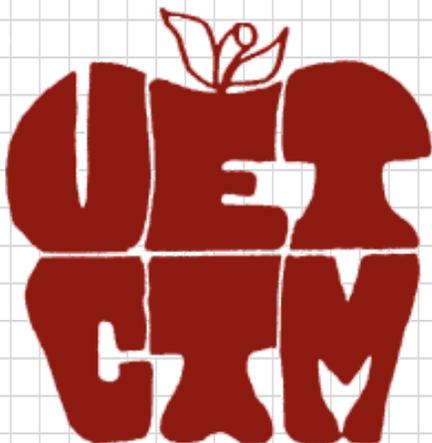


UETCTM

Upper East Tennessee Council of Teachers of Mathematics



Word Problems, Math Games, Special Education



Featuring Teachers from:

- 1st Grade
- 2nd Grade
- 6th Grade
- 7th Grade
- 8th Grade

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WORKING A LITTLE BIT LESS

by Rachel Pugh
8th Grade

When switching to a new grade level, one of the things that I struggled with was doing too much work. I could hear echoes of wise teachers from my student teaching days, saying, "You're working harder than the students; make them do more of the work." Now, I realize that a first year in a new grade will require more planning and preparation than any subsequent years, but I believe that heeding those wise teachers will help prevent burnout.

Here is one of the ways that I attempted to put more work on my students....

Once my 8th graders got the hang of a new topic, either for the day or after a few days, I asked them to create their own sample problem with a partner. In geometry, this meant students made their own designs of a rotated pentomino, where they chose the center of rotation (inside the shape, on the edge of the shape, or outside the shape). With linear equations, this meant students generated their own linear situation that could be represented as a line on a graph. With volume, this meant students drew their own cylinders with labeled dimensions.

In all of the examples I listed above, I asked the students to show the design/graph/problem on the front of the paper and the work of the solution on the back.

Now I could use the students' work as practice problems for the rest of the class. I wasn't the one who had to create all these problems. I didn't even have to solve them.

Student pairs then traded problem pages with other student pairs to solve the other students' problems and compare their answers. In the examples above, this meant finding the center of rotation for the geometry, graphing the line to match the situation, and computing the volume of the cylinder.

If there were disagreements between the students who created and the students who solved the problems, they had to address what was confusing or misleading or problematic or incorrect about each other's work. Follow-up discussions with me or with the whole class helped them refine their thinking and their communication, which led to better labeling or solving on future activities.



...I could use the students' work as practice problems for the rest of the class..

This seemed to benefit everyone in many ways: Students wanted to make their problems clear yet challenging for their peers. Students had to defend their solutions and consider others' ways of arriving at an answer. Students became more precise and articulate about their thinking. We all had to evaluate what makes a good math problem. And I got to watch my students interact with each other and the math at deeper levels than if I had created a bunch of practice problems for them.

Hopefully, this reminder to put the work back on the students will help other Type A teachers avoid burnout too. :) ■



NCTM Virtual Conference



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TEACHING THE NEXT GENERATION OF BARGAIN SHOPPERS

by Emily Blevins

7th Grade

Okay, okay, I'll admit it. I (not so secretly) LOVE finding the best bargain possible. You've got a coupon? I will find a way to use it. I have pictures of receipts from Kroger reflecting savings of over \$60. According to my Facebook memories, I took one shopping trip and saved more than \$100! Clearly, this is a useful skill.

Cut to school and our curriculum. My 7th grade students are required to learn about unit rates, discounts, sales tax, and markups. There is an instant real-world connection. These skills are things that students can go home and use immediately. All of my students with the constant "When are we ever going to use this?" and "Why do I have to learn this?" are suddenly silenced when we reach this unit.

As I began to think of methods to use for teaching shopping, I realized this would be such a simple unit! "I'll just take them shopping with me!"...nope. No. That's definitely a bad idea. How can I get these kiddos to engage with percentages, understand it for a state test, and maybe remember it down the line? That's when it hit me---the internet! Who doesn't shop online? Here are some specific tools I was able to use to help me train up some bargain hunters (and teach them math in the process!)

