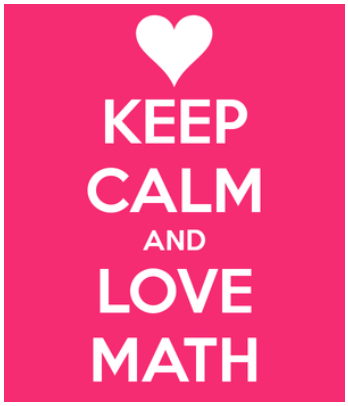
References:

***Adding It Up: Helping Children Learn Mathematics*. (2001). Niswonger Eastman Mathlete High School section.**



It's the End of the Math as We Know It … and I Feel Fine

By: Andy Walters



When I was young, I had a love-hate relationship with mathematics, meaning that I loved to hate math. This is not to say that I didn't have great mathematics teachers, from elementary through high school and even into college. The funny thing is that I was, on the whole, a successful mathematics student, all the way through AP and college-level calculus courses. As I reflect on my experience with mathematics, however, I realize that I was able to do the math. When I ask myself if I understood the meaning behind what I was doing, the answer would be a definite, "No."

Fast forward a few years, and I found myself standing in front of a third grade class teaching a curriculum using a new, somewhat controversial Math Investigations program, finding myself woefully unprepared to teach strategies instead of algorithms to my students. Admittedly, I clung to the algorithms I learned as a student because that was what I knew and thought I understood. I meddled my way through learning strategies alongside my students and relying on colleagues for support. Now, as a result of participating in MathElites, I have a new grasp on not only understanding the meaning behind the mathematical concepts for my grade level but also how to teach mathematics to my students. I have also found that learning the why behind the mathematics I teach has opened my eyes to math as not just something to do, and I am looking forward to teaching mathematics to my students in new and exciting ways this year.

We elementary math teachers today teach in a controversial environment. Since becoming a teacher, I have had to continually justify the "why" of what I teach to parents and other stakeholders, most often in the area of mathematics. From the Math Investigations program to Common Core State Standards to Tennessee State Standards, parents are most often highly resistant to the "new math" or the "Common Core math" that they do not understand and cannot help their students understand. I now feel much more capable of justifying the need for students to understand the why of mathematics and not just do mathematics after participating in MathElites. Parents often ask the question, "What's wrong with the way I learned it?" As Dr. George Poole put it, there is nothing wrong with a black-and-white television set, but given the choice, one would choose to watch a high-definition digital color television set. That is how we must view the way we teach mathematics to our students today in light of the need for our students to understand mathematical principles and strategies. The needs of the twenty-first century require students to have the deeper understanding that we are teaching with our latest set of curriculum standards. Thanks to MathElites, it's the end of the math as we know it, and I feel fine….

Teaching Students to be the " 

of Numbers"

By Yolanda Miller

Growing up, math was not the subject that I looked forward to learning about. I have always been a person who loves to learn, but math was one subject that never really made a whole lot of sense to me. As I look back on my elementary education, I remember learning the algorithms and memorizing facts without really understanding why. While this way of teaching math worked for some students, others were left feeling lost and confused. I remember feeling hopelessly lost, but unable to express that to my teacher. As an educator, I strive to help my students when they feel lost and confused.

This summer, my perspective on teaching and learning math was forever changed. In the past two weeks, I had several "aha" moments, but one in particular stands out. The idea that students should be taught to be the "boss of numbers" completely made sense to me. I realized that if students understood this idea, that math would not seem scary or confusing to them. I believe that this idea can empower students to learn how to manipulate numbers. Make the numbers work for them instead of the other way around. The way that I set up math procedures at the beginning of the year will definitely be different from now on. If I can use the first weeks of school to teach students that they are the boss of numbers, then teaching the different strategies would become a way they could tell the numbers what to do. Each new strategy can become a new way of manipulating the numbers. If this idea had been around when I was in school, math may have been a subject filled with joy instead of dread.

