

Thursday, July 27th

8:00 – 9:00 am Registration, *Dining Hall*

8:15 – 8:45 am Intro to TMC, Julie Reulbach ([@Jreulbach](#)) and Glenn Waddell, Jr. ([@gwaddellnvhs](#)), Room 700

9:00 – 9:25 am Opening Session, *Dining Hall*

9:30 – 11:30 am Morning Sessions

Talk Less, Smile More: Discussion in Math Class, Room 717

Matt Baker ([@stoodle](#)) and Chris Luzniak ([@Plspeak](#))

Grade Levels: Upper Elementary (Grades 5-6), Middle School (Grades 7-8), High School (Grades 9-12)

Are you interested in reducing your own talk time and increasing student talk? Do you want to know what students are thinking? Would you like to see and hear your students reason through and defend their arguments?

In this workshop we will explore a variety of structures and techniques that can be implemented in any classroom to help create a Culture of Thinking, where reasoning and arguments are visible and valued. We will immerse ourselves in activities that promote student discussion and debate in and about mathematics. Over the course of three mornings, we will explore methods for increasing student talk, developing student to student conversations, and getting students on their feet excitedly debating math problems and procedures. We will draw from multiple sources and experiences, presenting activities small and large that will help to create a culture of mathematical discussion. Time will be given each day to assess and evaluate the various ideas and develop ways of implementing appropriate structures into your own classroom.

Keywords: Common Core State Standards, Discussion / Debate, Supporting Teachers, All Levels

Thursday, July 27th
9:30 – 11:30 am Morning Sessions

Mathematical Yarns, Room 614

David Butler ([@DavidKButlerUoA](#)) and Megan Schmidt ([@Veganmathbeagle](#))

Grade Levels: General Interest

These sessions are all about engaging in your own mathematical investigation and making new mathematics of your own, through the medium of hyperbolic crochet. Crochet can produce the most amazing structures with only the most basic skills, and has great potential for making and testing predictions, and for classifying and describing the results. Through crochet you can experience what it is like to not know and to have to work to find out more for yourself, just like a research mathematician.

At the first session, you'll learn all the crochet skills you need (which are just the very basics), and then you'll begin to make your first crochet corals. We'll discuss various ways to change the patterns you make and choose some questions to investigate. Then across the three days, we'll make predictions and try them out, and be inspired by others' work to try even more. Along the way, we'll discuss the properties of the things we make, and find ways to express the mathematical ideas we're forming. We'll also reflect on what the experience tells us about mathematical investigation. At the end of the three days, we'll display our work for everyone to see.

No experience with crochet is required. Feel free to bring your own yarn/wool or crochet hooks with you, though a selection of yarn and hooks will be provided.

Keywords: Inquiry, Making mathematics

Rich Tasks Demand Rich Implementation to Maximize Student Learning,

Room 618

Peg Cagle ([@pegcagle](#)), Cal Armstrong ([@sig225](#)), and Bill Thill

([@roughlynormal](#))

Grade Levels: Middle School (Grades 7-8), High School (Grades 9-12)

For more than twenty years, math education research has documented the critical role of rich, non-routine tasks in providing all students access to high-quality opportunities to learn mathematics, developing both conceptual understanding and strategic procedural fluency.

The reform curricula crafted with NSF support in the 1990's all revolved around the use of rich tasks. For example, the Interactive Mathematics Project (IMP) utilized aspirational tasks to introduce a unit, and their solution to conclude. The Connected Mathematics Project (CMP) lessons were organized using a "Launch, Explore, Summarize" structure to engage students in a type of guided inquiry. These ideas have been built upon and expanded in a variety of ways over the past two decades. This includes work such as Estimation 180, 3-Act Lessons, and Open- Middle Problems. The 5 Practices for Productive Discussion aimed at further leveraging the use of non-routine tasks, connecting the use of such tasks with crafting mathematical discourse in the secondary classroom.

This series of sessions will take a deep dive into rich tasks, including the attributes of non-routine tasks, supporting student engagement through questioning, ensuring coherence when integrating tasks, and implementing everyday tasks in rich ways.

This workshop is derived from the PCMI-Reflecting on Practice coursework, and presented by 3 of the original RoP authors & staff members.

Keywords: Curriculum / Lesson Planning, Questioning, Rich Tasks, Instructional Choice

Thursday, July 27th

9:30 – 11:30 am Morning Sessions

What is the relationship between the Standards for Mathematical Practice & equity?, Room 716

Grace Chen ([@graceachen](#)), Brette Garner ([@brettegarner](#)), and Sammie Marshall ([@MarshallMath_er](#))

Grade Levels: General Interest

The CCSS have been promoted as contributing to equity, even though they do not mention equity explicitly. It is implied that the CCSS support better mathematics instruction for all students, and thus will lead to greater equity in our nation's schools. In particular, the Standards for Mathematical Practice (SMPs) call for greater attention to student thinking and sensemaking. With this in mind, we will explore: How can the practice standards promote equity, regardless of your student population? Are they sufficient? This session will explore the relationship(s) between the SMPs and the idea of teaching mathematics for equity. We'll consider a framework for equitable mathematics teaching practices and use that as a lens for examining the relationship between concrete classroom tools (such as talk moves or instructional routines) and student learning (about mathematics, themselves, and society). We hope this session serves as an opportunity for teachers to reflect collaboratively about what equitable mathematics teaching means and our pedagogical responsibility as math teachers, not just to our students but to our society at large. Together, we hope to directly connect the SMPs to outcomes beyond improved mathematical learning such that each of us can continue our work with an expanded, clearer sense of purpose and of our role in a deeply inequitable society.

Keywords: Common Core State Standards, Social Justice

Socratic Seminars in the Math Classroom - Of Course!!!, Room 714

Tara Daas ([@chatelet0211](#))

Grade Levels: Middle School (Grades 7-8), High School (Grades 9-12)

Beginner Level

Socratic Seminars are a great way to engage students in mathematical discussions. Come and participate first hand in Socratic Seminars that I have implemented in my classroom. Experience the rich discussion that takes place and different ways to use Socratic seminars to help students culminate ideas within a content strand or interpret what they know through analyzing incorrect work.

Participants will also have the opportunity to develop their own Socratic Seminar idea in groups with similar content interests to share and take away to their own classrooms. I will provide details for implementation from my experiences and draw upon the experiences of participants for discussion and ideas for improvement. Further daily discussion will include a scope of how Socratic seminars can help teacher instructional teams to build a community that can share ideas and find strategies for improving instruction and assessment of learning as a team.

Keywords: Discussion / Debate, Supporting Teachers, Instructional Strategies

Thursday, July 27th
9:30 – 11:30 am Morning Sessions

Hinge Questions, Room 712

Nik Doran ([@nik_d_maths](#))

Grade Levels: Elementary (Grades K-4), Upper Elementary (Grades 5-6), Middle School (Grades 7-8), High School (Grades 9-12), Post Secondary

Hinge, or diagnostic, questions are a powerful method to formatively assess students, gauge understanding and expose misconceptions, all within about 3 minutes of lesson time. Hinge questions are suitable for use across all grade levels and subjects and are built on the research findings of Dylan William.

Day 1: Explore what hinge questions are, the theory behind them, how we can use them and discuss some examples.

Day 2: Working with others to develop hinge questions for use in classrooms

Day 3: Feedback on others questions, develop them further

As much time as possible will be spent developing resources to use and share. We will try to ensure people who teach the same level or content work with each other but if you come with a buddy who teaches a similar grade level or topic to you, this will be easier! Cookies and chocolate included.

Keywords: Assessment, Questioning

The Co-teaching Tango, Room 710

Andrew Gael ([@bkdidact](#)), Melynee Naegele ([@MNMmath](#)), and Tina Cardone ([@crstn85](#))

Grade Levels: General Interest

Beginner Level

Have you ever been frustrated by a co-teaching experience? You're not alone! There are many components and concerns that make successful co-teaching practice challenging. However, since research has shown co-teaching to be an effective pedagogical framework, it is imperative we make it work!

That's where you come in! Join us for a deep dive into everything co-teaching. We will dissect the established models, explore current classroom uses, and develop and reflect on strategies for implementing successful communication and collaboration that you can "use on Monday!"

Keywords: Supporting Teachers

Thursday, July 27th
9:30 – 11:30 am Morning Sessions

Using Cooperative Learning Strategies to Incorporate Group Work in the Math Classroom, Room 708

Sarah Martin ([@Sarah3Martin](#))

Grade Levels: Grades K-12

Are you scared to try group work in a math setting? Then, this session is for you. You will learn how to get all students to be accountable in a group. We will look at and try cooperative learning strategies that can be used every day or once a week depending on how you want to structure your classroom. We will spend a little over half the session learning/ trying and the rest of the session coming up with a plan on how you can implement what you learned in the coming school year.