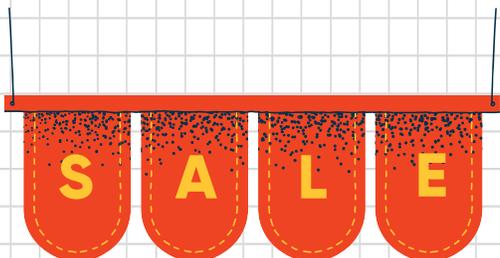
● [The Coupon Kid](#) is a great place to grab student interest. This video features a young man who is a master couponer. When students see this video, they often ask how and why, but they are always amazed by the numbers.

● [The Better Deal](#) (Desmos) asks students to compare the unit rate of various items, ultimately leading up to asking them to create a scenario where the unit rates are the same.

● [Dueling Discounts](#) (Dan Meyer) and [Bed, Bath, and Beyond](#) (Robert Kaplinsky) are 3-Act Tasks from Robert Kaplinsky that lead students through a shopping scenario, asking which is better: a dollar amount or a percent deduction? By presenting students with the scenario and then offering some sample products to purchase, students will lead themselves to their own conclusions while practicing the mathematical skill intended.

I know what you're thinking. Great. Another teacher, throwing out ideas that I don't have time for and I am not able to implement. False! Give it a try! The first time I had my students complete similar (because it was several years ago) activities, they were more engaged than I had ever seen them.

As a matter of fact, one class wanted to take the assignment out into the real world. They asked their families to take them grocery shopping. They began examining price tags. They pulled out their phones and did the math themselves. One student found



that a certain dollar store, of the general variety, had an erroneous sign. This led to a class campaign. They wrote letters to the corporate office, they made a movie showing how the wrong unit rate could affect their purchasing, their lives, and the universe (they were 7th graders--they definitely went with the dramatic element!), and they talked to other classes, wondering why they weren't out looking at price tags, too.

Almost every year, I have my students work through the tasks above (or very similar tasks) and then I assign them to take it home. Find the best deal on toilet paper. Get involved in the grocery shopping and budgeting process. Is there a way to save your family \$20 a week? What can really be done with this information? My hope is that maybe, just maybe, I have inspired a student or two to clip those coupons and watch the savings roll. ■

In Memoriam: Genevieve M. Knight

Genevieve M. Knight, National Council of Teachers of Mathematics (NCTM) [1999 Lifetime Achievement Award](#) recipient and nationally known mathematics educator, passed away on August 19.

Dr. Knight spent more than 40 years teaching and mentoring students at historically Black colleges and universities. She served on the NCTM Board of Directors and helped found the Benjamin Banneker Association. Through her years of service to the mathematics education community, Genevieve Knight always spoke out in support of equity in mathematics education. She was committed to supporting those working to be mathematics teachers to inspire and support students in their learning and understanding of mathematics.

Genevieve Knight's numerous awards attest to her distinguished career and status as a master teacher and mentor. She will be missed by the many whom she inspired.

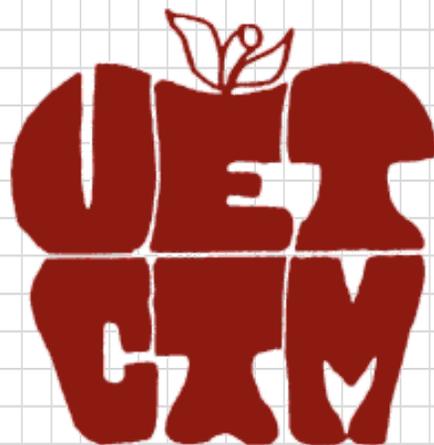


NCTM'S WORKSHOP

New! Classroom Resources

NCTM's community of mathematics educators and leaders have come together to develop a collection of "grab and go" resources for the year.

Use these resources to design learning opportunities for students, make connections within and across grade levels, support coherency, and emphasize reasoning and sense making to ensure the highest-quality mathematics education for each and every student.



THE INCLUSION CLASSROOM

by Megan Shelton

2nd Grade

Step into any elementary classroom during mathematics instruction, and you're likely to see many of the same things- a whole-group lesson being presented, students working in math workbooks, or a teacher meeting with a small group of students to refine skills being taught. While one would expect to see these things within a classroom setting, it would not necessarily be expected to see students learning skills that span three or more grade levels, multiple instructional assistants, special education teachers, interventionists, and interpreters present, work being modified to meet legal requirements and student needs and abilities, and a large range of classroom modifications from seating to the type of writing instrument being used by a student, all present during the mathematics block of a general education classroom. Allow me to welcome you to my classroom- a second grade inclusion classroom.

