

Tennessee Mathematics Teachers Association

State Conference September 29 & 30, 2017

Modeling the Standards



















Tennessee Mathematics Teachers Association & Mathematics Teachers of Tennessee Northwest at The University of Tennessee at Martin





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For more information, please visit our Conference Website <u>http://math.utm.edu/tmta/</u> or our main website <u>https://tmta.wildapricot.org/</u>



Cover art by Amanda Niedzialomski Logo by Chris Caldwell

Conference Registration and Vendor Exhibits

Friday, September 29, 1:30 p.m. – 5:45 p.m.

Saturday, September 30, 7:45 a.m. – 12:00 p.m.

Conference Registration: Watkins Auditorium Lobby, University Center University of Tennessee at Martin

THANK YOU to our VENDORS for their generous contributions to the TMTA Conference. Please visit them in the University Center 206 A-B-C.

Diamond Exhibitors (Providing Refreshments and Supporting Student Award Winners):

> Fluency Games Geyer Instructional Products Imagine Math

> > Silver Exhibitors:

Casio Box Cars and One-Eyed Jacks Outstanding Mastery Guides CPM Teachers 'N Tools, Inc. UMathX by Neufeld

Provided Bookmarks:

NASA Space Place

Schedule At A Glance

Friday, September 29			
9:00 a.m. – 12:30 p.m.	TAMTE Preconference (requires separate registration)—University Center 111		
11.00 1.00	TMTA Executive Board Meeting (members of the Executive Board only)—		
11:00 a.m 1:00 p.m.	University Center 229		
12:00 – 1:30 p.m.	Exhibit Set-Up (not open to TMTA participants)—University Center 206 A-B-C		
1:30 – 5:45 p.m.	Registration Open—University Center Watkins Auditorium Lobby		
1:30 – 5:45 p.m.	Exhibits Open—University Center 206 A-B-C		
3:00 – 3:45 p.m.	SESSION 1 (various locations—see detailed schedule)		
4:00 – 4:45 p.m.	SESSION 2 (various locations—see detailed schedule)		
5:00 – 5:45 p.m.	SESSION 3 (various locations—see detailed schedule)		
	TMTA Awards Banquet—University Center Ballroom (2 nd Floor)		
	Speaker: Trent Okerson, Meteorologist, WPSD		
6:00 8:00 n m	Student Award Winners sponsored by:		
0.00 – 8.00 p.m.	Fluency Games		
	Geyer Instructional Products		
Imagine Math			
	Saturday, September 30		
7:45 a.m. – 8:45 a.m.	Continental Breakfast—University Center 206 A-B-C		
7:45 a.m. – 12:00 p.m.	Registration Open—University Center Watkins Auditorium Lobby		
7:45 a.m. – 12:00 p.m.	Exhibits Open—University Center 206 A-B-C		
9:00 – 9:45 a.m.	SESSION 4 (various locations—see detailed schedule)		
10:00 – 10:45 a.m.	SESSION 5 (various locations—see detailed schedule)		
11:00 – 11:45 a.m.	SESSION 6 (various locations—see detailed schedule)		
	Lunch and Affiliate Meetings		
	Pick up boxed lunches in University Center Ballroom		
	CAMTA: Chattanooga Area Mathematics Teachers' Association-UC 230-A		
	SM ² EA: Smoky Mountain Mathematics Educators' Association—UC 230-B		
12.00 - 12.45 n m	MACOTOM: Memphis Area Council of Teachers of Mathematics—UC 229		
12:00 12:10 p.m.	TMATYC: Tennessee Mathematics Association for Two Year Colleges—UC 230-C		
	MT ² NW: Mathematics Teachers of Tennessee, Northwest—UC Ballroom		
	UETCTM: Upper East Tennessee Council of Teachers of Mathematics—UC 231		
	(MT) ² : Middle Tennessee Mathematics Teachers—UC 111		
	TAMTE: Tennessee Association of Mathematics Teacher Educators—UC Ballroom		
12:00 – 1:30 p.m.	Exhibit Take-Down (not open to TMTA participants)—University Center 206 A-B-C		
1.00 - 2.15 n m	FINAL SESSION: Updates from Tennessee Department of Education, TMTA		
1.00 - 2.15 p.m.	Business Meeting, Door Prizes—University Center Watkins Auditorium		

Just for Fun

The Sun produces about 400,000,000,000,000,000,000,000,000 watts of power. The Earth is about 150 billion meters from the Sun, and the Earth has radius of about 6000 kilometers. All humans on Earth consume a total of about 1,000,000,000 watts (averaged over the day). What is the approximate ratio of the total amount of solar power hitting Earth over the total amount consumed by humans?

Source: Expii, <u>https://www.expii.com/solve/69/2</u>

My Schedule

Day/Time	Session	Location

My Contacts

Name	Email/Phone	Why?

BUILDING ABBREVIATIONS AND CAMPUS MAP

UC – University Center HU – Humanities LIB – Paul Meek Library



Just for Fun

You are recycling water bottles for Earth Day. You can recycle any 2 bottles to get a new bottle. You start with 2017 bottles. How many new bottles can you make by starting from these 2017 bottles and recycling?

Source: Expii, https://www.expii.com/solve/69/3

FRIDAY	SESSI	ON 1:	3:00-3:45
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<i>Friday, September 29, 2017 Session 1: 3:00-3:45</i>			45
GRADE	PRESENTATION	STRAND	ROOM
K-2, 3-5	 PowerPlay-Math Games for Place Value & More! (part 1) Stephanie Bainbridge stephanie Bainbridge steph@boxcarsandoneeyedjacks.com Come prepared to play games with cards, place value dice, number lines that teach: ordering, comparing, naming numbers, expanding, rounding numbers, decimals. Game boards, journal ideas & student samples provided. THIS IS A TWO HOUR PRESENTATION. 	Number and Operation, Mathematical Processes, Mathematical Modeling	UC 230-A
K-2, 3-5, Pre- service, General	 Multisensory Strategies for Students with Dyscalculia Melissa Burnside mburnside119@gmail.com Lenore Turner lenoreses1@hotmail.com This session will equip participants with information about dyscalculia. Multi-sensory strategies will be taught to help students with disabilities. THIS SESSION IS REPEATED SATURDAY 9 AM 	Number and Operation, Data Analysis, Statistics, Probability, Mathematical Processes, General Activities, Teacher of Teachers, Mathematical Modeling	HU 416
3-5, Middle, Pre- service, General	Counting Down to Number Sense and Flexible Strategies Ryan Fox <u>ryan.fox@belmont.edu</u> Whitney Spain <u>Whitney.spain@mnps.org</u> Demonstration of a game, modified from a European gameshow, focused on reaching a target number using a mix of basic arithmetic operation. THIS SESSION IS REPEATED FRIDAY AT 4 PM	Number and Operation, Mathematical Processes	HU 412
3-5, Middle, High	Create an OMG! Rhonda K. Davis <u>Rkdmath@gmail.com</u> Create an OMG! – a collection of graphic organizers tailored for each grade 2 – Algebra 2. <i>THIS SESSION IS REPEATED FRIDAY AT 4 PM</i>	Use of Vocabulary and Graphic Organizers	UC 230-C

