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IN THIS ISSUE

IT'S A NEW YEAR	2
MUSIC, MATH, AND MEMORY	4
DIVIDE ACROSS AND SAVE THE EMBARRASSMENT	6
ONE TO ONE IN YOUR CLASSROOM	8
COMMANDER IN CHIEF OF THE CLASSROOM	10
THE AGE PROBLEM	12

IT'S A NEW YEAR

by **MAGGIE HALL**

The beginning of the year... New faces, new expectations, and a new classroom. But with that also comes the wonder, fear, and anxiousness. The beginning of



school can be nerve-racking for both teachers and students. Students may wonder, What will my teacher be like?, Who will be in my class?, and What will I be

learning this year?. On the other hand, the teacher is wondering, what will these students be like? What are their learner levels and what kind of learners are they, and how can I make this year better than last year?

There are a few activities that can help students get over their anxiousness. At the beginning of the year, I begin each morning with a "Morning Meeting." During this time, students get a few minutes to share information with the class. This allows them to feel more comfortable and have a voice in the classroom. This includes myself. I

take this time to allow my students to get to know me a little bit. I don't, by any means, spill my life to them. However, I do feel that it is important that they know a few personal things about me so they can make a connection with their new teacher. Hopefully this will help me gain a little of their trust and make them feel more at ease being in my class.

Another activity I complete in my morning meeting is one that allows everyone, including myself, to learn everyone's name. I begin by picking out a topic. For example, I may pick the topic food. Next, I tell the students to think of a food that begins with the first letter in their name. After giving students time to think of a food, or research one on the computer, and modeling the activity, we can begin the game. Students take turns saying, "Good Morning. I am Twix Tina." and the rest of the class says "Good Morning Twix Tina!" We continue around the room until every student has gone. This activity can also be done with many other topics including, but not limited to, animals, toys, specific subject areas, etc. I have found that this activity, get students more comfortable with the students in the classroom, and allows the teacher and students time to learn the students' names in a fun way.

Furthermore, I think it is important to set expectations at the beginning of the year. I typically take the first few days of school going over expectations in the classroom. I explain to my students several of the topics that we will be learning throughout the year and explain that they will be learning these topics in a fun, creative way! I let them know what by the end of the year, they will be filled with extreme knowledge and be able to share their knowledge with others.

Going over my expectations also includes going through the room and allowing everyone to “explore”

where everything is in the class. Furthermore, I give students a few minutes to practice and use the items in my classroom. I show students how to use the classroom library and computer station the correct way and then have them practice. This makes the students feel more comfortable with the classroom.

At the beginning of the year I have a few specific rules that I implement; however, I do not just say, “Here are the rules. Follow them!” The students sit down with me and come up with rules they feel are the most important and we add those to our rules chart. We

also make consequences for breaking the rules together. This gives them ownership of the rules; therefore; I feel they are more likely to follow them.

Doing these things in my classroom has helped eliminate some of the wonder, fear, and anxiousness at the beginning of the new school year. Hopefully, through some of these activities, the students gain a better understanding of the year and feel more a part of the classroom. This also gives the teacher a chance to get to know the students a little better and get a good start to a new year.



“Doing these things in my classroom has helped eliminate some of the wonder, fear, and anxiousness at the beginning of the new school year.”

Music, Math, and Memory

by Linda Compton



"One . . . similarity between music and math is the necessity to solve multi-step problems."



Research has, for years, shown that music education improves math and science skills for students. Why is that? Having been a band director for years before switching to math education, I believe it is due to the many common skills learned in music education that transfer to the math classroom. As math teachers, we can encourage the development of these skills in our own classrooms, as they seem to match well with the current Common Core standards.

The first, and perhaps most important, common goal between music and math is the development of a series of skills that build upon each other. In both disciplines, it is absolutely crucial that the student understands the basics intimately if he or she is to have hope of understanding the later, more advanced concepts. This is where the memory part comes into play. Practicing these basics early and often ensures that children actually understand the concepts instead of just memorizing them. True



understanding of key concepts is necessary for students to remember them past a test or exam. Some of the basic ideas in a musician's training include posture, how to hold the instrument, and how to make a sound. These fundamentals are essential; if learned improperly in the beginning, they are almost impossible to fix because the use of these skills is inherent in everyday application. This idea can be used in math classes as well. Elementary mathematical ideas are practiced in most every aspect of the subject, so early understanding of these concepts is necessary.