Inclusion of special education students in the least restrictive environment is a federal mandate which must be met by all educational institutions, but how that mandate is met often looks different from state to state, district to district, school to school, and even classroom to classroom. The school I teach at typically has one or

two classes per grade level designated as inclusion classrooms, where students who have an IEP (individualized education plan) are grouped together in order to receive services from the classroom teacher, special education teacher and assistants, interventionists, and volunteers within the classroom. Currently, I am the only inclusion teacher in my grade level, and I am preparing to start my fifth year in this role. Ideally these classrooms have fewer students than the other classrooms to allow the students to receive more individualized instruction, although many years I have as many students or more than the other classes in my grade level due to students transferring to our school with a preexisting IEP and/or need for services. In my experience, inclusion classrooms are much more likely to offer students flexible seating options, flexible desk options, specialized supplies such as pencil grips and specially-lined paper, sensory items such as a 'cool down corner' and resistance bands on chairs, and generally a more low-key experience than a traditional classroom. My classroom either has, or has at one time had, all of these elements and more.

Math instruction, as well as other subject areas, looks somewhat different in my inclusion classroom. Rather than having one lesson planned to teach to all

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My classroom is focused much more on progress and growth than achievement...

Some days I teach the students who are working at grade level, while other days I teach students who are working significantly below grade level, and all in between. The beauty of having additional staff members in my classroom at various times throughout the day is that we can divide and conquer much more material than I could teach on my own.

While teaching an inclusion class can be challenging, it is very rewarding. My classroom is focused much more on progress and growth than achievement alone, and we celebrate both individual and group progress alike. If you are unfamiliar with how an inclusion classroom functions, I challenge you to visit one (perhaps even mine) and see how things function differently from other classrooms. A visit to the land of inclusion is often eye-opening and gives general education teachers a look into a whole new world. ■

students, I have to carefully plan each day's instruction to ensure that I am meeting the needs and abilities of both my general education students and inclusion students. While I always have some students who can learn and work at a second grade level, I also almost always have students who work below or significantly below grade level. In order to meet the needs of all my students, I typically keep my mini-lesson very brief and use small-group instruction to convey the concepts I wish for students to grasp that day. While all students must be exposed to grade-level material, it is important that I focus on helping students learn at the level they are currently at.

Math small groups in my inclusion classroom are typically grouped homogeneously by ability level of students when possible, but at times it is necessary to veer from this plan and heterogeneously group students to aid in the facilitation of peer tutoring. It is not uncommon to walk into my classroom during math block and see one group of students being taught by me, one group of students being taught by a special education world teacher or assistant, and another group of students being taught by another student.



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Looking for funding for a special project, coursework, or professional development? The MET Grants application portal is now open for the winter cycle of grants, scholarships, and awards.

Applications are due by November 1, 2021. [Apply now](#) for an MET Grant!



New Grant: Partnership for Transition to College Readiness Grant

We are pleased to announce a new grant supported by the William and Marjorie Speer Family Fund and NCTM. The purpose of the Partnership for Transition to College Readiness Grant is to support partnerships between high schools and local higher education entities and to support innovation in 12th-grade preparation, promoting successful transition to college mathematics. Applications are due by November 1.

[Learn more here!](#)

MIDDLE SCHOOL MATH GAMES: ARE THEY SO IMPORTANT?

by Elizabeth Saxena
6th Grade

Any teacher who has been in a classroom during the last decade is well aware that, long gone are the days of teachers being curriculum deliverers through endless worksheets and fill-in-the-blank study guides. Nonetheless, there are many teachers, newbies and seasoned veteran teachers alike, who allow their mathematics instruction to fall into the same monotonous routine, year after year, including how they review skills in preparation for tests. Perhaps this happens, because so much of teaching does remain constant from year to year, or the demands placed upon teachers consistently increase, leaving teachers with less time all around.