1	Friday, September 29, 2017 Session 1: 3:00-3:45		
GRADE	PRESENTATION	STRAND	ROOM
Middle, High, Pre- service	Creatively Assessing Students in AP/Honors Math Classes Sister Cecilia Anne Wanner, OP When given the privilege of a room full of students who love math and sincerely enjoy learning, assessment can go beyond standard tests. Gain a few new assessment ideas while also sharing reflections on tried-and-true methods. THIS SESSION IS REPEATED FRIDAY AT 4 PM	Algebra, Mathematical Processes, Mathematical Modeling, Calculus, Teacher of Teachers	HU 407
Middle, High, Pre- service	Is it a FUNction? Theresa Hopkins <u>thopkins@utk.edu</u> Ashley Brown <u>Abrow147@vols.utk.edu</u> Do your students struggle with determining if a relation is a function? Let's look at how family pets can help decide if a relation is a function! <u>THIS SESSION IS REPEATED FRIDAY AT 4 PM</u>	Algebra, Mathematical Processes	UC 231
Middle, High	Can DESMOS Replace the Graphing Calculator? Liz Quinn-Stine lquinnstine@sasweb.org DESMOS is a powerful, free, online graphing program that I use more and more in the classroom. Can it replace expensive TI-calculators? Come and see what you can do with DESMOS. THIS SESSION IS REPEATED FRIDAY AT 4 PM	Algebra, Data Analysis, Statistics, Probability, Mathematical Modeling	HU 414
Middle	Proportional Reasoning-Deepen Your Understanding Through Multiple Representations Christi Sampson csampson@carenegielearning.com Broaden your understanding of proportional relationships by experiencing tasks from a student's perspective by using double number lines, graphs, tape diagrams, and tables to make connections. THIS SESSION IS REPEATED FRIDAY AT 4 PM	Mathematical Modeling	UC 230-B
Middle, High	Exploring Geometry Through Hands-on Learning Kimberly G. Williams <u>kwill126@utm.edu</u> Rachelle Reid, Jennifer Kaneer Participants will experience a variety of hands-on activities that can be used in the secondary mathematics classrooms to engage students in geometry.	Geometry, Measurement	UC 229

<i>Friday, September 29, 2017 Session 1: 3:00-3:45</i>			45
GRADE	PRESENTATION	STRAND	ROOM
Middle, High College	Fibonacci Sequences and Golden Rectangles Connections? Carroll G. Wells <u>carroll.wells@lipscomb.edu</u> How many ways can you climb a staircase taking one or two steps at a time? What is a golden rectangle? Are there connections? THIS SESSION IS REPEATED FRIDAT AT 5 PM	General Activities	HU 405
Middle, High	Strategies Used to Promote Discourse in Mathematics Classrooms Gerry Long gerrylong@cpm.org Participants will learn about and practice many study team teaching strategies. These strategies will help teachers facilitate and structure effective collaboration among their students.	Mathematical Modeling	HU 408
High, College	Practical Activities for your Statistics Class James N. Adair adair@dscc.edu Participants will complete the activities that are used to help statistics students understand probability distributions, sampling distributions, the Central Limit Theorem, correlation, regression and Goodness of Fit. THIS SESSION IS REPEATED FRIDAY AT 4 PM	Data Analysis, Statistics, Probability	HU 310

You have two buckets, one holds exactly 24 cups of liquid and one holds exactly 15 cups. What is the smallest nonzero volume of water that you can measure out exactly using the two containers?

Source: Expii, <u>https://www.expii.com/solve/67/2</u>

Just for Fun

While you and your friend are having a picnic in the park, you notice that when you put your thumb against the ground, there are 5 blades of grass lined up from the tip of your thumb to its first joint, which is a distance of 2.5 cm (about 1 inch). About how many blades of grass are there in a square meter (about 1 square yard)?

Source: Expii, <u>https://www.expii.com/solve/65/2</u>

FRIDAY SESSION 2	2: 4:00-4:45
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Friday, September 29, 2017 Se		ession 2: 4:00-4:	45
GRADE	PRESENTATION	STRAND	ROOM
K-2, 3-5	Continued: PowerPlay-Math Games for Place Value & More! (part 2) Stephanie Bainbridge steph@boxcarsandoneeyedjacks.com Come prepared to play games with cards, place value dice, number lines that teach: ordering, comparing, naming numbers, expanding, rounding numbers, decimals. Game boards, journal ideas & student samples provided. THIS SESSION IS CONTINUED FROM 3:00	Number and Operation, Mathematical Processes, Mathematical Modeling	UC 230-A
K-2, 3-5, Middle, High, College, Pre- service	THIS SESSION IS CONTINUED FROM 3:00 STEM on the Road: Mobile Renewable Energy Education Paula Gale pgale@utm.edu John Cole Jcole42@utm.edu John Cole Jcole42@utm.edu Non Cole Jcole42@utm.edu Rachna Tewari@utm.edu Our mobile renewable energy classroom contains educational demonstrations and activities that describe how energy is produced, what we use it for and how it can be conserved. THIS SESSION IS REPEATED SATURDAY AT 9 AM Elipping Out Over Factors and Remainders	General Activities, STEM	PARKING LOT OUTSIDE HU
3-5, Middle, Pre- service, General	Ryan Fox ryan.fox@belmont.edu Cearra Logan cearra.logan@pop.belmont.edu How adapting a coin-flipping activity teaches Middle school students about factors and remainders while developing pre- service teachers' mathematical knowledge for teaching. THIS SESSION IS REPEATED FRIDAY AT 3 PM	Mathematical Modeling, Number and Operation, Mathematical Processes	HU 412
3-5, Middle, High	Create an OMG! Rhonda K. Davis <u>Rkdmath@gmail.com</u> Create an OMG! – a collection of graphic organizers tailored for each grade 2 – Algebra 2. <i>THIS SESSION IS REPEATED FRIDAY AT 3 PM</i> Can DESMOS Replace the Graphing Calculator? Liz Quing Stine [quingstine@gesweb.org	Use of vocabulary and Graphic Organizers	UC 230-C
Middle, High	DESMOS is a powerful, free, on-line graphing program that I use more and more in the classroom. Can it replace expensive TI-calculators? Come and see what you can do with DESMOS. THIS SESSION IS REPEATED FRIDAY AT 3 PM	Algebra, Data Analysis, Statistics, Probability, Mathematical Modeling	HU 414