Another "aha" moment I had in class came when we talked about the regrouping method for subtracting. As a student I was taught that in order to subtract larger numbers, you had to learn how to borrow or regroup. Not fully understanding why, I memorized the steps and tried my best to remember them. The past two weeks have really helped me understand how important it is to teach students several different strategies. I also realized that I might be introducing the algorithm to early. Although the algorithm is one strategy, there are several other strategies that can be taught before traditional borrowing. Students that may be lost when it comes to using the borrowing method might feel more confident if they are allowed to choose the way that best works for them.

Each time we were taught a new adding or subtracting strategy this summer, I felt more and more empowered. I could see all the different ways you could manipulate a number to reach the same answer, and I understood how beneficial that would be to my students. All students learn differently and it makes sense to give students several different ways to reach the same answer. I am forever grateful to Dr. Poole for showing me how I can better reach my students. I am looking forward to the upcoming year and the chance to share my knowledge with my new group of students. I have become the "boss of numbers" and I hope that all the students in my class understand that they can also be a "boss of numbers".

HOW ARE WE DOING, REALLY?

by Teddy Faxon

Our students are so awful, they were only 9th out of 47 in the 2007 TIMSS international test for 8th grade math. Wow, we must be doing something terribly wrong. Right? This is what the prevailing public opinion of us as teacher is here in the United States. Is this mindset justified? Context, here, is paramount.

Let us consider this 9th of 47 statistic from 2007 in a bit of context, with a bit of math. 9th of 47 puts us in the top 19% or so among participating nations. Let us compare this to how we did before 2007. In 2003, we scored 15th out of 45, or the top 33%. In 1995, we scored 28th out of 41, or the top 68%. Before that was the SIMS, where we scored an average of 70% from 1980 to 1982, and the FIMS in 1964, where 92% of participants beat us. What do these numbers mean? It is clear that in the measure of internationally standardized testing, America was once quite bad indeed, but that we have since climbed from the bottom 8% to the top 19%, in only 52 years. If this were our sole standard of measurement (which would be a poor measure, indeed), our strides would be most impressive.

These numbers are all quite abstract, really only measuring children's ability to successfully take math tests. What about real world thinking produced? How can this be measured? One could make several arguments in this regard. The United States has produced 350 Nobel laureates, almost triple the next nearest nation, ranking us far and away the most Nobel decorated nation in the world, and 16th worldwide per capita. For perspective, China has 8, India 11, Vietnam 1, and Japan 22 – the nations whose mathematics programs we are trying to emulate.

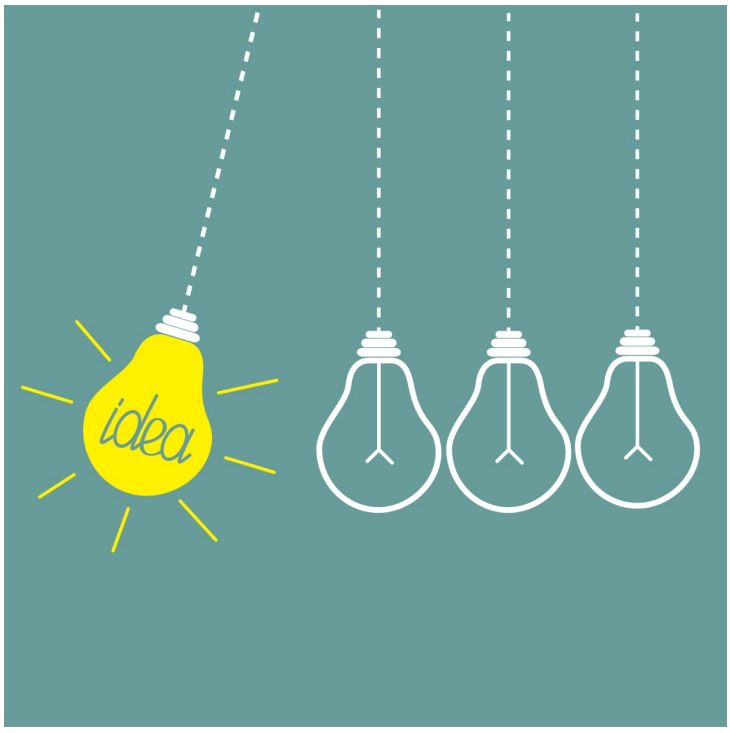
Another measure of American problem solving could be gross domestic product, perhaps adjusted per capita. Businesses are increasingly international, and this international competition is being won by America. Our GDP of roughly 17,000,000,000,000 is on par with the entire European Union combined. China, our nearest competitor, produces only 59% as much, and they have 432% of our population. Is this the math we should be trying to create in our schools? It does not add up.

