Scratching Algebra: Learning Algebra through Programming
(Beginning Algebra)
James Town

Be prepared to engage as students in problem-solving exercises that can only be solved with programming. We’ll use MIT’s easy-to-earn Scratch programming platform, so no programming experience is required or special software (but you will need a laptop). By the end of the session, you will be ready to help your students develop important 21st century skills.

Maximizing Student Understanding of Algebraic Relationships
(Beginning Algebra)
Kim Knighton

How do we pose questions to support productive struggle while our students work? Participants will explore tasks that involve optimization through tables, graphs, and equations. They will assess student work and discuss practical strategies to move students forward in their mathematical thinking.

You Better Work! How to be a Super Model-ing Teacher
(Beginning Algebra)
Brian Shay

Math Modeling is more than word problems. Get students to productively argue about math situations. Participate in problem-solving tasks that require mathematical modeling, sense making, and the construction of viable arguments. Learn teacher moves, strategies, and what mathematical modeling is and is not. Get ready to work that classroom!

Become a Master of Tasks without Turning into a Task-Master
(Beginning Algebra)
Brian Shay

What does it mean to engage students with rich tasks? What makes a task rich? What do I do with my current resources, which are lacking in rich tasks? Participants will engage in rich tasks that connect topics within an Algebra 1/Integrated Math 1 course and that can easily be leveled up or down. We will develop strategies to turn even the most humdrum of textbook problems into a well crafted series of tasks.
2 Fast, 2 Curious
(Beginning Algebra)
Alison Espinosa

Get your systems ready. In this project-based session, you will experience how data collection and analysis will develop students’ understanding of linear and quadratic relationships, as well as solving systems of equations. This session will use analytic modeling of real data to solve problems.

Exploring Structure to Solve Problems
(Beginning Algebra)
Alison Espinosa

In this workshop, participants will solve problems by exploring the structure of contexts and quantities. We’ll focus on how breaking down the structure of quantities in contextual situations can help students make generalizations and become more efficient problem solvers.

Programming Optical Illusions
(Geometry)
James Town

Using the HTML5 canvas object, participants will learn how to use geometry to program and animate optical illusions in a web browser. Your students can learn programming and math at the same time by utilizing a laptop or other device with a web browser and text editor.

Mystery Plots
(Geometry)
Michael Todd Edwards

In this interactive presentation, we explore the use of dynamic geometry software (DGS) as a medium for changing student and teacher interactions (and attitudes) with functions. We offer three examples of sketches that may be used to encourage students to build their own functions. Moreover, we share a strategy for developing additional sketches, namely, our three-step MTA process (Measure - Trace - Algebratize). Note that these steps roughly correspond to concrete, iconic, and symbolic levels of representation proposed by Bruner. As our examples illustrate, the MTA approach provides students with opportunities to explore and construct remarkably nonstandard functions - often beautiful, unexpected, and thoroughly original.

Curiosity, Conjectures, and Connections in a Geometry Classroom
(Geometry)
Kim Knighton

Conjecturing motivates a natural curiosity in our students about what might be happening and why it is happening. Participants will engage in making conjectures to describe “the what” and forming arguments to explain “the why” in a geometric setting. Practical strategies about promoting student discourse in the classroom will be discussed.
Angle Chasing
(*Geometry*)
Michael Todd Edwards

In this interactive presentation, we explore Angle Chasing, a process of determining measures of angles using deductive logic, which provides students with an engaging way to explore fundamental properties of angles. Angle chasing requires students to “use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure,” mathematics content featured in the Common Core (CCSSI 2010, p. 50).

Thinking Vertically
(*Intermediate Algebra*)
Ashli Black

How can thinking vertically help with lesson planning and promote student reasoning and sense making between mathematical ideas? Using the progression of the concept of “rate of change” through the CCSSM into calculus as a focus, participants in this session will complete several classroom-ready tasks that help develop conceptual understanding about rates while making connections between secondary standards. Discussion will focus on strategies and tools to use while lesson planning with vertical thinking in mind.

Adapting Tasks for Students at All Levels
(*Intermediate Algebra*)
Ashli Black

The day-to-day work of a teacher is filled with adapting tasks to fit the needs of the class. In this session, we will discuss several strategies for adapting “off the shelf” trigonometry tasks, with special attention focused on engaging students of all levels and making connections. By re-imagining the presentation of a problem, we can provide more of our students access to meaningful grade-level mathematics.