l	Friday, September 29, 2017 Se	ession 2: 4:00-4:	45
GRADE	PRESENTATION	STRAND	ROOM
Middle, High	Slope and Linear Relations – Modelling Makes Thinking Visible Rudy Neufeld <u>RNeufeld@UMathX.com</u> Darlene Lovingood lovingoodb@monroe.k12.tn.us Session will model blended learning in diverse learning environments, discuss pedagogy, choose appropriate lessons to "grapple" problems and "see" solutions in Linear Relations and Slope. THIS SESSION IS REPEATED SATURDAY AT 11 AM	Mathematical Modeling	HU 118
Middle, High, Pre- service	Is it a FUNction? Theresa Hopkins <u>thopkins@utk.edu</u> Ashley Brown <u>Abrow147@vols.utk.edu</u> Do your students struggle with determining if a relation is a function? Let's look at how family pets can help decide if a relation is a function. THIS SESSION IS REPEATED FRIDAY AT 3 PM	Algebra, Mathematical Processes	UC 231
Middle	Paper Quitts with Area: Melinda Hopkins Melinda.hopkins@knoxschools.org Engaging students in an art project that involves calculating area, finding patterns, and discussing important mathematical skills. THIS SESSION IS REPEATED FRIDAY AT 5 PM	Geometry, Measurement	HU 405
Middle	Proportional Reasoning-Deepen Your Understanding Through Multiple Representations Christi Sampson csampson@carenegielearning.com Broaden your understanding of proportional relationships by experiencing tasks from a student's perspective by using double number lines, graphs, tape diagrams, and tables to make connections. THIS SESSION IS REPEATED FRIDAY AT 3 PM	Mathematical Modeling	UC 230-B
Middle, High, Pre- service	Creatively Assessing Students in AP/Honors Math Classes Sister Cecilia Anne Wanner, OP When given the privilege of a room full of students who love math and sincerely enjoy learning, assessment can go beyond standard tests. Gain a few new assessment ideas while also sharing reflections on tried-and-true methods. THIS SESSION IS REPEATED FRIDAY AT 3 PM	Algebra, Mathematical Processes, Mathematical Modeling, Calculus, Teacher of Teachers	HU 407

l	Friday, September 29, 2017 Session 2: 4:00-4:45		
GRADE	PRESENTATION	STRAND	ROOM
High, College, General	 Why MUST a Soccer Ball Have Exactly Twelve Pentagons Steve Gadbois, <u>steve.gadbois@musowls.org</u> Euler's formula from graph theory applies to solid polyhedra, which then immediately translates to many areas, from sports (soccer balls) to chemistry (buckminsterfullerenes). THIS SESSION WILL BE REPEATED FRIDAY AT 5 PM 	General Activities	HU 416
High, College	James N. Adair <u>adair@dscc.edu</u> Participants will complete the activities that are used to help statistics students understand probability distributions, sampling distributions, the Central Limit Theorem, correlation, regression and Goodness of Fit. <u>THIS SESSION IS REPEATED FRIDAY AT 3 PM</u>	Data Analysis, Statistics, Probability	HU 310
High, College	Solve Free Response Questions in AP Calculus AB and BC Exam (part 1) Yanli Cui <u>cuiy@scsk12.org</u> Free Response Questions are challenging concepts in AP Calculus AB and BC exams. It requires the transition from purely procedural knowledge to development of conceptual understanding of the important ideas in calculus. We will work through the released FRQ questions step by step to understand how to tackle these types of questions. THIS IS A TWO HOUR SESSION.	Mathematical Processes, Teacher of Teachers, Mathematical Modeling, STEM	HU 408
K-2, 3-5	An Introduction to the Revised Tennessee Math Standards Eddie Keel <u>keelmath@bellsouth.net</u> Stacy Ussery <u>Stacy.Ussery@tn.gov</u> What has been revised, refined, dropped, or added to the revised math standards? Come to this session to learn what you need to know about the standards. We will also spend time discussing how rigor is an integral part of the instructional shifts in mathematics.	General Activities	UC 229
General	The Apollo Missions-One Flight Controller's Story (part 1) W.G. "Bill" Weppner wweppner@southwest.tn.edu A look back at my experiences as the Apollo Program celebrates 50 years. THIS IS A TWO HOUR SESSION. THIS SESSION WILL BE REPEATED SATURDAY 10 AM	STEM, History	UC 111

FRIDAY SESSION 3: 5:00-5:45

F	Friday, September 29, 2017 Set		15
GRADE	PRESENTATION	STRAND	ROOM
	Rolling into Math-Primary Math Games		
K-2	Stephanie Bainbridge <u>steph@boxcarsandoneeyedjacks.com</u> Come prepared to play games that use cards, dice, multi-sided dice that teach: operational fluency, number sense and more. Strategies, game boards, journal writing ideas provided!	Number and Operation, Mathematical Processes	UC 230-A
	The UTM STEM Center for Teaching and Learning		
K-2, 3-5, Middle, High, Pre- Service	Elliott S. Elliott <u>selliott@utm.edu</u> Walk across the beautiful UTM campus to visit the STEM Center, learn about workshops and view center resources.	STEM	MCCOMBS CENTER
	Fauivalent Fraction Multiplication Partial Products _		
3-5	Model to "SEE" Rudy Neufeld <u>RNeufeld@UMathX.com</u> David Carlisle <u>dctrek47@yahoo.com</u> Session will model blended learning in diverse learning environments, discuss pedagogy, choose appropriate lessons to "grapple" problems and "see" solutions in Fractions and Partial Products.	Mathematical Modeling	HU 118
	Dirty Math – An exploration of soil texture	Algebra	
3-5, Middle	and the soil textural triangle Paula Gale <u>pgale@utm.edu</u> Soil texture is the relative percentages of sand, silt and clay sized particles. This activity uses soil samples to explore percentages, measurement, estimation, size and volume. <i>THIS SESSION IS REPEATED SATURDAY AT 11 AM</i>	Geometry, Measurement, Data Analysis, Statistics, Probability, General Activities, STEM	PARKING LOT OUTSIDE HU
	Fibonacci Sequences and Golden Rectangles		
Middle, High College	Connections? Carroll G. Wells <u>carroll.wells@lipscomb.edu</u> How many ways can you climb a staircase taking one or two steps at a time? What is a golden rectangle? Are there connections? THIS SESSION IS REPEATED FRIDAY AT 3 PM	General Activities	HU 407