National pride can be an important thing. Before we allow ourselves to degenerate into name-calling and general deploring of our educational system, let's take a step back and consider who we are and where we came from. We are, in the worldwide scene, an upstart nation. We have only existed as a country for a bit over two hundred years. Compare that to China. To Great Brittain. To India. In our short tenure aboard this Earth, the United States of America has grown from nothing, to a cradle of the Industrial Revolution, a military superpower in the aftermath of World War II, and the forerunner of the information age we presently find ourselves thrust into.

One hundred fifty years ago, we were an agrarian nation. In 1890, we had an active military of 40,000 men – hardly a world power. We have grown, and continue to grow today. We have, of course, infinite capacity for further growth, and that growth will, of course, happen through the education of our children. But let us not lose sight of how far we have come already in so short a time.

How does this all fit together? In 1964, when the news that we scored 11th out of 12 nations on the FIMS, we were upset, even though our education system had played its part, just 19 years earlier, in thrusting us forward as the most powerful nation on Earth. Did we really have anything that needed fixing? Now, we have moved forward 61 years, and the "gap" is closing – we are finally catching up to the other countries. Yes, our children are performing better on average at international math tests than they ever have before. Yet now, our children hate math. Our adults claim math illiteracy with pride rather than the shame they feel admitting they can't read. We have improved our scores, yes, but at what cost?

We must return to a feel of exploration in our schools. We must rekindle the spirit of entrepreneurship, independence, pride and innovation that made our nation the most powerful on Earth. Let us always remember our place in the world, and in time, in the context of where we have come from, how we got here and just how fast it all really happened. Scoring below other nations in an international test of math skill stings our pride. I know of 350 Nobel laureates who believed in what we do here, regardless of the FIMS, the SIMS, or the TIMSS. I know of 17,000,000,000,000 reasons to believe we have been doing something very right here in America, something that hasn't been getting done anywhere else in the world, regardless of population. China may catch us one day, but if they do, it will have been because we failed to be who we are and started chasing who they were, last time the TIMSS was administered. We tell our students all the time, "Be yourself." Well, educators, be yourself. Be true to America, to our sense of exploration, to our sense of wonder and creativity, and we will continue to be the world's premier superpower in the years to come.

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tips
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videos
Mailing
mathematics
resources
division
formulas
History
fun
benders
school
Students
algebra
addition
multiplication
solutions
instructions
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parents
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help
Chatboard
Action
cool
practice
cards
decimals
concepts
elementary
set
singular

The "Group Maker" iPad Application in the Classroom

By: Susan Saam

There are great benefits to cooperative learning. Since there are often many different ways to approach most problems, group exploration can explode into the discussion of multiple ways a problem or task can be solved. This discussion can give all involved a deeper understanding of the task and its solution.

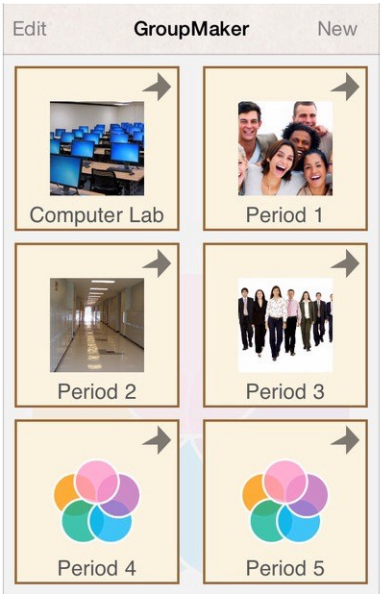
One difficulty for the teacher is grouping students. After a teacher gets to know the students in their class, grouping by ability or mixed ability is very valuable. The teacher can group students into groups with mixed ability levels, allowing for peer tutoring. Or, the teacher can group higher level students together and lower level students together. This will allow for differentiated instruction by giving each group a different task of different levels (higher level groups can be given a task to challenge them, while the lower level student groups work on a more simpler task).