Student Errors, Mistakes, and Wrong Answers, Oh My! – Opportunity: Rethink!
(*Intermediate Algebra*)
Vicki Lyons

Especially when reasoning and problem solving, everyone has gone down ineffective paths as they learn mathematics. But how can we help students overcome their feelings of inadequacy or failure while they are trying to make sense of the important concepts and processes we are trying to teach them? Tasks that require students to build argument and determine contextually sound conclusions will be used to help teachers recognize student errors as opportunities to rethink through flawed results and inefficient arguments. Using errors as opportunities for productive mathematical discourse can help students embrace mistakes as important ways to refine their thinking and persevere to meaningful, accurate understandings.
Using Connected Representations to Promote Reasoning and Problem Solving
(*Intermediate Algebra*)
Nicole Bannister

This goal of this session is to use a shared problem-solving experience to make sense of larger ideas about connecting representations and fostering productive group work. This session will focus on (a) solving an intermediate algebra task that connects multiple representations, (b) debriefing the collaborative problem-solving experience in the context of the Principals to Actions Mathematical Teaching Practices, CCSSM Standards for Mathematical Practice, and NCTM Process Standards, and, time permitting (c) watching classroom video of students who worked on a similar task.

Fostering Meaningful Mathematical Discourse in Your Intermediate Algebra Classroom
(*Intermediate Algebra*)
Nicole Bannister

The goal of this session is to use a shared problem-solving experience to make sense of larger ideas about facilitating meaningful mathematical discourse. Participants will (a) experience a discourse-intensive intermediate algebra task; (b) debrief the collaborative problem-solving experience in context of the Principals to Actions Mathematical Teaching Practices, CCSSM Standards for Mathematical Practice, and NCTM Process Standards; and (c) make sense of these practices by analyzing classroom video.

Engage Students with Multiple Connections to Make Sense of Independence
(*Statistics*)
Vicki Lyons

This session will focus on tasks embedded in rich contexts that help students understand and be able to use statistical independence and dependence. These important concepts will be explored in classroom-ready activities through meaningful settings, diagrams, tables, plots, and symbolic analysis.

Statistics Uses Context!
(*Statistics*)
David Spohn

Almost paradoxically, math eventually sheds itself of context while statistics thrives in context. Although the CCSSM of “Making Inferences and Justifying Conclusions” will be a primary focus, contextual examples will be used that develop several statistics standards at once.

Using Probability and Statistics to Make Decisions
(*Statistics*)
David Spohn

Making decisions using probability and statistics will have meaning only when students understand how these decisions are made. Participants will use simulation, modeling, expected value, and probability to develop the ability to make informed choices, evaluate decisions, and understand the meaning of “fair game.”
Supporting Mathematically Talented High School Students

*(Equity)*

Judith Quander

In this session, we will discuss the importance of supporting mathematically talented high school students in the mathematics classroom. National discussions regarding curriculum and assessment of high school students often neglect the particular needs of this student population. Additionally, they are often left out of discussions about equity; however, there are mathematically talented students in all schools, including urban high schools. We will take a look at best instructional practices, based on the literature, and mathematical tasks that can both support creativity and encourage interest in mathematics among these students.

Developing Algebraic Thinking in Early High School Mathematics

*(Equity)*

Judith Quander

Many students start high school enrolled in a prealgebra or algebra course. These students often bring with them weak understanding of whole-number concepts, fractions, and other elementary and middle school mathematics concepts. As such, these foundational courses must be taught with an emphasis on understanding and making sense of algebraic relationships and representations but without a strict focus on symbolic mathematics. This session will explore rich mathematical problems and instructional techniques that teachers can use.

Mathematical Practices and Language: Reviewing Materials to Scaffold Math Instruction for ELs

*(ELL)*

Judit Moschkovich

This workshop is a follow-up session on the keynote titled “Common Core and English Learners: Focusing on Mathematical Practices.” The session will provide an opportunity for participants to discuss issues raised in the keynote and share resources for scaffolding mathematics instruction for ELs. The main focus of the session will be to review teaching materials for high school mathematics using “Guidelines for Mathematics Instructional Materials for ELs” (Moschkovich 2013) that maximize alignment between mathematics instruction for ELs and the CCSS for Mathematical Practices.