F	Friday, September 29, 2017 Session 3: 5:00-5:45		15
GRADE	PRESENTATION	STRAND	ROOM
Middle	Paper Quilts with Area! Melinda Hopkins Melinda.hopkins@knoxschools.org Engaging students in an art project that involves calculating area, finding patterns, and discussing important mathematical skills. THIS SESSION IS REPEATED FRIDAY AT 4 PM	Geometry, Measurement	HU 405
High	Technology Resources for the High School Classroom Kimberly G. Williams kwill126@utm.edu Kade Larson, Andrea Austin, Nickolas Cobb This session will provide participants with free technology resources that can be used in the high school classroom to engage and challenge students.	Technology	UC 229
High, College	Investigation with Right Triangles Holly Anthony hanthony@tntech.edu Jackie Vogel vogelj@apsu.edu Jackie Vogel vogelj@apsu.edu Stephanie Kolitsch styler@utm.edu Right triangles offer opportunities for in-depth exploration of geometry and algebra content. We share our recent investigations and offer suggestions for engaging high school students	Geometry, Measurement	UC 230-B
High, College, General	 Why MUST a Soccer Ball Have Exactly Twelve Pentagons Steve Gadbois <u>steve.gadbois@musowls.org</u> Euler's formula from graph theory applies to solid polyhedra, which then immediately translates to many areas, from sports (soccer balls) to chemistry (buckminsterfullerenes). THIS SESSION IS REPEATED FRIDAY AT 4 PM 	General Activities	HU 416
High, College	Continued: Solve Free Response Questions in AP Calculus AB and BC Exam (part 2) Yanli Cui <u>cuiy@scsk12.org</u> Free Response Questions are challenging concepts in AP Calculus AB and BC exams. It requires the transition from purely procedural knowledge to development of conceptual understanding of the important ideas in calculus. We will work through the released FRQ questions step by step to understand how to tackle these types of questions.	Mathematical Processes, Teacher of Teachers, Mathematical Modeling, STEM	HU 408

Friday, September 29, 2017 Ses		ssion 3: 5:00-5:4	15
GRADE	PRESENTATION	STRAND	ROOM
	Open Season with Circle Equations Carey Wilson <u>cwilson@yaidragons.com</u>		
High	Students will need to be able to write the circle equation in standard form, and graph it to know if they have had a successful hunt.	Geometry, Measurement	UC 230-C
	Continued:		
	The Apollo Missions-One Flight Controller's Story (part 2)		
General	W.G. "Bill" Weppner <u>wweppner@southwest.tn.edu</u>	STEM, History	UC 111
	A look back at my experiences as the Apollo Program celebrates 50 years.		

6:00 P.M. UNIVERSITY CENTER BALLROOM

TMTA BANQUET

Featuring Guest Speaker Trent Okerson WPSD Paducah Meteorologist

and celebrating

The 2017 TMTA High School Math Contests Award Winners and Teachers

SATURDAY SESSION 4: 9:00-9:45

Saturday, September 30, 2017 S		ession 4: 9:00-9.	•45
GRADE	GRADE PRESENTATION		ROOM
K-2, 3-5, Middle, High	When Your Classroom Management Strategies Don't Add Up Peter Vajda pvajda@truenorthpartnering.com Learn "8:00 Monday morning" research-based strategies of a fair and simple classroom management system that will eliminate unwanted behaviors by 70% or more. THIS SESSION IS REPEATED SATURDAY AT 10 AM	General Activities, Teacher of Teachers, Classroom Management	HU 412
K-2, 3-5, Pre-service	Using Contextual Problems to Differentiate Instruction on Operations Audrey Bullock <u>bullocka@apsu.edu</u> Participants will learn to create and use different types of contextual problems with the four operations as well as a variation dealing with elapsed time.	Number and Operation	UC 229
K-2, 3-5, Middle, High, College, Pre-service	Tammie T. Patterson tpatterson@utm.edu Math lectures are flat-lining our students' brains and we must engage them in open-ended questioning in order to change their minds about STEM/STEAM careers. We will look at how to teach math using the Socratic Method. THIS SESSION IS REPEATED SATURDAY AT 10 AM	Mathematical Processes, Teacher of Teachers, Mathematical Modeling, STEM	HU 414
K-2, 3-5, Middle, High, College, Pre-service	Establishing a Growth Mindset in the Mathematics Classroom Jaelle Johnson jaelle.johnson@wcs.edu Learn how to create a classroom culture that embraces failure, celebrates mistakes, and focuses on the belief that all students can achieve great success in math. THIS SESSION IS REPEATED SATURDAY AT 10 AM	Growth Mindset	HU 416
K-2, 3-5, Middle, High, College, Pre-service	STEM on the Road: Mobile Renewable Energy Education Paula Gale pgale@utm.edu John Cole Jcole42@utm.edu Rachna Tewari rtewari@utm.edu Our mobile renewable energy classroom contains educational demonstrations and activities that describe how energy is produced, what we use it for and how it can be conserved. THIS SESSION IS REPEATED FRIDAY AT 4 PM	General Activities, STEM	PARKING LOT OUTSIDE HU

Saturday, September 30, 2017 S		ession 4: 9:00-9:	•45
GRADE	PRESENTATION	STRAND	ROOM
K-2, 3-5, Pre-service, General	Multisensory Strategies for Students with Dyscalculia Melissa Burnside mburnside119@gmail.com Lenore Turner lenoreses1@hotmail.com This session will equip participants with information about dyscalculia. Multi-sensory strategies will be taught to help students with disabilities. THIS SESSION IS REPEATED FRIDAY AT 3 PM	Number and Operation, Data Analysis, Statistics, Probability, Mathematical Processes, General Activities, Teacher of Teachers, Mathematical Modeling	UC 231
3-5, Middle, High	Math Norms to Empower and Engage ALL Students Gail D. Boyd gail.boyd@cityschools.net Participants will walk away with 7 math norms to cultivate a learning environment that empowers all students to increase their self-efficacy in mathematics. THIS SESSION IS REPEATED SATURDAY AT 10 AM	General Activities	UC 230-A
3-5, Middle, High	One and Done!Now Teaching is Fun David Frongillo <u>davidfrongillo@yahoo.com</u> Disruptive students dominate your attention and time. Imagine speaking to your troublesome student(s) just once, and it ends there. It can happen and it does! THIS SESSION IS REPEATED SATURDAY AT 10 AM	Teacher of Teachers, General Activities, Classroom Management	UC 230-B
Middle, High, College, Pre-service	Let's Get Physical! Physics Activities for Math Classrooms Jeneva Clark <u>dr.jenevaclark@utk.edu</u> THEC-funded teacher workshop provided physics lab equipment and lesson plans for teaching mathematics through hands-on physics activities. Workshop directors will share some examples.	Mathematical Modeling	UC 111
Middle, High	A Potpourri of Activities (part 1) Betty Mayberry Betty.mayberry@jp2hs.org Amanda Peper <u>Amanda.peper@jp2hs.org</u> and Mathematics Department at JP2 A combination of activities that include lessons and ideas for Algebra through Calculus will be shared with all participants. Participants will be encouraged to share ways to expand and use these activities. THIS IS A TWO HOUR SESSION.	Number and Operation, Algebra, Geometry, Measurement, Data Analysis, Statistics, Probability, General Activities	HU 408