Keywords: Discussion / Debate, Supporting Teachers, Problem Based Learning/Group work

Playing with Exeter Math, Room 711

Wendy Menard ([@wmukluk](#)), Danielle Reyser ([@0mod3](#)), and Jasmine Walker ([@jaz_math](#))

Grade Levels: General Interest

Intermediate Level

The Exeter Math program is a series of high school courses in which meaning is constructed through a series of spiraled problems. It is renowned for its student-centered approach, and its success in producing mathematically astute students. Everyone can play Exeter Math!

In this morning session, participants will work through a section of the Exeter Math curriculum of their choosing, incorporating technology such as Desmos and Geogebra as desired. There will be options to work at different levels depending on interest. As a group, we will create a document which traces Big Ideas as they spiral through the individual courses and the entire curriculum, and collect our annotations to the problem sets in a series of Google Docs.

The goal for each participant is enrichment for both themselves and their students, with the ability to take away rigorous problem sets for future use (that are easily searchable by topic!). Presenters will share their experience with Exeter math and how they have used the problems in their classes as well as brainstorm ideas for future use.

*PLEASE NOTE: This workshop is open to anyone who wants to work on math problems, whether purely for personal enrichment or for classroom use. Although the Exeter Math classes are targeted to high school students, anyone can play Exeter Math!

Keywords: Problem Solving, Algebra, Geometry, Pre-Calculus

Thursday, July 27th
9:30 – 11:30 am Morning Sessions

Math Coaches Huddle, Room 611

Chris Shore ([@MathProjects](#)) and Pierre Tranchemontagne ([@Pierre Tranche](#))

Grade Levels: General Interest

The evidence shows that Math Coaching is indeed effective, but you need Principles, Protocols and a Plan. Learn the major components of successful coaching programs, particularly communicating a vision, questioning skills, our task selection and other topics that you bring to the table. Share your own expertise and glean ideas from colleagues. Collaboration, reflection and discussion will be the bread and butter of this session. Let's strengthen each other and our math programs back home.

Day 1: Vision & Relationships: Getting to know each other; Sharing of personal goals and/or questions; Practicing facilitation together; Reflecting on our learning.

Day 2: Influence: Conversation Protocols; the 3 Giant Needs of Teachers; Tasks Selection and Training. As a coach/facilitator, please think about a problem of practice and be ready to talk describe it (i.e.- a challenging situation you encountered with a teacher or group of teachers, a specific teacher that is resistant to change, a school that you are working with that you are struggling with, etc.)

Day 3: Evidence Protocols and Your Plan: Data Collection; Open topic(s); Next steps and personal goals; Staying in touch to move our learning forward.

Keywords: Common Core State Standards, Supporting Teachers, Leadership/Advocacy, Questioning

Thursday, July 27th
9:30 – 11:30 am Morning Sessions

Unpacking and Creating Connecting Representations Tasks, Room 706

Megha Singh ([@megha529](#)), Margarite Yuelys, and Kaitlin Ruggiero ([@Kaitruggiero](#))

Grade Levels: High School (Grades 9-12), General Interest

This workshop enables participants to talk about their teaching practices in specific and concrete ways after the conference by first developing and then leveraging a shared understanding of an instructional routine called Connecting Representations.

Participants will first experience Connecting Representations together as learners a few times. This will help participants understand which parts of the routine stay the same and which parts of the routine change in each enactment. Next participants will unpack how the components of the instructional routine and the embedded mathematical tasks interact to support desired student mathematical thinking through teachers doing the math themselves, anticipating and discussing possible student approaches, and then considering how they can support students with a specific mathematical focus for the task.

Participants will create a Connecting Representations routine and get feedback on the task before rehearsing the instructional activity together a couple of times with different volunteers playing the role of the teacher. Through this rehearsal, participants will focus on understanding the components of the instructional activity and how each of those components support students, thereby becoming better prepared to plan and enact this instructional routine with their students.

Finally we will make an agreement to try out this instructional activity with our own students and share with each other the tasks we create and what we learn about teaching practice.

Keywords: Curriculum / Lesson Planning, Instructional Routines, Connecting Representations, instructional routines, task creation

Thursday, July 27th
9:30 – 11:30 am Morning Sessions

Differentiating CCSS Algebra 1 — from drab to fab using Exeter Math 1 & Exploratory Talk, Room 700

Elizabeth Statmore ([@cheesemonkeysf](#))

Grade Levels: High School (Grades 9-12)

All Levels

How can we improve & differentiate a basic, mandated Algebra 1 using Exeter Math 1 & problem-based, differentiated group work to transform the experience for all learners?

The purpose of this morning workshop is twofold: (i) to provide an immersive experience in transforming a basic, mandated CCSS Algebra 1 course into a richly differentiated, problem-based unfolding of advanced proportional reasoning, modeling & "micro-modeling" so that it suits the needs of all learners, including your speed demons and (ii) to provide you with practical strategies for using Exeter to open students' minds about how much the math they already know rewards curiosity about the world around them.

Over the three days of the workshop, we will explore this question from both the perspective of the learner and from the perspective of the teacher, through immersive "doing" segments and reflective, inquiry-based seminar segments in which we will explore differentiation, methods for improving group work, & cultivating a community of true exploratory talk. All levels of math teachers and learners are welcome in this session, and the mathematics we will actually do during the workshop will be accessible to everyone who wishes to participate.

Keywords: Curriculum / Lesson Planning, Discussion / Debate, Social Justice

Become a Classroom Chef, Room 624

John Stevens ([@Jstevens009](#)) and Matt Vaudrey ([@MrVaudrey](#)), Mullet Extraordinaire

Grade Levels: General Interest

Intermediate Level, Advanced Level

With an abundance of great resources at our fingertips, we will work to navigate the nuances of teaching math in 2017. Whether it is an appetizer that hooks the class immediately, an entree that has students craving a second helping, or a dessert that truly tops off a solid lesson, we want educators to walk away from Twitter Math Camp 2017 with two things: a firm grasp of the readily available resources, and next steps to get students taking risks in the math classroom.

Keywords: Assessment, Curriculum / Lesson Planning, Supporting Teachers

11:30 am – 1:00 pm Lunch (on your own)

1:00 – 1:30 pm Afternoon My Favorites, Dining Hall

Thursday, July 27th

1:30 – 2:30 pm Keynote, *Dining Hall*

The Politics(?) of Mathematics Teaching

Grace Chen ([@graceachen](#))

What does it mean to say that mathematics teaching is political, and what does that mean for our moral and ethical responsibility as mathematics teachers? I'm looking forward to continuing the conversation from my last [blog post](#)!

2:45 – 3:45 pm Afternoon Sessions

Algebra Tiles and Area Models, Room 611

Mary Bourassa ([@MaryBourassa](#)) and Sheri Walker ([@SheriWalker72](#))

Grade Levels: Middle School (Grades 7-8), High School (Grades 9-12)

This hands-on session will allow you to see how algebra tiles and area models help build algebraic thinking and give students a concrete way of seeing polynomials. We will work through multiple examples of how to simplify polynomial expressions, how to multiply, divide and factor polynomials, and complete the square.

Keywords: Algebra

A Teacher's Guide to Action, Room 614

Andrew Browning-Couch ([@abrowningcouch](#))

Grade Levels: General Interest

Beginner Level

Sometimes, in order to advocate for our students, we must act outside the school walls. However, we have all heard stories about teachers being fired or defamed because of participating in perceived political action. So, what do we do when the time comes to act?

I have been struggling with this question since I became a teacher and have been exploring it more in depth this year as part of an education policy fellowship. In this session, I will share what I have learned (and am still learning) about how to navigate taking action as a public employee. We will look at the difference between direct and indirect action, help one another discover the regulations in our states and districts, and maybe even plan some actions ourselves.

The societal safety and equality of our students is not a political cause, but a moral one; one that we, as professionals, are specially equipped to work for.

Keywords: Social Justice, Supporting Teachers

Thursday, July 27th
2:45 – 3:45 pm Afternoon Sessions

Developing Concepts in Middle School; an Illustrative Mathematics Curriculum Delve., Room 712

Nik Doran ([@nik_d_maths](#)) and Kate Nowak ([@k8nowak](#))

Grade Levels: Middle School (Grades 7-8)

Illustrative Mathematics has been working with Open Up Resources to develop a focused, coherent, and rigorous curriculum for grades 6-8 including student materials for digital and print, teacher materials and assessments. It will be publicly available in a general release prior to the 2017-18 school year. In the hour you will: have a chance to try out some of the classroom activities, examine and discuss the supporting teacher materials including insight into the purposeful decisions made by the authors about both student and teacher materials. You will also be able to ask questions about implementation and walk away with ready to go lessons and units across grades 6, 7 and 8. Attendees will have the opportunity beforehand to focus the session on particular topics, clusters or implementations.