Whatever the reason that we as mathematics teachers might find ourselves passively falling into this common practice, in order to remain relevant and effective as educators, we must proactively make the choice to employ creativity, flexibility, and a bit of ingenuity to consistently engage our students in actively learning and retaining skills mastered. One way teachers can do this is by regularly integrating math skill review games into classroom concepts and skills review routines. Many of us legitimately make the argument that we simply cannot spare an extra day for review, or lack time to gamify skills review. Admittedly, these are very valid objections, but before deciding to stop reading to finish grading a stack of papers, let's explore a few reasons why we as teachers cannot afford not to invite our students into a

world of learning that is as engaging as the digital brain-candy vying daily for space in their minds, and holding their collective attention captive.

It is no secret that, each year, online gaming designers and social media engineers spend millions of dollars studying what we as teachers already know; simply put, novelty and pleasure, paired with any activity, primes the human brain to remember and store learned information in our long term memory. In other words, the more enjoyment we receive from an activity, the more receptive our minds are in storing the information we learned during that activity. On the flip side, any teacher who has ever experienced the dramatic sighs and exaggerated eye rolls that occur when handing out written study guides, knows that many students would rather wear braces into adulthood than robotically fill in the blank on a worksheet. Naysayers insist that these rote learning study guides are very effective and engaging, but how many of us adults look forward to the fill-in-the-blank IRS worksheets required of us each year? Likewise, although we fill out the same form, with the same numbers and information, each year, remarkably few of us have mastered the algorithm used to calculate what we annually owe Uncle Sam.

Although gamifying math skills practice is much more effective and engaging than rote memorization for test review, there are many additional activities in the mathematics classroom in which gamifying learning enhances student learning and skill retention.

For example, gamifying formative assessment is an extremely effective way for students to quickly convey individual levels of understanding. It goes without saying that eager, voluntary student participation also gives us as educators a true snapshot of overall student learning and effectively informs our instruction as to which concepts and skills should be reinforced and which ones are mastered. Effective teachers use this information to reveal any misconceptions students might have about specific concepts as well as error patterns that identify instructional deficits.

Playing math review games also motivates even the most reluctant of learners, including those with learning disabilities and impulse control deficits, and increases overall classroom participation. In addition, review games allow students to ask those questions they were afraid to ask in class. This also gives teachers a way to address those questions in a way that is more personal, while avoiding singling out individual students, which is vital to future student participation in the middle school setting.

There are many classroom review games and digital resources on the internet that gamify learning and review skills. As a fellow educator, I want to challenge you to give up some of the time, control, organization, and engage your middle school students in these fun learning games. The visible change will transform your whole classroom environment, student interactions and most importantly, your students'

perception of learning through simple, and engaging review games integrated into the classroom.

I have compiled a brief list below of classroom games and digital online gamifying platforms, many of which can also be modified for use in other subjects as well.

1. Survivor- This game is played like four corners. I have a PowerPoint created with a fun Survivor theme song and sound effects from the Survivor series. It does take a little time to set up the template but after that you have created a review in a matter of minutes.

Directions:

Label the corners 1, 2, 3, 4.

Explain to students that they are going to play a game, but they are not allowed to run or talk.

Instruct students to stand up and reveal the first slide.

The questions are formatted with answer choices in A, B, C, and D. Read the question and all of the answer choices aloud and students will go to the corner they think is correct.

Students have 30 seconds to choose. Any students not choosing a corner are automatically out.

When everyone has chosen a corner, reveal the answer.

Students in the wrong corner will take a seat and write the remaining game questions and the correct answer choice down.

Students must still participate if they are out, and can still review but are no longer an active corner chooser in the game.

Just like the Survivor series, the last Survivor in the game usually wins a prize.

2. Kahoot- This free, digital online review game platform is beneficial if you are pressed for time. (Kahoot offers a paid version as well, but I have found the free version works just fine.) There are thousands of questions you can use to build your review game or you can create your own questions.

Once you have created it, it saves it for your personal use or you can share your creation with fellow educators. Students can play as teams or individually.

3. Quizizz- This is another online game platform that is free and has an app so students can play on their mobile devices from anywhere. It works similarly to Kahoot, but the difference is that all students are answering the same questions at different times, and it is student paced. Teachers can choose to create their own quiz or select different questions from a database containing other teachers' quizzes. There are thousands of quizzes to choose from in all subject areas as well. It is Google Classroom friendly, and can be assigned as homework or as an extra free time activity.