Sa	Saturday, September 30, 2017 S		•45
GRADE	PRESENTATION STRAND		ROOM
Middle	I am Floored by this Activity! Christina Ploeckelman <u>Christina.ploeckelman@cmcss.net</u> Jennifer Yantz <u>yantzj@apsu.edu</u> Experience a hands-on, real-world activity that encompasses 5+ seventh grade standards and is easily differentiated. Materials will be shared.	Geometry, Measurement, Ratio, Proportion, Percent, and Scale	HU 407
High	Divide & Conquer in a Mathematics Course Amy Rigsby rigsbya@wcde.org Kristina Hill hillt@wcde.org Cooperative grouping using the Divide & Conquer technique: Create and Collaborate, Tech it Out, and You & Me (direct instruction with small group discussion). THIS SESSION IS REPEATED SATURDAY AT 10 AM	General Teaching Strategy	UC 230-C
High, College, Pre-service, General	Teaching Career Skills Through Mathematical Content Caroline Maher-Boulis <u>cmaherboulis@leeuniversity.edu</u> Jason Robinson jrobinson@leeuniversity.edu Bryan Poole <u>bpoole@leeuniversity.edu</u> We will share ideas from CATCH Math^2, a workshop that aims at emphasizing mathematical skills in careers, with focus On the Statistics and Functions domain. THIS SESSION IS REPEATED SATURDAY AT 10 AM	Data Analysis, Statistics, Probability, Algebra, Functions	HU 310
High	Similar Tastes for Similar Triangles Kimberly Troutman Ktroutm4@vols.utk.edu Theresa M. Hopkins thopkins@utk.edu This presentation will preview a menu activity designed for high school geometry with a discussion following on what other subject areas would be practical. Participants will get to order a menu item and complete the activity. THIS SESSION IS REPEATED SATURDAY AT 10 AM	Geometry, Measurement, General Activities	HU 405



SATURDAY SESSION 5: 10:00-10:45

Saturday, September 30, 2017 Session 5: 10.		ssion 5: 10:00-10	0:45
GRADE	PRESENTATION	STRAND	ROOM
K-2, 3-5, Middle, High, College, Pre-service	Using the Socratic Method to Teach Mathematics Tammie T. Patterson <u>tpatterson@utm.edu</u> Math lectures are flat-lining our students' brains and we must engage them in open-ended questioning in order to change their minds about STEM/STEAM careers. We will look at how to teach math using the Socratic Method. THIS SESSION IS REPEATED SATURDAY AT 9 AM	Mathematical Processes, Teacher of Teachers, Mathematical Modeling, STEM	HU 414
K-2, 3-5, Middle, High, College, Pre-service	Establishing a Growth Mindset in the Mathematics Classroom Jaelle Johnson jaelle.johnson@wcs.edu Learn how to create a classroom culture that embraces failure, celebrates mistakes, and focuses on the belief that all students can achieve great success in math. THIS SESSION IS REPEATED SATURDAY AT 9 AM	Growth Mindset	HU 416
K-2, 3-5, Middle, High, Pre- Service	The UTM STEM Center for Teaching and Learning Elliott S. Elliott <u>selliott@utm.edu</u> Walk across the beautiful UTM campus to visit the STEM Center, learn about workshops and view center resources. <i>THIS SESSION IS REPEATED FRIDAY AT 5 PM</i>	STEM	MCCOMBS CENTER
K-2, 3-5, Middle, High	When Your Classroom Management Strategies Don't Add Up Peter Vajda <u>pvajda@truenorthpartnering.com</u> Learn "8:00 Monday morning" research-based strategies of a fair and simple classroom management system that will eliminate unwanted behaviors by 70% or more. THIS SESSION IS REPEATED SATURDAY AT 9 AM	General Activities, Teacher of Teachers, Classroom Management	HU 412

Saturday, September 30, 2017 Ses		ssion 5: 10:00-10	0:45
GRADE	PRESENTATION	STRAND	ROOM
3-5, Middle	Number Line to 10,000,000 and Other Math Manipulatives (part 1) Jim Franklin <u>Slide-A-Round@comcast.net</u> Susan Franklin <u>sfranklin@floydboe.net</u> Join us for a differentiation of instruction demonstration with a number line to 10,000,000 and learn strategies to add/ subtract mixed number fractions with different denominators without paper and pencil. THIS IS A TWO HOUR SESSION.	Number and Operation, Mathematical Processes, Mathematical Modeling, STEM	HU 407
3-5, Middle, High	Using Multiple Representations to Promote Conceptual Understanding Margaret Garwood margaret.garwood@cmcss.net When presented with multiple representations, students are empowered to meaningfully engage with content and make connections between topics. THIS SESSION IS REPEATED SATURDAY AT 11 AM	Mathematical Modeling	UC 229
3-5	Multiply Fractions, Partial Products – Model Visible Thinking Rudy Neufeld <u>RNeufeld@UMathX.com</u> David Carlisle <u>dctrek47@yahoo.com</u> "Build-Talk-Own" to address topic. Give access to lessons and computer program to empower students to "grapple" and "see" solutions through simulations and manipulatives.	Mathematical Modeling	HU 118
3-5	Millions, Billions, and Double Trouble Patricia Hewitt phewitt@utm.edu Discover games and simulations to teach about very large numbers and the effects of doubling using real-world data on the environment and society.	Number and Operation, Mathematical Modeling, STEM	HU 409
3-5, Middle, High	 Math Norms to Empower and Engage ALL Students Gail D. Boyd gail.boyd@cityschools.net Participants will walk away with 7 math norms to cultivate a learning environment that empowers all students to increase their self-efficacy in mathematics. THIS SESSION IS REPEATED SATURDAY AT 9 AM 	General Activities	UC 230-A