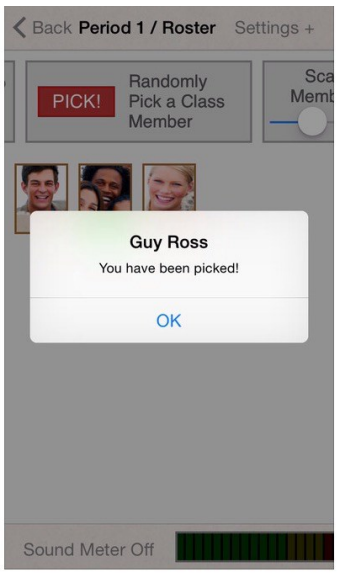
But what can a teacher do in the beginning of the year, when they are just getting to know their students? Or what if the teacher needs a quick way to group students randomly?

I have an ipad in my classroom. One of the apps I use to group students is "Group Maker" by Richard de los Santos

GroupMaker
Richard de los Santos

With this app, each class can be set up to include the names of the students in that class. And their picture can be assigned to their name.





The teacher can decide the group size (pairs, groups of three, groups of four, etc.), and the app will randomly place students into groups of that size. If the teacher wants to move a student into a different group, the app allows the teacher to drag and drop students into different groups.

One of the best features of this app is the "Randomizer". The app will randomly select one student or one group of students. The students love watching the randomizer as it moves around, highlighting different students until it stops on the chosen student or group. This is a fair way to choose a student or group to present to the class their findings about a task.

I use my document camera to display my ipad onto my smartboard, so students can watch the randomizer randomly pick a student or group. My students really like watching this in anticipation of who will be chosen.

This app has a 3.5 star rating and has some limitations, however, I have found it to be a great tool for grouping students quickly and the randomizer is wonderful! Check it out!

There is Power in the Struggle

By: Casey Eaton

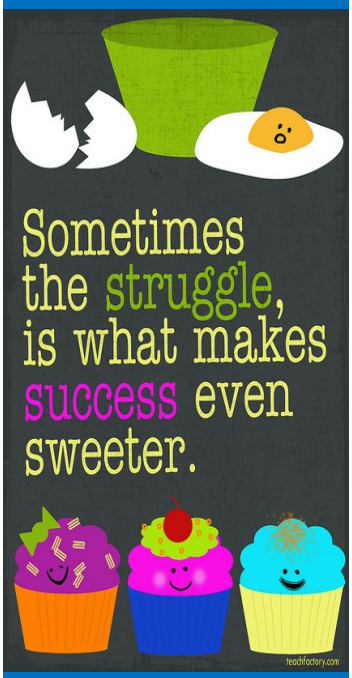
“There is power in the struggle.” This phrase has been floating in my head ever since a colleague mentioned it in a PD. I have to ask myself, “Do I let my students struggle?”. If I were to be honest, I think the answer is no. Like any good mother hen, I swoop in and save the day when I see a student struggling. Sure, I may let them spend a few minutes in mathematical turmoil, but do they truly struggle. No.

In turn, I am robbing them. I am robbing them of precious opportunities to make sense of math on their own. I am robbing them of the chance to feel accomplished once the task is complete. I am robbing them of the chance to be exposed to a rigorous classroom. All because I thought I was “helping” them.

Struggle is important in the classroom. Students who have the feeling of productive struggle make stronger connections to math. If we think about this in real world context, it begins to make sense. How many times as an adult have you struggled with something? And how many times are those experiences much more memorable and rewarding? The same is true in the math classroom. Students need to struggle at times to make their conceptual understanding clearer.

So how do you foster struggle in a positive way in the math classroom? First, utilize math tasks that require higher order thinking skills. Presenting these tasks can develop the conceptual understanding that is needed for mathematical fluency. Next, let the students know that struggle is okay in your classroom. Foster a climate that accepts mistakes and struggle as the pathway to understanding and success. Explain a time in which you struggled to understand something and praise students for their effort. Finally, be reasonable about how long you let a student struggle. There is a difference between productive struggle and utter frustration. When you get to know your students, you will be able to judge how long they can struggle with a problem. We never want our students to get too frustrated and give up all together. To avoid this, use questioning techniques such as assessing and advancing questions to further the student’s thinking without giving away the answer.