Another goal of both music education and the Common Core curriculum is the desire to allow students to discover their own solutions to problems presented. In music, problems often present themselves in the form of a new piece to learn. Students are encouraged to try reading the piece on their own at first, so they can see what they think will pose difficulties and what will be learned quickly. Once they've found the hardest parts, many teachers suggest that the student try to find his or her own way to play it. This is especially true for string players. My daughter, as a violinist,

was instructed to find at least two or three different ways to play a difficult phrase and explain to her teacher why each method would or wouldn't work. This is exactly what the Common Core curriculum is trying to stress. In our classrooms, we have to allow our students to use all of their previous knowledge and discover solutions to problems for themselves. Naturally, we are there to help alleviate some of the difficulty, and when a student is completely lost, we as teachers are there to provide guidance. The end result, though, is that each student is allowed to discover, and therefore come to fully understand, the methodology behind the simplest and eventually the most complicated problems they might face.

One final similarity between music and math is the necessity to solve multi-step problems. A musician facing a new piece must see not only the notes to be played, but also the rhythm, dynamics, and articulation required. Every one of these aspects can prove difficult, and each requires the student's attention. First, the student tackles the notes and rhythms, learning how to make each note sound at exactly the right time. Then he or she looks at the articulation, how

each note in the phrase should be attacked, and has to build that component into the notes and rhythms that have already been learned. Finally, the dynamics are added in, how soft or loud the phrase should be, and this element is added to what has already been established. Naturally, this multi-step process is applicable to math as well. Students must understand how to work out one piece at a time, how to go through the logical sequence of steps to reach the conclusion. Not every musician learns a piece the same way, and the same goes for our math students. As long as the students are faithful to the problem presented, their own logic should be encouraged to shine.

All students should be encouraged to try music. As stated earlier, research proves that music education is a tremendous asset to all students, especially those in math and science. We, as math teachers, can also use these ideas from music education to improve our own classrooms and make them both Common Core and student friendly.

Divide Across and Save the Embarrassment

by Jaime Hise

When my son came home from 4th grade with a worksheet on reducing fractions, I was anxious to make sure he absolutely and completely understood the concept. As you know, fractions are something many students struggle with, and I was determined my son would “get” them.

As I looked over his Common Core worksheet, a problem like this was demonstrated:

Example:

Divide Across:

$$\frac{4}{10} \div \frac{2}{2} = \frac{2}{5}$$

I take one look at this and say to myself, the math teacher, “You can’t divide across! There’s a mistake on this paper!” So, I ask my son for his notes, and what’s there? Notes and examples that show that they are dividing across. So I reteach my son the “correct”

way to divide fractions, i.e., the Keep, Change, Flip method, or in the language of mathematics, leave the first fraction the way it is and multiply it by the reciprocal of the second. The way I wanted the explanation on the paper to be written was essentially this:

$$\frac{4}{10} \div \frac{2}{2} = \frac{2}{5}, \text{ which is dividing the numerator and denominator by common factor}$$

Now, the really embarrassing part:

I wrote my son’s teacher a really sweet letter that explained the apparent error on the worksheet. I didn’t attack her teaching but rather questioned the method on the worksheet and explained that I was afraid that older students would confuse the “Divide Across” method as the “right” way to divide fractions when they got to Algebra. I never received a reply and here’s why I think she was the one who was truly sweet:

During my Algebra I Mathletes course in July 2014, I discovered, with direction from my professor, Dr. Nivens, that this method is an accurate way to model dividing fractions, and not only this, but

also that in many cases, it’s much easier!