Satı	aturday, September 30, 2017 Session 5: 10:00-10:45):45
GRADE	PRESENTATION	STRAND	ROOM
3-5, Middle, High	Inspiring STEM Students through Sports, Careers and Money Stephanie Holzwarth <u>sholzwarth@everfi.com</u> Join us for hands-on exploration of five FREE EverFi digital resources. Obtain access to engaging and self-assessing programs, TN standards-alignment guides, supplemental resources, and more.	Algebra, Geometry, Measurement, Data Analysis, Mathematical Processes, General Activities, STEM	LIB 215
	One and Done!Now Teaching is Fun		
3-5, Middle, High	David Frongillo <u>davidfrongillo@yahoo.com</u> Disruptive students dominate your attention and time. Imagine speaking to your troublesome student(s) just once, and it ends there. It can happen and it does!	Teacher of Teachers, General Activities, Classroom Management	UC 230-B
	THIS SESSION IS REPEATED SATURDAY AT 9 AM Math Stations		
Middle	Deana Secrest <u>Deana.secrest@cityschools.net</u> The 2016-2017 Grant Recipient will demonstrate how she uses Math Station Manipulatives in the 6th grade classroom.		HU 314
	Using Geogebra for Graphs, Animations, and Geometry		
Middle, High, College, General	(part 1) Tommy Elliott <u>belliott@tntech.edu</u> Sam Narimetla <u>snarimetla@tntech.edu</u> To help students gain mastery over the learning outcomes involving Graphs or Geometry, use Geogebra. In two one- hour , hands-on sessions, we will show you how. <i>THIS IS A TWO HOUR SESSION</i> .	Geometry/ Measurement, Data Analysis, Statistics, Mathematical Modeling, Probability	HU 415
	The Effects of Frequent Quizzing		
Middle, High	 Nicole L. Hardison <u>nhardison@clarksvilleacademy.com</u> Jennifer Yantz <u>yantzj@apsu.edu</u> We will discuss recent research where students were given quizzes and we will discuss the effects on students and the teacher. 	Research	HU 312
Middle, High, College, Pre-service, General	Problem Solving in Mathematics John Garwood garwoodj@apsu.edu This session will focus on the importance of communication and perseverance in solving mathematical problems.	Number and Operation, Mathematical Processes, Mathematical Modeling	HU 307

Satı	uturday, September 30, 2017 Session 5: 10:00-		0:45
GRADE	PRESENTATION	STRAND	ROOM
Middle	 TGIF! Middle Years Math Games (part 1) Stephanie Bainbridge steph@boxcarsandoneeyedjacks.com Engage your students with games using dice, cards. Concepts include: rebuilding fact fluency, integers, linear equations, probability & more. Game boards provided. Come prepared to play! 	Algebra, Data Analysis, Statistics, Probability, Mathematical Modeling	UC 231
Middle, High	IHIS IS A TWO HOUR SESSION. Continued: A Potpourri of Activities (part 2) Betty Mayberry Betty.mayberry@jp2hs.org Amanda Peper Amanda.peper@jp2hs.org and Mathematics Department at JP2 A combination of activities that include lessons and ideas for Algebra through Calculus will be shared with all participants. Participants will be encouraged to share ways to expand and use these activities.	Number and Operation, Algebra, Geometry, Measurement, Data Analysis, Statistics, Probability, General Activities	HU 408
High	Similar Tastes for Similar Triangles Kimberly Troutman <u>Ktroutm4@vols.utk.edu</u> Theresa M. Hopkins <u>thopkins@utk.edu</u> This presentation will preview a menu activity designed for high school geometry with a discussion following on what other subject areas would be practical. Participants will get to order a menu item and complete the activity. <i>THIS SESSION IS REPEATED SATURDAY AT 9 AM</i>	Geometry/ Measurement, General Activities	HU 405
High, College, Pre-service, General	Teaching Career Skills Through Mathematical Content Caroline Maher-Boulis cmaherboulis@leeuniversity.edu Jason Robinson jrobinson@leeuniversity.edu Bryan Poole bpoole@leeuniversity.edu We will share ideas from CATCH Math^2, a workshop that aims at emphasizing mathematical skills in careers, with focus on the Statistics and Functions domains. THIS SESSION IS REPEATED SATURDAY AT 9 AM	Data Analysis, Statistics, Probability, Algebra, Functions	HU 310

Satı	Saturday, September 30, 2017 Session 5: 10:00-10:45		0:45
GRADE	PRESENTATION STRAND R		ROOM
High	Math as a Language: Comprehensible Input with Mathematics Nicholas King sking@cakmail.org Using cross-curricular teaching strategies with world language education, MovieTalk and edPuzzle formatively assess student comprehension through dialogue and flipped classroom methodology. THIS SESSION IS REPEATED SATURDAY AT 11 AM	General Activities	HU 308
	The Math Behind Music		
High	Sister Cecilia Anne Wanner, OP Math can be seen – and heard! – in the world around us. Did you know that geometric and algebraic translations can be found everywhere in music? From classifying pitches through exponential functions, to using trigonometry to determine what music "sounds good," learn how math and music are intimately connected. THIS SESSION IS REPEATED SATURDAY AT 11 AM	Algebra, Mathematical Processes, Mathematical Modeling, Geometry, Measurement, Trigonometry	HU 306
	Divide & Conquer in a Mathematics Course		
High	Amy Rigsby <u>rigsbya@wcde.org</u> Kristina Hill <u>hillt@wcde.org</u> Cooperative grouping using the Divide & Conquer technique: Create and Collaborate, Tech it Out, and You & Me (direct instruction with small group discussion). THIS SESSION IS REPEATED SATURDAY AT 9 AM	General Teaching Strategy	UC 230-C
	The Apollo Missions-One Flight Controller's Story		
General	(part 1) W.G. "Bill" Weppner <u>wweppner@southwest.tn.edu</u> A look back at my experiences as the Apollo Program celebrates 50 years. THIS IS A TWO HOUR SESSION.	STEM, History	UC 111