Keywords: Curriculum / Lesson Planning

Differentiation and Student Choice, Room 618

Megan Dubee ([@MeganDubee](#))

Grade Levels: High School (Grades 9-12)

Two years ago, I restructured my Algebra 1 class to be a sort of "choose your own adventure" in terms how students meet standards. My class meets in a lab space with numerous writeable surfaces, and students have access to both MacBooks and iPads which we use daily. We spend about a third of our time doing collaborative activities and the rest on small group instruction and individual/partnered practice. In this session, I'll explain how the class operate, the rationale behind it, and what I've learned from teaching this way as well as create discussion for designing classroom structures, practices, and choices to meet the needs of all students. According to student feedback received after the first year, "It (the class) was more hands on and in order to fully understand concepts, you needed to seek help for yourself rather than having all of the answers and ways to solve problems fed to you. I believe that the core reason why I was more successful in math this year is because I was able to fully understand the concepts because I learned them in my own way."

Keywords: Algebra, Curriculum / Lesson Planning

The Pigeonhole Effect: Undoing the Manipulative Trap through Flexible Representations, Room 617

Graham Fletcher ([@gfletchy](#)) and Joe Schwartz ([@JSchwartz10a](#))

Grade Levels: Elementary (Grades K-4)

Intermediate Level

Many times we pigeonhole student thinking because of the way we force them to see manipulatives. This creates a false positive where we think students have ownership of understanding, when in reality they're repeating a series of steps/procedures. In this session, we'll identify the traps and explore ways to set thinking free.

Keywords: Common Core State Standards, Curriculum / Lesson Planning

Thursday, July 27th

2:45 – 3:45 pm Afternoon Sessions

SmudgedMath: Blurring tasks sparks mathematical curiosity, conversation and critique, Room 708

Norma Gordon ([@normabgordon](#))

Grade Levels: Middle School (Grades 7-8), General Interest

SmudgedMath, launched by Dr. Peter Liljedahl, transforms tasks by 'smudging' components thereby increasing ambiguity and opening the mathematical process thought space. Sparking curiosity creates opportunities for students to consider tasks critically, creatively and conceptually. Experience implementing and designing SmudgedMath tasks and hear about our middle grade experience.

Searching #SmudgedMath will give you an idea.

Keywords: Curriculum / Lesson Planning, Questioning, Supporting Teachers

What is university math? A lightning answer with pictures., Room 624

Edmund Harriss ([@Gelada](#))

Grade Levels: High School (Grades 9-12), Post Secondary

Beginner Level

I have to admit I did not know what I was taking on by doing a math major (beyond knowing I loved maths). This talk will help you answer this question for your students; to support whether or not mathematics is a good university option for them. It will also give some general knowledge of the subject you teach. Most importantly it will have a LOT of pretty pictures!

Keywords: Questioning, Supporting Teachers, University Math, Math Art

From Calculus Zero to Calculus Hero in 60 Minutes, Room 710

Chase Orton ([@mathgeek76](#))

Grade Levels: Upper Elementary (Grades 5-6), Middle School (Grades 7-8)

Beginner Level

Have you always wanted to learn about calculus but were too afraid to ask? Have you avoided learning it because you think you don't know enough math? This session is for you! This workshop is a stress-free, algebra-free, anxiety-free introduction into calculus. It is appropriate for all regardless of math abilities or prior knowledge; all you need is a willingness to wonder. You will not only learn what calculus is and why it's useful, but you also gain a deeper appreciation for the math you already know and teach. Calculus is an elegant and beautiful idea that everyone can learn and should learn. You'll be inspired to the point that you'll want to teach your elementary, middle, or high school students some calculus too! Come geek out. You'll have fun. And you'll give a confidence boost to the math nerd inside of yourself.

Keywords: Calculus, Supporting Teachers

Thursday, July 27th
2:45 – 3:45 pm Afternoon Sessions

Mathematicians are Not Just White Dudes, Room 711

Annie Perkins ([@anniekperkins](#)) and Jonathan Osters ([@callmejosters](#))

Grade Levels: General Interest

Mathematicians aren't just white men, but most of the mathematicians our students learn about are. Since most of my students don't look like that, I spend time each week teaching students about a mathematician that is specifically not a white man. From "Hidden Figures" to a Somali teacher working in my building, I seek out mathematicians with identities reflected in my students, and my students love it. This year, I've focused on reaching out to contemporary mathematicians and expanding my student's knowledge about what professional mathematicians do.

Come learn about how this project helps me connect with students, learn from them, and expands my student's belief in their abilities as mathematicians.

Keywords: Social Justice

Reaching the Full Range, Room 706

Henri Picciotto ([@hpicciotto](#))

Grade Levels: Middle School (Grades 7-8), High School (Grades 9-12)

As everyone knows, students learn math at different rates. What should we do about it?

One traditional response is tracking, but even in a tracked environment, all classes are still heterogeneous. (Admittedly, some more than others.) Another response is acceleration of some students, but that creates its own issues as it values superficial coverage over depth of understanding. A third approach is individualization, which is a lot of work for the teacher, undermines the classroom as a learning community, and at any rate is not always appreciated by the students.

I propose the non-traditional response I developed in my 42 years in the classroom and 30 years as department chair in a school with no tracking. My philosophical framework: a counter-intuitive alliance with the strongest students, and simultaneously, support for the weakest.

I will give an overview of the components of a full implementation of the philosophy: cooperative learning, genuine discourse, problem-solving throughout, and a tool-rich pedagogy (manipulatives, technology.) Getting good at those requires time, and is enhanced by teacher collaboration. A necessary but challenging necessity for a tool-rich pedagogy is pruning of the curriculum. I will propose guidelines for doing this intelligently.

Then I will drill down to focus on relatively easy-to-implement practices: lagging homework, separating related topics, cumulative tests, valuing test corrections and other alternative approaches to assessment. These strategies can be introduced immediately, they take no extra time, and they help create an environment that supports a growth mindset.

Keywords: Curriculum / Lesson Planning, Social Justice, Supporting Teachers

Thursday, July 27th
2:45 – 3:45 pm Afternoon Sessions

"An Object to Think With": The whole body as a tool for mathematical sense making, Room 700

Malke Rosenfeld ([@mathinyourfeet](#)) and Max Ray-Riek ([@maxmathforum](#))

Grade Levels: General Interest

Seymour Papert's phrase "body knowledge" is a potent challenge to our conception of what knowledge is and where it resides. It also places the student in the very center of the learning process, a powerful place for mathematical sense making. Learn how a whole, moving body can spark inquiry, conversations and collaboration, and become a meaningful thinking tool for doing mathematics.

This session addresses how working at the intersection of math and movement creates a strong environment for student learning. Through active whole-body experiences (both non-dance and dance based) and collaborative reflection with colleagues, participants will learn the necessary elements of making sense of math with a moving body and the specific criteria with which to evaluate, and critique whole-body math learning.

Keywords: Assessment, Geometry, Math Practices

Exploring a Researched Informed Framework for Teaching Fractions, Room 714

Pierre Tranchemontagne ([@Pierre Tranche](#))

Grade Levels: Elementary (Grades K-4), Upper Elementary (Grades 5-6)

The Fractions Learning Pathway, developed by Cathy Bruce and colleagues from Trent University in Ontario, Canada, provides educators with a research informed framework and interactive planning tool. During this session, we will solve field-tested tasks in order to think carefully about the mathematical content and mathematical processes that students engage in when solving problems about fractions and how we, as teachers, can better support the development of our students' fractional reasoning.

Keywords: Curriculum / Lesson Planning, Questioning, Fractions

Thursday, July 27th
2:45 – 3:45 pm Afternoon Sessions

Teach Me How to Factor: AKA My Favorite Unit, Room 716

Anna Vance ([@TypeAMathLand](#))

Grade Levels: High School (Grades 9-12)

I once heard a teacher remark that they were in their factoring unit "the pit of Hades" and that it didn't matter what they did, their students couldn't factor. I'm pretty sure this is a sentiment held by many teachers. During this session I'm going to walk you through my factoring unit for Math 1/Algebra 1 as well as the pieces I add for higher algebra courses. This will be a more in depth session than last year's on Building Coherence with the Area Model where I will actually model the conversations I have with my students that helps them make connections with prior knowledge and why I think this unit has been so successful for me over the past few years.

We will discuss factoring GCFs, 4 terms, trinomials, difference of squares and perfect square trinomials. Connections to the area model will be involved in all of them.