All summer I have mulled over the idea of “power in the struggle.” After much reflection and thought, I find truth in that statement. There is power in the struggle. There is power in being allowed to figure things out on your own .There is power in feeling successful in math. There is power in being a part of a rigorous classroom. And there is power in being a teacher who skillfully orchestrates all those experiences for his or her students.



Miraculous Mathematic Mistakes

By: Caitlin Tomski

There I sat in the fourth grade with my knees furiously bouncing up and down, cheeks hot on fire, and eyes searching anywhere to avoid the impatient, glaring eyes at the front of classroom. It was somewhere around that time I decided to detest math and anything that surrounded it. In math class I was taught there was one way to be correct and that came from one, good old fashioned, standard algorithm. The power of the algorithm came from the much smarter human being glaring at me from the front of the classroom. Well, that's how my nine-year-old mind perceived it all those years ago. In my mind, making a mathematical mistake was mortifying! There was nothing productive or intelligent about a mistake, instead it just meant I wasn't "gifted" mathematically. I went through most of my math education having a defeated mindset.

It was not until I attended East Tennessee State University in college and sat at the very back of Dr. George Poole's mathematic classroom did I realize that being different, making mistakes, and struggling through it was okay! Not only was it okay, but also it was valuable, productive, and important! In that semester my mindset made a miraculous mathematical shift. I was taught, "kids think and learn differently and that's okay!" I began to see the concept of Piaget's conservation of numbers as freeing for both my students and me as a teacher.

According to Poole, "Piaget, a famous psychologist, philosopher, and educational researcher on the cognitive development of children, gave us the notion of Disequilibrium. Disequilibrium is the idea that everyone, including kids, struggle with learning new things. At the beginning, there may be a sense of confusion or a sense of being lost. There is a period of frustration in which we try to make sense out of, or understand something new (BP 1). Teachers and their kids should understand that struggle to understand is perfectly normal. It is not normal to learn quickly. "Huh moments" must come before those "Aha moments." Disequilibrium is Constructive Struggle." It's imperative to recognize mistakes as not something to fear, but rather something to embrace. It is our job as teachers to encourage our students that the math classroom is one where mistakes are just as significant as the "right answer." I have learned that numbers do not control us, but we control number. There should be no fear in numbers, and especially no fear in mistakes. There are many strategies, paths, and journeys to take in mathematical problem solving. The days of "one way, right way," should be put behind us as we strive to teach our students best practices and foster a safe place to make errors.

Now, I stand at the front of my own class, with little eyes peering up at me. I want my students to know, it is not just my pen that holds the "one and only" algorithm that can ever be used to unlock the mysteries of mathematics. I want to see their minds moving, mistakes being made, and constructive struggle pushing them towards progress. If the walls of my classroom could listen, I would want them to hear numbers talking, being made alive by the students who controlled them.

Ideas for New Teachers

By:Robert Cantor

Teaching can sometimes be a lonely task. You're in a room with 20-30 students and are responsible for teaching them whatever it is that you have planned on that day. It can be extremely rewarding; but it can also be a very stressful time for a new teacher who wonder if they are teaching the correct way, showing examples that reach every type of learner, or even pacing their lesson in a way that makes sense. There are a few steps a new teacher take to avoid feeling like they're on an island.

A new teacher should have a mentor teacher assigned to them. You can get a wealth of knowledge from your mentor. Of course if the mentor teacher is not teaching the same subject as you are, there could be a feeling of being alone if there are no other teachers in your subject area at the school. I'm certain the new teacher has questions such as how long to spend teaching a certain lesson or the best way to give an assessment.

The first step I recommend is to join a professional organization. As a new math teacher, I chose to join the National Council of Teachers of Mathematics (NCTM). This organization offers a website that is full of resources, lesson plans, ideas, and news. There are also many national and regional conferences to attend so that you collaborate with math teachers from across the United States. They do charge for an annual membership but some school systems will foot the bill for you.