SATURDAY	SESSION 6	6: 11:00-11:45
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Sati	urday, September 30, 2017 Se	ssion 6: 11:00-11:45			
GRADE	PRESENTATION	STRAND	ROOM		
3-5, Middle	Continued: Number Line to 10,000,000 and Other Math Manipulatives (part 2) Jim Franklin <u>Slide-A-Round@comcast.net</u> Susan Franklin <u>sfranklin@floydboe.net</u> Join us for a differentiation of instruction demonstration with a number line to 10,000,000 and learn strategies to add/ subtract mixed number fractions with different denominators without paper and pencil.	Number and Operation, Mathematical Processes, Mathematical Modeling, STEM	HU 407		
3-5, Middle, High	Using Multiple Representations to Promote Conceptual Understanding Margaret Garwood <u>margaret.garwood@cmcss.net</u> When presented with multiple representations, students are empowered to meaningfully engage with content and make connections between topics. THIS SESSION IS REPEATED SATURDAY AT 10 AM	Mathematical Modeling	UC 229		
3-5, Middle	 Dirty Math – An Exploration of Soil Texture and the Soil Textural Triangle Paula Gale pgale@utm.edu Soil texture is the relative percentages of sand, silt and clay sized particles. This activity uses soil samples to explore percentages, measurement, estimation, size and volume. THIS SESSION IS REPEATED FRIDAY AT 5 PM 	Algebra, Geometry/ Measurement, Data Analysis, Statistics, Probability, General Activities, STEM	PARKING LOT OUTSIDE HU		
3-5, Middle, High	Inspiring STEM Students through Sports, Careers and Money Stephanie Holzwarth sholzwarth@everfi.com Join us for hands-on exploration of five FREE EverFi digital resources. Obtain access to engaging and self-assessing programs, TN standards-alignment guides, supplemental resources, and more. THIS SESSION IS REPEATED SATURDAY AT 10 AM	Algebra, Geometry, Measurement, Data Analysis, Mathematical Processes, General Activities, STEM	LIB 215		

Saturday, September 30, 2017 Session 6: 11:00-11:45					
GRADE	PRESENTATION	STRAND	ROOM		
Middle, High	Slope and Linear Relations - Modelling Makes Thinking Visible Notesting Rudy Neufeld <u>RNeufeld@UMathX.com</u> Darlene Lovingood <u>lovingoodb@monroe.k12.tn.us</u> Main e, Session will model blended learning in diverse learning environments, discuss pedagogy, choose appropriate lessons to "grapple" problems and "see" solutions in Linear Relations and Slope. Main		HU 118		
	THIS SESSION IS REPEATED FRIDAY AT 4 PM				
Middle	Continued: TGIF! Middle Years Math Games (part 2) Stephanie Bainbridge steph@boxcarsandoneeyedjacks.com Engage your students with games using dice, cards. Concepts include: rebuilding fact fluency, integers, linear equations, probability & more. Game boards provided. Come prepared to play!	Algebra, Data Analysis, Statistics, Probability, Mathematical Modeling	UC 231		
High	 The Math Behind Music Sister Cecilia Anne Wanner, OP Math can be seen – and heard! – in the world around us. Did you know that geometric and algebraic translations can be found everywhere in music? From classifying pitches through exponential functions, to using trigonometry to determine what music "sounds good," learn how math and music are intimately connected. THIS SESSION IS REPEATED SATURDAY AT 10 AM 	Algebra, Mathematical Processes, Mathematical Modeling, Geometry, Measurement, Trigonometry	HU 306		
High	Open Season with Circle Equations Carey Wilson <u>cwilson@yaidragons.com</u> Students will need to be able to write the circle equation in standard form, and graph it to know if they have had a successful hunt. THIS SESSION IS REPEATED FRIDAY AT 5 PM	Geometry, Measurement	HU 412		
High	Math as a Language: Comprehensible Input with Mathematics Nicholas King sking@cakmail.org Using cross-curricular teaching strategies with world language education, MovieTalk and edPuzzle formatively assess student comprehension through dialogue and flipped classroom methodology. THIS SESSION IS REPEATED SATURDAY AT 10 AM	General Activities	HU 308		

Saturday, September 30, 2017 Session 6: 11:00-11:45						
GRADE	PRESENTATION	STRAND	ROOM			
General	Gaming 2.0: Utilizing Technology! Kimberly G. Williams <u>kwill126@utm.edu</u>	General	HU 416			
	This session will provide participants with free web-based resources to immediately incorporate gaming into your mathematics classroom.	Activities				
Middle,	<i>Continued:</i> Using Geogebra for Graphs, Animations, and Geometry (part 2)	Geometry, Measurement, Data Analysis				
High, College, General	Tommy Elliott <u>belliott@tntech.edu</u> Sam Narimetla <u>snarimetla@tntech.edu</u> To help students gain mastery over the learning outcomes	Statistics, Mathematical Modeling,	HU 415			
	involving Graphs or Geometry, use Geogebra. In two one- hour , hands-on sessions, we will show you how.	Probability				
	Continued: The Apollo Missions-One Flight Controller's Story (part 2)		UC 111			
General	W.G. "Bill" Weppner <u>wweppner@southwest.tn.edu</u>	STEM, History				
	A look back at my experiences as the Apollo Program celebrates 50 years.					
	SPECIAL SESSIONS WITH UNDERGRADUATE PR	ESENTERS				
11:00-11:20						
	and Middle School Students					
Middle	APSU Pre-service Teachers <u>darroughr@apsu.edu</u>	Number and Operation	HU 414			
	This presentation describes our experiences in a Middle school mathematics RTI classroom and activities that worked and didn't work.					
11:25-11:45						
	Undergraduate Students Presentations Simplified Chain					
	Rule in Calculus using Back Substitution					
High, College	Linh Do <u>ldo@my.apsu.edu</u> Daniel Mayo	Mathematical Processes	HU 414			
	Introducing a simplified method for teaching the Chain Rule in Introductory Calculus that uses function decomposition with back substitution.					

1:00 p.m. Watkins Auditorium University Center

FINAL SESSION

featuring

Updates from the Tennessee Department of Education

TMTA Business Meeting

Door Prizes (must be present to win)

Just for Fun

Have you ever been walking down the street on a cold day when suddenly a gust of wind makes you feel even colder? The wind chill can make the coldest days of winter even colder with just the slightest wind speed. The National Weather Service uses the formula:

 $35.74 + 0.6215 T - 35.75 V^{0.16} + 0.4275 T V^{0.16}$

to estimate what temperature it feels like when the wind is blowing at V miles per hour, and the air temperature is T degrees Fahrenheit. The formula requires a wind speed of at least 3 miles per hour, and a temperature at or below 50 degrees Fahrenheit.

The reason for these requirements is that the formula is an approximation which only holds in a certain range. To test its limitations, suppose that the wind speed is exactly 3 miles per hour. If this formula worked across all temperatures, at what actual temperature T would the wind chill temperature be equal to T? Round your answer to the nearest degree Fahrenheit.