As a side bonus, your entrance ticket to this session will include an exclusive rendition of my difference of squares rap - written and performed by yours truly. It is as ridiculous, hilarious, and embarrassing as it sounds, but my students eat it up and get into it as they learn it.

Participants will leave with all my guided notes for the unit and what activities I use to reinforce the lessons. If time allows I'm always happy to digress into dividing polynomials with the box, and my new favorite: completing the square with the box.

Keywords: Algebra

Bridging elementary skills & concepts to high school & beyond, Room 717

Glenn Waddell, Jr. ([@gwaddellnvhs](#))

Grade Levels: General Interest

Beginner Level, Intermediate Level

As math educators, we have spent time learning teaching methods relevant to our grade band specialization, but rarely have the opportunity to experience how good teaching methods connect from elementary to high school and beyond. This session will explore pedagogical techniques of multiplication, fractions, compensation, and more. We will discover how learners are really working one, single, math problem from kindergarten through high school and beyond! Bring those "does this ever show up again later?" questions along with standards and sample problems so we can nail down where and how.

Keywords: Algebra, Common Core State Standards, Discussion / Debate

Thursday, July 27th
4:00 – 4:30 pm Afternoon Sessions

Expos: Student Presentations in Math Class, Room 614

Matt Baker ([@stoodle](#)) and Kat Glass ([@glasymptote](#))

Grade Levels: High School (Grades 9-12), General Interest

Beginner Level

This workshop will explain how we run student presentations in our math classes. Students are given a complex problem to develop a 5-7 minute presentation about, highlighting important concepts and misconceptions. We will show an example presentation from our class and share resources we've developed, and give time to answer participants' questions.

Keywords: Common Core State Standards, Curriculum / Lesson Planning

A Half Hour of COOL! , Room 618

Sadie Estrella ([@wahedahbug](#))

Grade Levels: General Interest

Come join us for an informal "talk-story" session about the cool and amazing things that teachers experience in this profession. Get reminded of why you choose this profession and what keeps you coming back to it year after year.

Keywords: Supporting Teachers

Did My Students Actually Learn Anything Today?, Room 620

Dylan Kane ([@math8_teacher](#))

Grade Levels: General Interest

Do you ever have the sneaking suspicion that your students haven't learned 90% of what you thought you taught them? I do. What is learning anyway? How can I figure out what my students actually know and don't know? What is that good for? How can approaching learning with some humility help me become a better teacher? Let's explore these questions and see where thirty minutes take us.

Keywords: Assessment, Curriculum / Lesson Planning

One Task + 4 Beanbags = So Many Entry Points!, Room 706

Bob Lochel ([@bobloch](#))

Grade Levels: General Interest

See how one simple bean-bag tossing task can provide rich data for many grades. Variability, inference, dotplots, mean and median, linear models and more - there's something here for everybody. Whether you are worried about CC Stats for middle school or seek something new for AP Statistics, this activity will find a place in your classroom!

Keywords: Statistics

Thursday, July 27th
4:00 – 4:30 pm Afternoon Sessions

Micro-decisions in Questioning, Room 700

David Petersen ([@calcdave](#))

Grade Levels: General Interest

The surrounding context of a question is important to how the recipient will approach the question. Who is posing the question? What tools are allowed to answer the question? What does the environment say about how the question should be approached? We will look at some of the many micro-decisions made when considering a question in order to better inform the way we ask questions.

Keywords: Questioning, Context

Radio Free Mathematics, Room 708

David Petro ([@davidpetro314](#)) and Amy Zimmer ([@zimmerdiamonds](#))

Grade Levels: Middle School (Grades 7-8), High School (Grades 9-12), General Interest
Beginner Level, Intermediate Level

Podcasting has actually been around since the 90s but in the last 10 years it has literally exploded so that now there are over 100,000 podcasts available and more coming all the time. And with that much content there has to be some that are interesting, informative, have high production values and are about math. Come to this session to find out where you can find these and how you can use them in your classes. We will highlight some obvious choices as well as some hidden gems.

Keywords: Curriculum / Lesson Planning, Statistics, Technology

Spiraling Algebraic Art, Room 711

Megan Schmidt ([@Veganmathbeagle](#)) and Stephen Weimar ([@sweimar](#))

Grade Levels: General Interest
Beginner Level

Come learn an exciting, visual way to look at algebra using a spiraling set of numbers. Explore patterns, create mathematical art, and see algebraic expressions in a whole new way. You can bring these explorations back to your classroom to share with students or just enjoy them as pure mathematical recreation. This activity can be adapted for all ages and grade levels.

Keywords: Algebra, Mathematical Art

Thursday, July 27th
4:00 – 4:30 pm Afternoon Sessions

Fraction Operations: From Arithmetic to Problem Solving, Room 710

Lisa Soltani ([@LisaSolt](#))

Grade Levels: Upper Elementary (Grades 5-6), Middle School (Grades 7-8)

Building number sense and fluency around fraction operations is hard. In this session, we will think about what we want our students to be able to do in middle school and beyond, and offer a progression of lessons that will help students get there. We will start with a series of problems from Illustrative Math that involve fraction division:

- A recipe for hot chocolate calls for 3 cups of milk. What fraction of the recipe can Nelly make with $\frac{2}{3}$ of a cup of milk?
- One thermos of hot chocolate uses $\frac{2}{3}$ cup of cocoa powder. How many thermoses can Nelly make with 3 cups of cocoa powder?

We will ask: what do students need to understand about dividing fractions in order to solve these problems? and how can we get them there? As a model for how one might structure a unit, we will focus on dividing fractions, and examine a progression of tasks, beginning with mental division ($\frac{2}{3} \div \frac{1}{3}$), common denominator division, division on a number line, estimation, complex fractions, part-whole reasoning (bar diagrams), and finally multiplying by a reciprocal. I hope to show how to build the conceptual underpinnings of fraction division that will enable students to tackle those Illustrative Math problems with confidence.

Keywords: Curriculum / Lesson Planning

Pimp My Worksheet, Room 712

Sara Vaughn ([@Vaughn_trapped](#)) and *Lydia Kirkman* ([@lydiakirkman](#))

Grade Levels: Middle School (Grades 7-8)

Active classrooms where engagement is high and where every student is learning are among each teacher's goals. Using classroom games and activities to replace the old worksheet when computation practice is needed or just when the class needs to change things up is a solution. One key is that the activity needs to be able to be set up with little time. Activities also must be fun! In this session participants will try some games and build a storehouse of high participation review activities. This session is active with hands-on-learning that teachers can use tomorrow. This is geared toward the middle school classroom, but modifications could stretch it to K -12.

Keywords: Curriculum / Lesson Planning, Student Engagement

Thursday, July 27th
4:00 – 4:30 pm Afternoon Sessions

Discovery Learning in Calculus, Room 714

Jasmine Walker ([@jaz_math](#))

Grade Levels: High School (Grades 9-12), Post Secondary
Intermediate Level, Advanced Level

Explore the Active Calculus curriculum to see how to bring calculus alive. This open source, free resource is a text for the full two year calculus sequence with concepts developed through innovative inquiry activities.

I've used this curriculum for the last year and a half and it has revolutionized how I teach calculus. It is suitable for traditional or Honors/AP classes. There are also lots of Desmos activities (many developed by Dave Sabol) to accompany the text.

This workshop is for both calculus teachers and those who might be interested in reteaching themselves calculus using a guided method.

Keywords: Calculus, Curriculum / Lesson Planning

Informative Formative Assessment, Room 717

Mary Williams ([@merrywilliams](#))

Grade Levels: Middle School (Grades 7-8), High School (Grades 9-12)

Formative assessment is an important tool for monitoring student achievement and identifying learning gaps, but the real value in formative assessment is utilizing that information to modify instruction. With time at a premium, how do we find time for formative assessment? What tools can we effectively use to collect and analyze this data? Are there ways to communicate data back to our students so they can modify their learning strategies? Yes! Learn about tools such as NearPod and Desmos Activity Builder where assessment can be embedded directly into a slidedeck presentation. Want to use a gaming platform? Check out Kahoot! for some competitive fun, or Quizizz which allows students to work at their own pace. And of course, Go Google! Google Quiz grades quickly, while the add-on Flubaroo allows you to compile data from a Google Form and share it individually with students through Google Drive. Come talk about these and other tools we can use to leverage technology to effectively manage formative assessment!