Try it with several easy divisions of fractions; you’ll see ... it works every time!

$$\begin{aligned} \frac{6}{18} \div \frac{6}{6} &= \frac{1}{3} \\ \frac{4}{15} \div \frac{2}{5} &= \frac{2}{3} \\ \frac{5}{8} \div \frac{1}{8} &= \frac{5}{1} = 5 \end{aligned}$$

The last case is the easiest because if you already have the common denominator, the answer is just the ratio of the first numerator to the second numerator. Kids are already familiar with getting common denominators because they learn to add and subtract fractions before they learn to multiply and divide them. So, you want make it easier, get the common denominator first:

$$\begin{aligned} \frac{5}{8} \div \frac{2}{3} &= \frac{15}{24} \div \frac{16}{24} \\ &= \frac{15}{16} = \frac{15}{16} \end{aligned}$$

Get a common denominator

24 ÷ 24 = 1, then simplify

You can even show it to be true in pictures or with fraction tiles, by asking how many of the divisor go into the dividend or "how many parts go into the whole; in this case, how many "one-eighths" are in "three-fourths"? See the picture below:

Example 3 $\frac{3}{4} \div \frac{1}{8}$

Problem: $\frac{3}{4} \div \frac{1}{8}$

Think/Ask: How many $\frac{1}{8}$'s are in $\frac{3}{4}$?

Model:

There are 6 $\frac{1}{8}$'s in $\frac{3}{4}$.

We've seen it in examples and in pictures, but we must ask,

"Can we divide fractions across every time?" Consider the following:

Assumptions Let a, b, c, and d be real numbers, such that b, c and d are not equal to zero.

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{\frac{b}{c}} * \frac{d}{d} = \frac{a}{\frac{b}{c} * \frac{d}{d}} = \frac{ad}{bc}$$

$$\frac{\frac{ad}{bc}}{\frac{cd}{cd}} = \frac{ad}{bc} = \frac{ad * \frac{1}{c}}{bc * \frac{1}{c}} = \frac{ad}{b * \frac{1}{d}} = \frac{a}{\frac{b}{d}} = \frac{a \div c}{b \div d}$$

Anyone else surprised at that one? I was completely surprised to be able to use this property for all numbers with no exceptions except no zeros in the denominator. (By the way, you can also show it's true when you start to have things like "x + 3" in the numerator and denominator in Algebra I and 2. I reserve that from here)

When I realized this, it hit me just how sweet my 4th grade son's teacher is. You see, when I wrote this very detailed – but incorrect! – letter on dividing fractions by

multiplying the reciprocal, she didn't correct me. She kindly didn't reply and embarrass me at all. However, I know when I worked through Mathletes with Dr Nivens and studied more on this topic, I realized I'd embarrassed myself!

In conclusion, two morals to this story: 1. you can divide fractions by dividing straight across and sometimes, it's a lot easier! 2. Before you write a letter to the 4th grade math teacher about something you fear might be confusing to the kids before high school algebra, make sure you know your 4th grade algebra.

P.S. Yes, I'm going to write a letter of apology and admit my mistake. *Sigh ... *



One to One in Your Classroom

by Michael Christian

This past school year I had the opportunity to take part in a one to one digital conversion at my school. For anyone who is not up to date on this cutting edge lingo, like myself last year, one to one means that every student in the building has their own piece of technology that is used in the classroom to support their learning. My school chose to issue laptop computers as the students' technology support. I would like to share my experience in terms of classroom management, clerical organization (paper pushing), and curriculum and instruction.

The digital conversion made me rethink many of my daily classroom management strategies. I was no longer spending time in front of the class doing instruction. This made for a very quiet classroom. It also left the teacher in more of a facilitator role in the classroom. As a result, most of my interactions with students were individual and small group.

One of the obvious first questions that pops up with digital conversion is, "What do you do if they are not

using the computer for learning?" This was something that I had to deal with on a daily basis at the beginning of the conversion. Our school's response to this was to confiscate the computer immediately. This rule was consistently enforced throughout the school which I believe was the most important part of dealing with the issue. Students would lose their computer privilege for a period of time based on the number of offenses until it was permanently taken.

This method was effective due to the fact that students did not want to lose the privilege. If lost, it meant they were either working on a desktop at school or going back to doing all their work on paper. Having a backup plan for this and any situation is advisable. Whether the wireless network is down at school, or the student shows up to class without the computer, or you need to confiscate a computer, have a backup plan at all times.

As mentioned earlier, I was no longer using large portions of my class doing traditional instruction. I tried to find students several resources per topic that included instruction or video tutors as I called them. Sometimes it was a video I found and sometimes I would record my own. This served two purposes in the classroom. It

gave students a choice on who they felt most comfortable with, and it also let them take ownership of their learning as not every "tutor" is going to use the same method.