Source: Expii, https://www.expii.com/solve/57/2

Registration Phillip **FIRST FLOOR** Watkins Auditorium Room 100 s 💠 N North West Entrance Restrooms Room 125 Welcome Center Welcom (Open Saturday to TMTA) Room 107 XX South Patio Skyhawk Elevator **Dining Hall** Computer Store 128 Catering Office Room 124 Kitchen UC 111 Staincase Skyhawk Dining Hall Room 134 Legislati Chambe Stak South Room 111 Entrance State Restrooms Market 121 Elevator SAME Staircase Elevato Food Court Room 120 BARNES & NOBLE Chick fait

University Center Maps

UNIVERSITY CENTER STORE HOURS

Barnes & Noble Bookstore: Friday 7:30 am – 4:30 pm and Saturday 9 am – Noon

Food Court: Friday 7 am - 8 pm and Saturday 11 am - 8 pm

On The Fly (Market): Friday 8 am - 8 pm and Saturday 4 pm - 7 pm

Captain's Coffee (in the Paul Meek Library): Friday 8 am - 3 pm and closed Saturdays

The Hangar (Starbuck's): Friday 7 am - 3 pm and closed Saturdays



The 2016 Nobel Prize for Literature was won by rock and roll poet, Bob Dylan. One of his most famous songs, "Blowin' in the Wind", opens with the signature line, "How many roads must a man walk down, before you call him a man?" While the answer may be blowing in the wind, we can estimate how far a person would walk over 80 years. A moderately active person takes around 7,500 steps per day. Which of these is closest to the total distance walked over that time?

□ Across Town	□ Orient Express	□ Trans-Siberian Railway
□ Around the World	\Box 5 Times Around the World	\Box Moon and Back

Source: Expii, <u>https://www.expii.com/solve/53/1</u>

TMTA Executive Committee

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Webmaster: Kim Mullins Bethel Springs Elementary School mullinsk@mcnairy.org

Just for Fun

In the Hitchhiker's Guide to the Galaxy, the supercomputer, Deep Thought, takes $7\frac{1}{2}$ million years to compute and check the Answer to the Ultimate Question of Life, the Universe, and Everything. Deep Thought states the answer, 42, seems meaningless because the beings who programmed Deep Thought never actually knew what the Question was. A possible Question, for example, could be "What do you get if you add five and thirty and seven?" How many such Questions are possible, written in the form of adding together some list of positive integers with Answer 42? Consider 5 + 30 + 7 and 5 + 7 + 30 to be different Questions.

Source: Expii, https://www.expii.com/solve/42/3

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Sudoku Puzzle

9			3						
3		8		5	2			7	
2						8	3		
	2			7	1		5		
	5		2	9			1		
	9	6						2	
5			4	6		7		9	
					7			5	
http://lsudoku.com n* 2804 - Level Medium									

Kakuro Puzzle

Kakuro is like a crossword puzzle with numbers. Each "word" must add up to the number provided in the clue above it or to the left. Words can only use the numbers 1 through 9, and a given number can only be used once in a word. Every kakuro puzzle has exactly one solution.

http://www.kakuroconquest.com/



There is a highway that wraps around a large lake, making a 90-degree turn through a gradual curve which follows the arc of a perfect circle. Each direction has 5 lanes for traffic, each of which is 12 feet (about 4 meters) wide, and the radius of the circular arc is about 8 miles (about 13 kilometers). What is the difference between the distance traveled along the circular arc if you drive in the leftmost lane in a single direction, versus the rightmost lane in that direction?

Source: Expii, <u>https://www.expii.com/solve/64/1</u>

Just for Fun—Problems that Never End

- 1. Use each of the numbers 1, 2, 3, 4, 5, 6, 7, 8, and 9 exactly once to fill in the circles to make the sum of each side equal to 17.
- 2. Is there more than one solution? If so, how many solutions exist?
- 3. Use each of the numbers 1, 2, 3, 4, 5, 6, 7, 8, and 9 exactly once to fill in the circles to make the sum of each side equal to a number **greater than** 17. What is the greatest sum possible using this configuration?
- 4. Can you arrange the numbers to make the sum less than 17? Why or why not?
- 5. What other questions can you ask about this problem? (Think: More circles? Different numbers? Both positive and negative numbers? Do the numbers have to be consecutive? How does changing the numbers change the problem, the solution(s), the problem solving strategies, ...?)

Source: Adapted from a problem in <u>Advanced Common Core Math Explorations: Numbers and</u> <u>Operations</u>, by Jerry Burkhart (Prufrock Press, 2014)

Just for Fun—Problems that Never End

- 1. Use only x 4 and ÷ 8 to change 64 into 2 in five steps. Write numbers in the other circles to show your answer at each step. You may use x 4 and ÷ 8 more than once.
- 2. Is there more than one solution to the problem? Do the solutions have anything in common? How many solutions are there? How can you be sure when you have found all of the solutions?
- 3. Can you do the problem backwards (turning 2 into 64) using x 4 and $\div 8$?
- 4. What other questions can you ask about this problem? How could you adapt it (more circles? different operations? different numbers?)? How does changing the problem change your problem solving strategy?

Source: Adapted from a problem on http://www.5280math.com/problems-that-never-end/





Just for Fun—Problems that Never End

1.	In the list of fractions to the right, what pattern was used to create the list? Is there more than one pattern that could have been used?	2	7	5	8	3
2	What observations do you have about the fractions in the list?	$\overline{3}$	$\overline{10}$	7	11	$\overline{4}$
Ζ.	what observations do you have about the fractions in the list?	0	10	'	— —	

- 3. Can you use one (or more) of your pattern(s) to extend the list? How many ways can you extend the list? In what directions?
- 4. Create a new list using your pattern(s) with new fractions on the left and right. Are your observations still true about the fractions in the new list? Why or why not? Does it make a difference whether you use equivalent fractions or non-equivalent fractions as your "new fractions" when you create your new list? Why or why not?
- 5. What other questions can you ask about this list of fractions?

Source: Adapted from a problem on http://www.5280math.com/problems-that-never-end/

Just for Fun—Problems that Never End

- 1. This star is formed by extending the sides of a regular pentagon. Find the measures of the angles at the tips of the star using what you know about the angles in the pentagon.
- 2. Create other stars by extending the sides of other regular polygons. What are the measures of their star-tips angles? Are there patterns for finding those measures? Is there an algebraic formula (or formulas) for finding those measures?
- 3. What happens if you start with a non-regular convex polygon? Can you still create a star? Can you still conclude something about the measures of the star-tips angles?
- 4. Why did we start with a pentagon? Why didn't we use a triangle or a square?
- 5. What other questions can you ask about star-tips angles?

Source: Adapted from a problem on http://www.5280math.com/problems-that-never-end/

Just for Fun—Problems that Never End

On the planet Hexa, the inhabitants use a different numbering system	Our Number	Hexan Number
than we do. Examples of our numbers and the equivalent Hexan	8	12
numbers are given to the right.	14	22
6 6	20	32
Now that you have an idea of what "Problems that Never End" means.	26	42
what questions can you ask about Hexan numbers? Can you answer	32	52
your own questions?	38	102

What other Problems that Never End can you create?