Professional development courses are another good source to ensure you are not alone in your teaching endeavor. There are plenty of smart people out there and most are more than happy to share advice. School systems will usually have these courses laid out on a training schedule for you to pick and choose what you need. By attending courses, you will meet other teachers from your district and be able to compare notes with them.

In closing, new teachers have a wealth of knowledge out there to help them through a trying first year. You just have to get out there and find some resources and advice from folks who have more experience. Good luck!

Calculators in the Classroom

By Tara Carmichael

Think back to twenty years ago. Some striking differences you may recall are changes in fashion, music, health care, politics, and most importantly, technology. Twenty years ago, only a few had the privilege of computers, internet, and cell phones. Fast forward to now, and these are common commodities found in most households. It makes sense that education has changed, too, perhaps as a result of these influences. Since schools now have the capability to use technology in the classroom, teachers must ask themselves "How much technology is too much?" Particularly in the math classroom, teachers and students must consider the use of calculators. Are they helping or hurting? This is a difficult question to answer, and I would like to argue the pros and cons of this quandary.

As mentioned previously, advances in technology have led to nearly every person having a cell phone. This includes the students in our classrooms! Children now have the use of a calculator by retrieving their phones from a pocket or purse. Shouldn't teachers teach students how to use this tool? I believe yes. Since the technology is readily available, students should know how to use it. They may even be expected to use it for future jobs. I believe we would do a disservice to students if they were unaware of the technology in the palm of their hand. However, this brings up the possibility that students become reliable on the calculator for any calculations. They may not know how to do routine, everyday tasks such as make change, balance a checkbook, make a budget, or calculate a tip without having to refer to a calculator. Many may argue that a cell phone will always be on hand to help them with the calculations. I still believe it is important that people know how to do the math without an aide, and then teach when it is reasonable or just to use a calculator as a tool, and not as a constant need.

I have noticed a decline in fluency and numeracy skills of students. It seems like fewer and fewer know their multiplication tables or understand why it is useful to have them memorized. Why should I have to know this if I can just type it into the calculator? Students need to understand how numbers and operations work; they need to see the underlying relationships between numbers. The jobs of today and the future are math and science based, thus students need to be mathematicians and scientists in order to do those jobs. Another argument is that a calculator is only as smart as its user. In other words, students need to know what to put into a calculator in order for it to be useful. This argument supports the idea that students still need procedural fluency. They must know whether to multiply, divide, add, or subtract before they can type something into a calculator. Problem solving often requires multiple steps in order to reach the answer. A calculator will not tell students what these steps are. Students must reach a solution path on their own. Lastly, students must be able to reason if their final answer is correct and makes sense in context of the problem.

While it is important to make sure students know what to put in the calculator, it is also important to see the calculator as a useful tool. Graphing calculators have so many capabilities, and I see the benefits of us-

ing many of them. One of the Mathematical Practices for the Common Core State Standards is to use appropriate tools strategically. This includes using the calculator. It is an efficient tool that can aid students in completing the small parts of a larger multi-step problem. It is extremely useful when being used confirm something that students are investigating, as long as they still comprehend the “math behind the scenes.” I see many benefits of calculator use in high school. By this time, students have learned basic numeracy skills, so they will use the calculator to speed up the problem-solving process. This way, it is not being used to take the place of something that students need to learn.

In conclusion, there are a variety of arguments supporting and opposing the use of calculators in the classroom. While people now have the availability of a calculator in their pockets, it cannot be stressed enough that a calculator can never take the place of learning mathematics. The human brain is the smartest tool at one’s disposal, and a calculator will never be useful unless the operator knows how to use it. Math teachers now have the daunting task of defining the fine line of “how much is too much” when it comes to using calculators. There are no rules, no guidelines for how to find a solution to this problem. Teachers must rely on their own beliefs and practices to see what works best in their classrooms.

MEMBERSHIP APPLICATION

Mail completed for m to:

Jerry Whitaker
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Washington County Schools
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Membership Fee $10
Payable to: UETCTM

Name:_____

Home Address:_____

_____

Phone: ( )_____

School:_____

School Phone: ( )_____

School Address: _____

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Email Address:_____

The Upper East Tennessee Council for Teachers of Mathematics is an organization for anyone I 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.