The biggest adjustment for me was letting go of the reins in the classroom. It was tough to sit back and let the students drive their learning. This feeling was short lived as I remembered something I had heard at an in-service training the past summer. "It should not be the teacher walking out of school exhausted at the end of the day. It should be the student that leaves school exhausted."

This was a new approach for me. It made me reevaluate the way I ran my classroom. I needed to ask the question, who is doing the thinking in the classroom? I would ask myself this question every time I planned a lesson. And there I found a place to use up that energy that was no longer being used on class lectures. I planned! I found that this was now the most important time in my day. I needed digital resources. I needed structured, challenging lessons that students could work through at their own pace. I needed extension pieces for students that would finish early. I needed support elements for students that would have trouble. Essentially, I used my planning time to teach all of my lessons for the

following day. If I had done my job well, I could see the result the following day while a merely facilitated the tasks and provided support when needed. I noticed that I was able to spend time with students who needed the help that normally would have been overlooked due to me being spread too thin between classroom management and giving instruction.

The clerical advantages would present themselves gradually while our school made the transition. Immediately, I noticed that I no longer made copies of things. I focused on making most of what I do into a digital copy. This took some trial and error but I found the technology staff in our system to be more than willing to assist. I no longer had the ever maddening question, "what is my grade in here right now?" This was now too online for them to access.

Our school system has decided to use schoology.com as our learning management system. I particularly like the features with this system, but do not have experience with other LMS systems. With this system I am now able to manage

everything in my class with the exception of attendance. Once students have joined my classroom through schoology, I can now interact with them in ways that used to take several different applications to accomplish. It provides discussion boards, assignment due dates and drop boxes, messaging, quiz and test options with grading, and the ability to provide feedback on assignments without ever using paper. It is not an overstatement to say that this has revolutionized my classroom.

I hope to hit the ground running this coming school year. I feel like I have a better grasp on using the technology that the students have to focus on their learning. There were times in the beginning that I felt lost and overwhelmed. Our entire school had switched horses in mid-stream and converted in January right on the tail of Christmas break. I quickly realized that it was not just me or the teachers that were adjusting. The students had to adjust as well. I honestly learned many things from my tech savvy students this past school year.

When the year came to an end, I felt like I had hit my stride using the laptops with students. It had simplified many of the headaches

that got in the way of my teaching and planning from a paperwork standpoint. I learned to concentrate on what do I want the students to tell me about their learning, not what will I tell the students they need to learn? All in all, I believe that the students' in Bristol City Schools are the winners here. Their teachers have never been more focused on their learning than now. Students have been able to take ownership of their learning like never before. I believe that these two things will result in better quality education for our graduates.



Commander in Chief of the Classroom

by Cody Dison

Over the past several years our education system has seen an overhaul of our standards and expectations, and during this time teachers have been left scratching their heads as they try to understand what this Common Core version of education looks like. At the moment teachers are caught up in a race to find as many activities and strategies as they can, to help them reach their students. What if we went the other direction, and really worked hard to limit ourselves to just a few really strong activities and strategies? We also find teachers pushing themselves to the breaking point as they try to appease students' desires for fun and please the administration's view of rigor. What if focus more on a student's locus of control and intrinsic motivation, and trust that our game plan for the year will get us to the desired results? Finally, does really matter if you have met your goals for the year if the one thing you once loved and were passionate about, teaching, becomes the one thing you hate?

We have to focus our attention on becoming the commanders and chiefs of our classrooms.

I absolutely love the idea of being more of a facilitator in the classroom and allowing my students to learn through exploration and creativity, but too often teachers fail to have positive influences in areas of a student's life that has nothing to do with education. We want our classrooms to be so free flowing and fun that we allow the students to always allow the students to dictate our decisions. As a teacher I need show my authority in the classroom and allow my students to see that I make decisions based on their needs, not their wants. This helps students build respect for their teacher, and I promise you that students today are looking for someone to respect and guide them through their year. As students build a strong, respectful relationship with their teacher, the students can transition from extrinsic motivation to intrinsic motivation. They no longer need to be bribed. They have a desire to meet their goals for themselves and also for their teacher.