Keywords: Assessment, Technology

4:30 – 5:00 pm Speed Dating, *Dining Hall*

Friday, July 28th

9:00 – 9:30 am Morning My Favorites and Announcements, *Dining Hall*

9:30 – 11:30 am Morning Sessions (same as Thursday)

11:30 am – 1:00 pm Lunch (on your own)

1:00 – 1:30 pm Afternoon My Favorites, *Dining Hall*

1:30 – 2:30 pm Keynote, *Dining Hall*

All I Really Need To Know I Learned From The MTBoS...Not Really, But Close

Graham Fletcher ([@gfletchy](#))

As members of the MathTwitterBlogosphere we continue to gather, share, and grow together. Over the years we've tweeted, blogged, and maybe had a Google Hangout or two, but this space can be overwhelming and tough to navigate. This raises the question, "How does it all fit and what's my place inside this space?" Unfortunately, you won't find all the answers in this session, but I'll share some tasks, ideas, and the lessons I've learned along the way and the reason I haven't left

2:45 – 3:45 pm Afternoon Sessions

Documenting Student Progress, Room 618

Cal Armstrong ([@sig225](#))

Grade Levels: General Interest

Documentation of learning is more than taking notes on student work and recording marks. Making mathematical thinking and learning visible among students, educators and parents is a priority, and together we will look at how the use of technologies (and arguably non-technologies) aid in the documentation of student learning, triangulation, pedagogical reflection and improving teaching & learning. How do we capture the students' ephemeral words and gestures that display understanding beyond just the written material we're most familiar with? Starting from a springboard of ideas collected from my own practice & research, participants will bring their tools, alternatives, approaches, experiences, hopes and challenges to the discussion – and document our own learning for sharing outside our group. Our overall goal is to not only improve the documentation that we do but also to find ways to engage students in documenting their own learning, and explore the option of sharing their learning with parents. Please bring the device(s) you may use in your classroom!

Keywords: Assessment, Lesson Planning, Technology, Portfolios

Friday, July 28th

2:45 – 3:45 pm Afternoon Sessions

Standards Based Grading in a Traditional Setting, Room 611

Jennifer Brackney ([@jwbrackney](#)) and Tony Riehl ([@rieht](#))

Grade Levels: Middle School (Grades 7-8), High School (Grades 9-12)

Do your grades have meaning? Does your grade system report what your students have mastered or their level of understanding? We will demonstrate why you NEED to grade students on math concepts and report the level of understanding in your grade reporting. We will show how we use Objective Based Grading in middle school and high school math courses. We will go over how we went from very traditional grading to our current method of reporting topic understanding. We do this in a traditional setting and grade system. We hope to include an open discussion on various versions that participants explored and use.

Keywords: Common Core State Standards, Standards Based Grading

Textbook Exercise Renovation: From Rote to Rich, Room 614

Gary Brown ([@mathandmaths](#))

Grade Levels: Upper Elementary (Grades 5-6), Middle School (Grades 7-8), High School (Grades 9-12)

Think HGTV Renovation Program. We are given common textbook exercises that lack beauty, intrigue, and depth of knowledge and we must renovate them to provide students with a learning experience that is engaging, conceptual and technology-rich. This pragmatic workshop provides a toolbox of strategies (some well-known and some lesser known) to renovate even the most rote of exercises. Our renovations will incorporate depth of knowledge, investigative thinking, and technology integration. The primary structure of this talk is an I Do, We Do, You Do format so be prepared to engage. No hard hat required.

Keywords: Curriculum / Lesson Planning, Technology

One Hundred Factorial: Playful and joyful maths, Room 706

David Butler ([@DavidKButlerUoA](#))

Grade Levels: General Interest

To me, the time when I most truly doing maths is when I am in a state of joyful play. (Yes, I do mean "maths" because I'm from Australia.) Play is when I am trying things out, asking all the questions that pop into my head and running down any rabbit-hole that looks inviting. Joy is when mathematical things fit together in new or surprising or satisfyingly complete ways. At my university, I lead a session called One Hundred Factorial where staff and students come together to solve puzzles and play games. (It's named "One Hundred Factorial" after the first puzzle we ever did.) In short, it's a couple of hours a week devoted especially to joyful play.

In this session, we'll explore what it means and what it feels like to engage in joyful play in maths, and how to encourage the atmosphere that allows for it. I'll describe what I have learned at One Hundred Factorial over the last ten years, and give participants a chance to experience a bit of what I do there for themselves. Come prepared to play with some puzzles together.

Keywords: Puzzles, Collaborative learning

Friday, July 28th

2:45 – 3:45 pm Afternoon Sessions

SMPs: leading learners to level up, Room 624

Jill Gough ([@jgough](#))

Grade Levels: General Interest

Beginner Level

Persevere! Express regularity in repeated reasoning! Be precise! Show your work!... but what if I can't? How might we make our thinking visible to empower our young learners to become self-correcting, self-reliant, and independent? How do we coach - what strategies do we use - to help our learners to embrace the Standards for Mathematical Practice?

Keywords: Assessment, Discussion / Debate

Significant Statistics, Room 711

Kerry Gruizenga ([@KGruizenga](#))

Grade Levels: Upper Elementary (Grades 5-6), Middle School (Grades 7-8), High School (Grades 9-12)

Beginner Level, Intermediate Level

Focused on actually doing the math, this workshop will offer non-AP Stats teacher participants "significant" opportunities to expand their working knowledge of statistics concepts from mean to normal curves, residuals to p-value. I am 99% confident that true learning will occur through this series of interesting problems, experiments and observational studies. In fact, the probability of fun is one!

Keywords: Statistics

Learning from Children's Mathematical Play at Math On-A-Stick, Room 700

Ilana Horn ([@ilana_horn](#)), Christopher Danielson ([@Trianglemancsd](#)), and Lara Heiberger ([@LaraHeiberger](#))

Grade Levels: Upper Elementary (Grades 5-6), Middle School (Grades 7-8)

We will share what we learned, as educators and researchers, at the Minnesota State Fair mathematical playground known as "Math On-A-Stick." The exhibit consists of multiple stations that allow visitors to engage in a range of mathematical activity, from making patterns with plastic eggs to making patterns on a pattern machine to filling space with tessellating turtles. The educators will share examples of rich mathematics they see children doing in the exhibit—counting and patterning of course, but also geometry, combinatorics and thinking about infinity. The researchers will report on a sample of ~350 children visitors they tracked by mounting GoPro cameras on their heads to document their play in the exhibit. Slightly more than half of the children identified as female, and the average age of participants was 8 years. Our analysis of children's play shows the range of children's engagement with the mathematical environments. We sorted kids as hummingbirds and hedgehogs. As their names suggest, hummingbirds flit around the exhibit, spending ≤ 5 minutes at the various stations, while hedgehogs burrow into at least one station for > 5 minutes, finding new ways to engage with the materials. Our research team wants to understand what supports children's sustained mathematical activity, with the goal of bringing mathematical play into structured learning environments like after school clubs or classrooms.

Keywords: Geometry, Play

Friday, July 28th

2:45 – 3:45 pm Afternoon Sessions

A Trig Exploration: Exact Values and the Golden Triangle, Room 710

Rachel Kernodle ([@rdkpickle](#)), Jamie Collie ([@jcollie44](#)), and Molly Tanner ([@teachermolly](#))

Grade Levels: High School (Grades 9-12)

How many sine values do you know without a calculator? We (Jamie, Molly, and Rachel) plan and teach an exploration-based, student-centered Precalculus course together at an independent school in the Bay Area. During this session we will be sharing one of these explorations. Participants will have the chance to derive sine values for angles beyond 30, 45, and 60 degrees, learning a little about the history of how trig values were determined before the days of the calculator. You'll get to experience the activity as "students," working in small groups, and then we'll debrief and talk about the mathematical ideas we've explored and possible extensions from the teacher perspective. Come learn some new math and have fun with us!

Keywords: Pre-Calculus

The Big Ideas Of Algebra Are Just Fancy Counting, Room 712

Brian Miller ([@TheMillerMath](#))

Grade Levels: Middle School (Grades 7-8), High School (Grades 9-12)

As educators we must ask ourselves: How do we develop procedural fluency from conceptual understanding? This session will examine a slam-dunk way of answering that question using rational exponents, radicals, logs, and more.

Vi Hart's video "Fancy Counting" serves as our inspiration as I share my experience and approach teaching students to connect basic counting methods they learned in lower grades to more advanced concepts they encounter in high school mathematics.

Attendees will get time at whiteboards to play with the ideas, and to practice the language and delivery of the lesson in small groups.

Other driving questions I want to discuss: How does this lesson promote a "thinking classroom" (as defined by Peter Liljedahl); What is the minimum amount of scaffolding required?; and, How does this approach connect to Math Practice #7 (looking for and making use of structure)?

Implementing "Fancy Counting" allows you the ability to link together the fundamental ideas of the high school mathematics curriculum. It could also be the tool needed to reach those students who just aren't getting it. It's fun too!