The most exciting thing about this online game is that it breaks down which questions students had the most difficulty with, and allows the teacher to present those questions for discussion.

4. Scoot- This classroom game is easy and gets students up and moving. Before class, you can cut up a worksheet with enough problems to place one on each student's desk.

Directions:

Students should get out a sheet of paper and number their paper according to the amount of questions you have. Then the teacher lays a question on each student's desk.

Each student will stand at a desk and answer the question on the desk, matching it with the corresponding number on their paper.

Instruct students that each time the bell rings, they will shift one desk to their right. Students will have 1 minute to complete each question (I use a timer).

When the timer bell rings, the students will shift to the right for the next question. If a student is at the last seat in the back row, they will move forward to the front and continue right. If a student is at the end of the row, they will move to the next row. This activity continues until students have made their way back to the original starting point.

Review the correct answers and students self grade their papers, making corrections. Discuss as a whole group, what questions were difficult and why.

5. Minute to Win It- This is probably my students' most favorite game. A buzzer at the front of the room is necessary.

Directions:

Divide the class into teams of 4 or 5 students.

Each team will send one team member up to the front to answer the question. The first person to ring in and answer correctly will earn the right to play the challenge game for more points for their team. Students have one minute to play silly games I have created and get points for their team.

The team with the most points at the end of the game is the winner. ■

RETHINKING WORD PROBLEMS

by Kerry Boito

1st Grade

I was fortunate to be a part of MathElites this summer. We explored lots of different ideas and filled our math teacher tool bag with engaging activities. Our book for the class was *Mathematize It! Going Beyond Key Words to Make Sense of Word Problems*. I am going to share some ideas that broadened and shaped my perspective.



I struggled at times with trying to show an equation..

The book that we read, *Mathematize It!*, has really helped me focus on breaking down word problems and helping students navigate them. One idea that the authors mention is focusing on the context of the story in the problem while trying not to think about the numbers. In my own head, I usually jump to trying to solve the problem without thinking about the situation or action that is taking place. I know many of my first grade students do the same thing. Putting this into practice in each chapter of the book, forced me to hone in on figuring out the context of the situation. Intentional modeling of how to think about what is going on in the problem will help my students shift their attention on working out the context first.

Another strategy the authors share is teaching students how to represent the action or situation taking place in a word problem, once they have figured out the context. Throughout the book, there were problems for the reader/participant to work out and think about. We were to figure out how we would both represent and solve them. I struggled at times with trying to show an equation that matched the context of the problem, particularly when my computational strategy was opposite of the action taking place in the problem.

For example:

Max had 5 crackers on his plate. His mom gave him some more. Now there are 12 crackers on Max's plate. How many crackers did Max's mom give him?

Typically, I would jump straight to thinking about what to do with the numbers and would subtract to find the answer to this problem. I would write,

$$12 - 5 = ?$$

Then I would solve it and figure out that Max's mom gave him 7 crackers. Did you see how I just hopped over thinking about the context and went right to thinking about the numbers? I didn't slow down and wonder about if there is any action taking place or if there is a situation in this work problem.

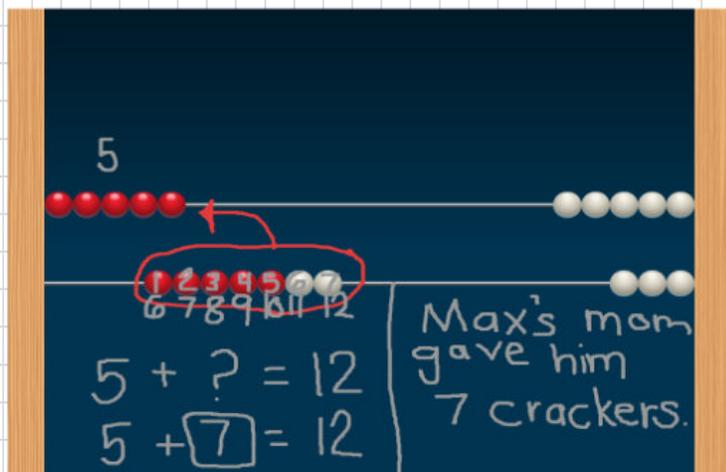
If I back up and rethink about the problem, I might think something like this:

Max has some crackers. His mom gives him some more. Now he has more crackers than with which he started. How many crackers did his mom give him?