Activities and strategies are a wonderful thing, but I think that too many teachers feel that the key to becoming the best teacher that they can be is accumulating activities. I believe that activities are a very small portion of what it takes to have a successful classroom and here is how I perceive it to break down: Activities 15%; Strategy 25%; Relationship/Management 60%. Educators should key in on classroom management techniques and focus on building strong relationships with their students because this will increase the quality of the activities that teachers implement. The number one of desire of each teacher at the beginning of the year should be to form a strong relationship with his or her students and have a lasting impact on their lives that isn't confined to education. Students should want to be just like you!

Finally, let's discuss what weighs on us all, the outcome. Today's education system has teachers stressed to their breaking point as they spend the majority of their year worried about their "AMQ" and "Growth." Teachers don't trust

their game plan heading into the year or they don't have a game plan, and when I say game plan I don't mean lesson plans or a standards calendar. Teachers need to have a specific plan for where they want their students to be at each quarter and teachers need to have a plan for how will develop a report with their students so that students gain confidence throughout the year. Educators need to set goals and have personal interviews with students about setting goals. Offering rewards for those goals is perfectly acceptable, but do not give that reward unless every student meets the goal, no exceptions! In the end if teachers stick to their game plan their students will have a strong relationship with them and the confidence needed to be successful.



"Educators should key in on classroom management techniques and focus on building strong relationships with their students"



"The number one of desire of each teacher at the beginning of the year should be to form a strong relationship with his or her students and have a lasting impact on their lives that isn't confined to education."



The Age Problem

by Brad Hill

In an effort to engage students in mathematical thinking I use this puzzle to explore numbers and their relationships. If age is really just a number, as they say, then let's explore it mathematically. As you will see we can scaffold this problem from the most basic of graphs $y = x$ to more complex functions with asymptotes. Also with this exploration we discuss asymptotes, rational numbers, the notion of undefined, parallel lines, slope, rates of change, and graphs with differing rates of change. For ease in calculations I have chosen a situation where the parents are 25 years older than the student. Within this one problem we can review T-tables, plotting points,

Your Age	Years After Birth
0	0
1	1
2	2
3	3

graphing lines, ratios, and proportions. While we are reviewing these we can introduce the ideas of parallel lines, line shifts, asymptotes, differing rates of change within one

graph, and we can start "making sense" of and "seeing structure" in mathematics.

Hopefully, the students will graph the line $y = x$, which will be a line representing their age as years pass.

What will this graph look like?

4	4
5	5
X	X

Here the students should graph the line $y = x + 25$, which represents your parent's age in relationship to their age.

What will this graph look like?

Your Age	Parent's Age
0	25
1	26
2	27
3	28
4	29
5	30
X	X+25

Here we are introducing the idea of ratios and rational functions. By making the ratio of the student's

Your age	Your age/Your Parent's Age
0	0
1	1/26
2	2/27
3	3/28
4	4/29
5	5/30
X	X/[X+25]

age over the parent's age we can represent their age as a percentage of their parents age. Now we are talking about ratios, percentages, and graphing a rational function. By now the hope is that the students are noticing that as they age they are closing the gap (percentage) between their age and their parent's age, but noticing they will never reach 1 or 100% of their parent's age. Now we have our first asymptote.

What will this graph look like? What is special about this graph?

Are there a value(s) for X that will not work? Why?

Parent's Age	Parent's Age Your Age
25	Undefined
26	26/1
27	27/2
28	28/3
29	29/4
30	30/5
X	$X/(25-X)$

In this graph we are looking again at a rational function, but here we are looking at a graph that is descending with a vertical asymptote at $x = 25$ and a horizontal asymptote at $y = 1$.

What will this graph look like? How does this graph differ from the one above?

Are there a value(s) for X that will not work?

Is y a function of x in both of these? Is x a function of y in both of these? Explain.

Homework

(Graph and describe using full sentences)

What conjectures can you make about the age relationship between you and an older (younger) sibling?

Describe the graphs if we compared your age to your grandparent's age?

Describe the graphs (your age, your age/parent's age) as an ordered pair and (your age, your age/g-parent's age) as a separate ordered pair?





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The Upper East Tennessee Council of Teachers of Mathematics is an organization for anyone involved in mathematics education from preschool through college in the greater Tri-Cities region. This year we will have a single-day conference in the spring at a day and location yet to be announced. The purpose of UETCTM is to promote excellence in teaching mathematics and to share best practices among mathematics educators.