Keywords: conceptual understanding, procedural fluency, algebra

Friday, July 28th

2:45 – 3:45 pm Afternoon Sessions

So Much and yet So Little Time- Making the Most of the Elementary Math Block, Room 708

Nicole Paris ([@solvingforx](#))

Grade Levels: Elementary (Grades K-4), Upper Elementary (Grades 5-6)

Oh the challenges of planning the ideal math block that is engaging and where the lesson elements are thought out and connected to each other. We'll discuss strategies for productive planning with teams of beginner and experienced teachers with a variety of comfort levels with mathematics. It's been a fantastic learning experience transitioning from being a middle school teacher to supporting 3rd, 4th, and 5th grade teachers and their students as a first year school based math specialist. Sharing the best of the MTBoS and getting their spin on my favorite middle school resources and activities and how to modify them for the elementary classroom. Influences for this presentation from Embedding Formative Assessment, Routines for Reasoning, and 5 Practices for Orchestrating Productive Mathematics Discussions, as well as an endless source of blogs and tweets of course!

Keywords: Curriculum / Lesson Planning, Supporting Teachers

Teachers as Advocates: A How To, Room 716

Max Ray-Riek ([@maxmathforum](#)) and Peg Cagle ([@pegcagle](#))

Grade Levels: General Interest

Beginner Level, Intermediate Level, Advanced Level

Public policy has a huge influence on teaching, from what is taught to working conditions, to how our time is spent (and mis-spent). How can we, as teachers and educators, have the central voice in these policy decisions. In this initial workshop we'll look at:

- * How educational decisions get made, and at what levels of government
- * How to distinguish between legislation, regulation, policy and practice
- * The ways that teachers can influence educational decisions (and different levels of risk involved)
- * Avenues for identifying key partners and building coalitions for strategically addressing particular issues
- * Practical skills and tips for how to increase your influence through media, organizing, and more

Throughout TMC we'll also make ourselves available for working sessions -- let's write press releases and letters to the editor, call our legislators, and practice being heard.

Keywords: Leadership/Advocacy

Using Google Apps for more engagement in math, Room 617

Venetia Ricchio ([@Bellagio594](#))

Grade Levels: General Interest

Student engagement doesn't just happen. You have to design your lessons for it. In this session I'll share "Magnetic Equations," an activity on Google drawings where students can create their own equations. "Compound Inequalities," a drag and drop activity on Google slides. Save time and space by using Digital assignment folders for your students' work. Use Padlet to organize your math units, student blogs and much more!

Keywords: Algebra, Geometry, Technology

Friday, July 28th

2:45 – 3:45 pm Afternoon Sessions

Am I Asking the Right Questions?, Room 714

Pam Wilson ([@pamjwilson](#))

Grade Levels: Middle School (Grades 7-8), High School (Grades 9-12)

Beginner Level, Intermediate Level

If you are like me and sometimes struggle to develop better questions that drive student thinking deeper, then this session is for you! Ideas from *More Good Questions* (Small & Lin), examples from classroom use of the QFT model, strategies from *Making Thinking Visible* (Ritchhart, et al) and *Formative Assessment Classroom Techniques* (Keeley/Tobey) for questioning will be shared. Bring some questions/standards you wish to improve. This will be a working session, with priority of time spent using ideas to create better questions. Walk away with many practical strategies and a great resource of new questions we create together.

Keywords: Questioning

4:00 – 5:00 pm Afternoon Sessions

Finding a "Place" for Place Value, Room 624

Devin Anderson ([@devin_andersond](#))

Grade Levels: Elementary (Grades K-4)

Beginner Level, Intermediate Level

Struggling to find intentional ways to support place value across the year? Learn about using learning progressions to plan lessons with purpose. Specific strategies will be shared to inspire engaging work with students and foster investigation. Leave with ideas that encourage all students to continue along a path of deeper place value understanding.

Keywords: Assessment, Curriculum / Lesson Planning, Discussion / Debate, Questioning, Supporting Teachers

Changing Math Mindsets, Room 618

Jill Buecking ([@lifeofjill](#))

Grade Levels: General Interest

This session will take you through the journey of one district (led by an elementary teacher turned k-12 math coordinator) as we set forth to change math mindsets and provide opportunities for all students in a district of 7000 students. We will look at the good, bad, and ugly of how we went about supporting growth in math pedagogy/instruction in order to change student and teacher beliefs and outcomes. The session will include a short presentation on how Eagle County Schools, CO is doing this work. The rest of the time will be a guided discussion around what each of our districts/schools is doing and how we can learn from each other and take these insights back to our own contexts!

Keywords: Leadership/Advocacy, Supporting Teachers

Friday, July 28th
4:00 – 5:00 pm Afternoon Sessions

Finding the Words: Learning the Universal Language of Mathematics, Room 710

Tina Cardone ([@crstn85](#))

Grade Levels: General Interest

While math is a universal language, it can still be challenging to provide equitable access to English language learners and native speakers with language based disabilities. In this session we will discuss the difficulties such students face, practice strategies to engage them and learn how to adapt activities to your populations.

Keywords: Discussion / Debate, Students with Disabilities

Rational Function Graphs for Dummies, Room 617

Meg Craig ([@mathymeg07](#)) and *Sheri Walker* ([@SheriWalker72](#))

Grade Levels: High School (Grades 9-12)

Are you intimidated by rational functions? Or do you love 'em, but your students get lost in all the "rules"? In this jam-packed session, we will showcase new ideas and activities on how to introduce them, how to lead your students to discover and create their own "rules", and how to make it all tie in with what you've taught before (polynomials, box method) and what's ahead (rational inequalities, limits). No prior ability with rational functions is assumed-come as a beginner to gain new understanding or as a veteran to gain new activities! Lessons will include both no-tech and Desmos and are suitable for an Algebra II, Precalculus, or Calculus level.

Keywords: Algebra, Calculus, Pre-Calculus

Making Practice and Review Activities Fun!, Room 611

Jennifer Fairbanks ([@HHSmath](#))

Grade Levels: Upper Elementary (Grades 5-6), Middle School (Grades 7-8), High School (Grades 9-12), General Interest

Beginner Level, Intermediate Level

How do you help students prepare for assessments? Join us in learning about many review activities involving tech to no-tech. A review day gives students opportunities to make sense of problems and persevere in solving them (CCSS-MP1) all in a fun, engaging environment. These activities can be formative assessment as the teacher can discover the students' strengths, weaknesses, and confidence while problem solving. Activities will include Risk, Jeopardy, Stations, ZAP, A/B review, Webs, Plickers, Quizizz, Kahoot, Desmos, Ghosts in the Graveyard, and Post It Relay. Things to think about: How do you decide which is best for your content? How do you set it up? How do the groups work?

Keywords: Algebra, Common Core State Standards, Curriculum / Lesson Planning, Geometry, Pre-Calculus

Friday, July 28th
4:00 – 5:00 pm Afternoon Sessions

Statistics and Probability for the Terrified MS Teacher, Room 700

Shauna Hedgepeth ([@approx_normal](#)) and *Joel Bezaire* ([@joelbezaire](#))

Grade Levels: Middle School (Grades 7-8), High School (Grades 9-12)

Beginner Level

Think about your experiences with statistics. Now imagine your middle school / Algebra 1 students engaging with statistics the exact same way. Are you excited for them? Or are you terrified?

Statistics and probability are best understood with the right visualization tool. We will use Tinkerplots and other data visualization techniques to put an image to terms, concepts, and standards that may usually sound like gibberish. We will use probability simulations and statistical modeling in the hopes of developing your understanding (and love) of statistics to pass on to your middle school/Algebra 1 students.

Keywords: Statistics, Technology, Modeling

Coaching Partnerships, Room 716

Megan Holmstrom ([@megyzi](#)) and *Ryan Grady* ([@ryanigrady](#))

Grade Levels: Elementary (Grades K-4), Upper Elementary (Grades 5-6), Middle School (Grades 7-8), General Interest

Beginner Level, Intermediate Level

Cultivating a Culture of Coaching - explore the connection between a coaching culture and a learning culture, specific to mathematics teaching & learning. Share models / expectations / evolution of creating a cadre of coaches, with a focus on impacting student learning (outcomes). Looking for those connections across grade levels and divisions.

"The primary purpose of coaching is to partner with teachers in reflecting on the impact of their decisions, in order to deepen student learning." Joellen Killion

Keywords: Common Core State Standards, Curriculum / Lesson Planning, Leadership/Advocacy, Questioning, Supporting Teachers, instructional coaching

A Step To The Left – Navigating and Understanding Sequences, Room 714

Doug McKenzie ([@DougRoom8](#))

Grade Levels: Middle School (Grades 7-8)

Beginner Level

Does the connection between tables and functions ever seem forced or shallow for your students? In order to reason independently about tables and functions, students need to be able to imagine the sequence present or implicit in the domain of a function table. And for that they need quality experiences exploring and reasoning about sequences. I will share my approach for introducing and scaffolding different types of work with sequences and the activities and materials I use.