When I slow down and digest what is happening, I see that this problem has action. I notice that Max starts with some crackers and then his mom gives him more. His mom giving him more crackers shows action. Now I know that I need to represent this action in the models I create to express my mathematical thinking. I also realize that my initial equation is a subtraction problem and that it does not properly reflect the context of the problem; the action of adding more to the plate.

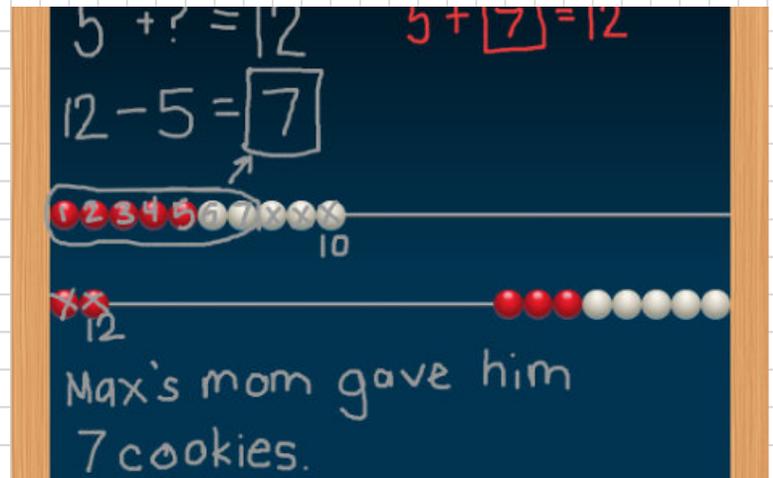
Let's go back to the word problem. Max had 5 crackers on his plate. His mom gave him some more. Now there are 12 crackers on Max's plate. How many crackers did Max's mom give him?

In thinking about the context of the word problem, this diagram shows that I understood that it was an add-to problem and I showed how Max had 5 and then 7 more were added to make 12.



My equation also shows that I know which part of the problem I needed to solve.

To be clear, the authors are not saying that it is wrong to figure out an addition word problem by using subtraction. The focus is on getting the students to realize the operations involved in word problems in order to represent them in context. Once students have determined the context of the problem, students are then able to decide on a computational strategy that best works for them to solve it. This may or may not coincide with the equation that represents the context and operation of the problem.



This diagram shows that I understand the context of the problem, but I'm switching to subtraction to solve the problem. I then went back to the contextual equation and filled in the missing part.

Another approach the authors shared is having students represent word problems in five different ways (contextual, concrete, pictorial, verbal, and symbolic). We know that it is not always possible for students to do all five, every day. The authors point out that when students demonstrate using a variety of representations, they are able to make connections that deepen their thinking and understanding of word problems.

These representations can also help teachers determine if students are clearly understanding the context of the problems. In some of the provided examples in the book, students might have found the correct answer, but their representations might not have shown contextual understanding. (Think back to my initial subtraction equation that did not match contextually with the add to word problem.) I have required my students to have both pictorial and symbolic representations, but I honestly cannot say that I was attending to their contextual understanding as much as I was for the correct answer.

These are just a very few ideas that have helped me rethink how to teach word problems and how to focus on my students' contextual understanding. There are so many more strategies and takeaways I could tell you about from this book. If you don't own it yet, I highly recommend it. I'm excited to implement these strategies and ideas with my class this year. ■

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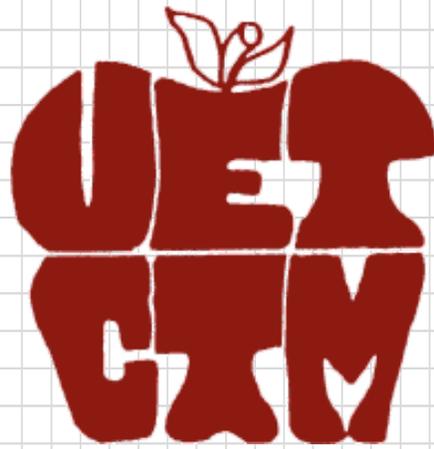
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Upper East Tennessee Council of Teachers of Mathematics

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