Keywords: Algebra, Discussion / Debate

Friday, July 28th
4:00 – 5:00 pm Afternoon Sessions

Engaging the Reluctant Colleague, Room 706

Scott Miller ([@smiller229](#)) and Bob Lochel ([@bobloch](#))

Grade Levels: Middle School (Grades 7-8), High School (Grades 9-12)

Do you work with or alongside teachers that have lost their passion for teaching? Do these teachers drain energy from you because they appear to have no desire to try anything new, are apprehensive about using technology, or have no interest in improving instruction? Come experience how to build relationships and engage your reluctant colleagues so that they become a valuable resource. Join us as we learn how to collaborate with teachers that resist change so that together we can create dynamic, engaging, spectacular, math learning opportunities for students.

Keywords: Questioning, Supporting Teachers, Technology

Engagement + Enjoyment = Learningment, Room 712

Anya Ostapczuk ([@anyaostapczuk](#)), Lydia Kirkman ([@lydiakirkman](#)), and Sara Vaughn ([@Vaughn_trapped](#))

Grade Levels: General Interest

Beginner Level, Intermediate Level, Advanced Level

This session focuses on a variety of strategies to keep all students engaged and learning. We will learn and practice strategies shown for all grade levels and any types of classrooms. You will be able to take back to your school all you learn and teach your colleagues. The session includes high tech, low tech, and no tech strategies so no matter what technology level you have we've got something for you. A few of the strategies include life size Candyland, Zombies Attack, Amazing Race, Sorting Sticks, and Plickers. Participants will walk out with activities they can use immediately. Did we mention there will be prizes?

Keywords: Common Core State Standards, Curriculum / Lesson Planning

Friday, July 28th
4:00 – 5:00 pm Afternoon Sessions

CO + DE = MATH, Room 614

Stephanie Reilly ([@reilly1041](#)) and *Tamar McPherson* ([@teachme124](#))

Grade Levels: Middle School (Grades 7-8), High School (Grades 9-12)

Beginner Level

You've heard, seen, or maybe even experienced the push for STEM and coding, so how can you bring those ideas into your classroom without sacrificing content or proposing a new course? Have you ever said, "I don't know where to begin? I've never written a line of code? I don't have enough time?" Come experience how two teachers discovered the power of coding and see how it transformed our classrooms. From the good times to the struggle of finding what works, we will take you on our journey from conceptualization to reality by sharing what we've done with support and regular ed students. You'll receive an overview of the three programs we've used in our classrooms, resources to get started in your own classroom, and even a chance to learn and try some coding...today.

This session will expose you to an Hour of Code, Bootstrap, and Python. Hour of Coding gives your students a one-shot exposure to coding in a non-threatening and positive environment. Bootstrap combines algebraic concepts and coding through a gaming interface where students write the code to create their own game. Python is an easy to learn code that can be incorporated into all levels of math class without students needing a background in coding. Using trinket.io, you can set up your classes and provide templates for your students, so they can focus on instructing the computer how to do the math (without worrying about the syntax!).

Keywords: Algebra, Geometry, Technology

Context for Learning, Room 708

Jenise Sexton ([@MrsJeniseSexton](#))

Grade Levels: Elementary (Grades K-4), Upper Elementary (Grades 5-6), Middle School (Grades 7-8)

Allowing students to make sense of mathematical concepts before providing explicit instruction aids in developing a deeper understanding. Within this session, we will explore multiple strategies for creating a context or purpose for learning which leads to opportunities for diving deeper than explicit instruction allows. Participants will explore how instructional strategies such as 3 act tasks, Desmos, number talks, and literature books can be used to establish student understanding of the content standards at the beginning and throughout a unit.

Keywords: Curriculum / Lesson Planning

Friday, July 28th
4:00 – 5:00 pm Afternoon Sessions

The Clothesline: The Master Number Sense Maker for Secondary, Room 717

Chris Shore ([@MathProjects](#))

Grade Levels: Middle School (Grades 7-8), High School (Grades 9-12)

Beginner Level

Make student numeracy visible with this dynamic number line. Raise their proportional reasoning, while deepening their conceptual understanding of variables and equations. Represent statistical measures in a whole new way. From Ratios and Statistics to Algebra and Geometry, this manipulable tool will blow your mind; I promise. clotheslinemath.com

Keywords: Algebra, Geometry, Statistics

Expanding Professional Learning, Room 711

Steve Weimar ([@sweimar](#)), Dylan Kane ([@math8_teacher](#)), and Megan Schmidt ([@Veganmathbeagle](#))

Grade Levels: General Interest

We engage in professional learning in many different ways. Twitter, blogs and conferences are three that tend to intersect at Twitter Math Camp, though there are many more. How can we expand the circle of teachers engaging in this type of learning? How can we go deeper or add quality when we want to? How can we take a large and often disconnected set of experiences and create options that are better integrated and support more teachers? Steve will bring his experience working with the Math Forum and NCTM; Dylan will bring his experience with the Global Math Department; Megan will bring her experience bridging the pd worlds of the district, MTBoS, and NCTM; and together we seek to discuss these issues with folks who bring different professional learning experiences and to plan for ways to continue to grow and extend what we all do together.

Keywords: Supporting Teachers

Saturday, July 29th

9:00 – 9:30 am Morning My Favorites and Announcements, *Dining Hall*

9:30 – 11:30 am Morning Sessions (same as Thursday and Friday)

11:30 am – 1:00 pm Lunch (on your own)

1:00 – 1:30 pm Afternoon My Favorites, *Dining Hall*

1:30 – 2:30 pm Keynote, *Dining Hall*

Hitting The Darn 'Send' Button

Carl Oliver ([@carloliwitter](#))

There are many positive outcomes that come from sharing your teaching online. And yet it can still be hard for newbies or veterans. Given today's changing educational climate, and the rapid advances in technology promise continued impact to society, teachers voices are needed at a time more than ever. Twitter Math Camp's existence demonstrates of the great accomplishments that are possible when teachers step outside of their classroom door and collaborate across the Math-Twitter-Blog-o-sphere. Let's find ways to encourage more teachers to share and ensure they are met with inclusion, amplification and collaboration.

2:45 – 3:45 pm Afternoon Sessions

Assessing and grading workgroup, Room 708

Anna Blinstein ([@Borschtwithanna](#))

Grades: Middle School (Grades 7-8), High School (Grades 9-12)

How do you assess students' understanding of content and practices? Do you grade or provide feedback to students on each assessment? What tools do you permit students to use on assessments? Do you use group tests? Tests on dry erase boards? Are they cumulative? Does your math test include writing? Do your students get multiple opportunities to revise their thinking? Maybe you've decided tests are not productive at all. Let's get together to share and discuss our current assessment strategies, the reasoning behind them and consider the advantages and disadvantages of various methods of assessment in an effort to develop a system that will be the most effective for you and your students. If you have strategies that you feel have been effective for you, please bring them, as well as questions and areas of need you'd like to workshop with the group. We'll use a Google form to gather information about needs prior to the workshop. Hopefully, you will leave with new strategies, improvements to your existing assessments, and a better understanding of how assessment fits into your overall pedagogy.

Keywords: Assessment, Curriculum / Lesson Planning, Questioning

Saturday, July 29th
2:45 – 3:45 pm Afternoon Sessions

Calculus for the Algebra Teacher, Room 624

Jonathan Claydon ([@rawrdimus](#))

Grade Levels: Middle School (Grades 7-8), High School (Grades 9-12)

Beginner Level, Intermediate Level

The concepts of Calculus sound really intimidating. But if you break them down, their roots can be traced to concepts students learn in Pre-Algebra, Algebra, and Geometry. Calculus students make generous use of point-slope equations, average rate of change, and area approximation with simple shapes. You have no idea how surprised seniors are to learn they've seen this all before. We will do a drive-by of the whole course, it's simpler than you think.

Keywords: Algebra, Calculus

Going Vertical - How I started using #VNPS, Room 710

Jennifer Fairbanks ([@HHSmath](#)) and *Kathy Campbell* ([@kd5campbell](#))

Grade Levels: Middle School (Grades 7-8), High School (Grades 9-12)

Beginner Level

Come hear about my first-year experience with Vertical Non-Permanent Surfaces and Visual Random Grouping in my Algebra 1 and 2 classes. I will discuss the why - from Alex Overwijk, the how - the materials needed for my classroom, how I changed my lessons, how it affected my students work process and learning, how I make my groupings and varieties to keep it interesting, and the what - what types of questions I have been using. As a group, we can brainstorm more quality questions to be used, possible websites as resources, and what a second year might look like. We can even try a few problems at the board. A hint – my students and I love #VNPS! Will you take a risk and try it?

Keywords: Algebra, Curriculum / Lesson Planning

Sense-Making: Is It at the Core of Your Classroom?, Room 717

Annie Fetter ([@MFAnnie](#))

Grade Levels: General Interest

Beginner Level, Intermediate Level

The National Resource Council points to a "productive disposition" as a key strand of mathematical proficiency. A major part of this strand is viewing mathematics as something that makes sense. Are your students making sense of the mathematics they explore? Do they feel that mathematics is an inherently sensible endeavor? We'll look at ways in which students don't make sense of mathematics, consider why, and discuss strategies for making it a larger part of the expectations in your classroom.

This can include looking at some of your textbook's lessons and thinking about how to make sense-making a focus, as well as some work time, if people are interested, so bring some resources.

Keywords: Sense-Making and Conceptual Understanding

Saturday, July 29th

2:45 – 3:45 pm Afternoon Sessions

Exploring the Progression of Order Through Game Play, Room 618

John Golden ([@mathhombre](#)) and *Joe Schwartz* ([@JSchwartz10a](#))

Grade Levels: Elementary (Grades K-4), Upper Elementary (Grades 5-6), Middle School (Grades 7-8), High School (Grades 9-12)

Beginner Level

We will explore the mathematical structure of order in elementary, middle and high school through the lens of a Fill the Stairs-type game whose structure is the same at each level, though the content will vary (eg. whole numbers, decimals, algebra.) We will play the game, share the game, explain how we used it with students at different grade levels, and discuss what we learned from seeing it in action. What are the qualities a game needs to make you think hard? How does the teacher support the students to maximize learning? How can you synthesize the lesson so that it was not just a fun diversion, but a meaningful experience that builds understanding? Participants will share their approaches and questions. (The game will be available beforehand on Joe's and John's blogs, so maybe they will even have tried it!) We hope a significant part of the discussion will be the kind of cross-grade band collaboration encouraged in Tracy Zager's work. Many of the Standards of Mathematical Practice are addressed in mathematical learning games, but SMP7, look for and make use of structure, is all over this one!

Keywords: games, SMP 7

Exploring Base Eight, Room 712

Kent Haines ([@KentHaines](#))

Grade Levels: General Interest

Beginner Level

What if humans were born with four fingers on each hand instead of five? How would this one simple difference alter the way that we understand math? In this session, we will explore the base eight number system, investigating the ways that the loss of a pinkie finger can reverberate through the mathematical universe. What rules change? What rules stay the same?

As the workshop progresses, participants should feel the discomfort of relearning how to count, add, multiply, and do higher maths with this new number system. Come join us for a brain-breaking hour of activities as we construct a 100 chart (or should we call it a sixty four chart?), build a multiplication table, and try to find other patterns that break and reform elsewhere in the mathematical world of base eight. This is a session for fun, brain-breaking math explorations.

Participants will walk away with a new appreciation for the depth and complexity of our own number system, as well as a firsthand experience struggling to learn a brand new number system. After all, that's what we ask our students to do every day.

Keywords: Discussion / Debate, Questioning, Math For Its Own Sake

Saturday, July 29th

2:45 – 3:45 pm Afternoon Sessions

Breakout EDU Challenge: Can you open the box in time?!, Room 614

Alison Hansel ([@ms_hansel](#)) and *Jacqueline Richardson* ([@jacrichardson](#))

Grade Levels: Upper Elementary (Grades 5-6), Middle School (Grades 7-8), High School (Grades 9-12), General Interest

Beginner Level

Experience the excitement and challenge of an escape room right here at TMC! Groups will first take part in a 40-minute breakout experience, where they will search for clues and solve puzzles in order to open the mysterious locked box in the center of the room. After time runs out, we will debrief the game and then the presenters will share their experiences using games like this in their classrooms to engage students in critical thinking, teamwork, and complex problem solving. We will close by providing you with resources, tips, and, we hope, a little inspiration to bring Breakout games into your classroom. (Note: Presenters are not associated with Breakout EDU and you do not need to purchase Breakout EDU kits to run games like this.)

Keywords: Common Core State Standards, Problem Solving

Math Teachers: Raid the Physics Lab!, Room 711

Megan Hayes-Golding ([@mgolding](#))

Grade Levels: High School (Grades 9-12)

I want to show off some of the coolest physics lab equipment that works well for your math standards AND your local physics teacher would probably love to share with you. My emphasis will be on free tools or those found in nearly all high school physics storerooms.

Examples include:

- * plot linear and quadratic functions using free video analysis software
- * solve simple rational equations with resistors, batteries, and a multimeter
- * add vectors using a force-balancing table and some weights

For teachers of algebra through pre-calculus, with an emphasis on algebra and geometry.

Keywords: Algebra, Geometry, Pre-Calculus

Saturday, July 29th

2:45 – 3:45 pm Afternoon Sessions

Practical Ideas on the Kind of Coaching We Need to Provide and Demand, *Room 700*

Steve Leinwand ([@steve leinwand](#))

Grade Levels: General Interest

I am increasingly convinced that the three missing ingredients for ensuring consistently high quality mathematics instruction are collaborative structures that reduce isolation, common unit assessments that set common expectations and COACHING - the lynchpin of professional growth. It is simply absurd to expect high quality teaching and learning throughout a school or a department when we are left to our own beliefs, preferences and proclivities devoid of constructive feedback from colleagues. Just try co-teaching and then debriefing a lesson and you get a sense of the power of coaching. Co-plan a lesson, review a forthcoming assessment, or ask a coach/colleague to focus on your questions and questioning practices and you get a sense of the power of coaching. Accordingly, this session will explore a range of collegial coaching strategies that everyone one of us can readily employ as early as September, 2017 as we strive for greater transparency and collective quality.

Keywords: Supporting Teachers

An Hour of Codebreaking, *Room 706*

Bob Lochel ([@bobloch](#))

Grade Levels: General Interest

Beginner Level

Help break the code in this hour which will move from simple coding methods, to "unbreakable" codes. From simple substitution ciphers and Caesar shifts, to more complex methods like Hill ciphers and the Enigma, take part in a fast-paced history of cryptography. This session is for the true beginner, and will include aspects of modular arithmetic, matrix operations and frequency tables - but don't let the math scare you off - online applets and engaging websites will provide support for all levels.

Keywords: Technology

Debates in Math Class, *Room 617*

Ethan Weker ([@Ethan MidPen](#))

Grade Levels: Middle School (Grades 7-8), High School (Grades 9-12)

I've been using debates in my math classes over the past few years as a way to improve student participation and engagement, and increase deeper thinking about small and big ideas. There are a number of formats that I've found are helpful, and I'd love to share these out. Maybe we could even put together a couple of debate teams and try out a debate on one of my favorite topics - was mathematics invented or discovered?

Keywords: Discussion / Debate, Social Justice

Saturday, July 29th

2:45 – 3:45 pm Afternoon Sessions

Pulling it all Together: How Implementing Ideas from Make it Stick Unified My Teaching Philosophy, Room 611

Anna Vance ([@TypeAMathLand](#))

Grade Levels: General Interest

Almost immediately upon entering my classroom, students and parents realize they are in for a new experience. While I incorporate many ideas commonly used in the #MTBoS, they aren't yet the norm in my community. How do I acclimate my students and their families to the new environment of my classroom, my expectations, and most important my *reasoning* for all these things? Make it Stick and its research has been a huge answer for me. It has provided support for the things I do that make students, parents, other teachers, and/or administration uncomfortable or at least curious:

- Generation (such as discovery, PBL, or notice/wonder)
- Spaced and Interleaved practice (not just one day of I do, we do, you do and 1 homework assignment then #moveonwithur life)
- Constantly reviewing prior topics (spiraling)
- Providing opportunities for reassessment via standards based grading (SBG)

This session is for newbies to Make It Stick (you don't have to have read the book!) and Make-It-Stick-Implementer-Extraordinaires (please bring your awesome tips, suggestions, and experiences to share). I'd like to do a quick run down of the key theories in the book and spend the bulk of the session talking about how all the pieces fit together to form a coherent classroom, how to garner support, the nitty gritty of managing all these pieces (while keeping most of your sanity) and adding to our collective toolbox of research based strategies to take home and try.

Keywords: Assessment, Curriculum / Lesson Planning, Teaching Philosophy

4:00 – 5:00 pm Flex Sessions, TBD

Sunday, July 30th

9:00 – 11:00 am My Favorites and Closing, *Dining Hall*