Milton Academy Math Educators Conference

Friday
February
5th

#MAMEC16

Milton Academy Math Educators Conference
February 5, 2016

8:30-9:30 am: Keynote Address

Sense-Making: Is It at the Core of Your Classroom? Keynote Speaker: Annie Fetter

The National Resource Council points to a "productive disposition" as one of the key strands 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. (Wigg)

Annie Fetter is a math educator at the Math Forum. She writes problems and supporting materials for the Math Forum's Problems of the Week, observes, mentors, coaches, and develops PD for teachers in grades K-12, teaches *Problem Solving in Geometry and Measurement in Grades 3-8* as part of the Math Forum's online PD program and three electives in Drexel's Mathematics Learning and Teaching Master's program (*Teaching Math with the Geometer's Sketchpad* and *Learning and Teaching Calculus with the Geometer's Sketchpad*) both of which are also available as Math Forum online PD, as well as *Teaching Middle School Math with the Geometer's Sketchpad.* She tweets as @MFAnnie and frequently presents at math conferences, including NCTM. She will share her thoughts with us and also lead some small group sessions after her talk.

One Hour Sessions with Annie Fetter

Block I: 9:45-10:45 am

One hour informal question and answer session with Annie Fetter. What did you notice about the keynote? What are you wondering? Stop by anytime to share your thoughts and find out more about establishing and maintaining a focus on sense-making. (Ware 406)

Block II: 11 am - 12 pm

One hour session with Annie Fetter: Noticing and Wondering in Grades K-5

What does Noticing and Wondering look like in the elementary grades? We'll try it ourselves, look at some examples generated by students, and strategize about different ways we might use it with our own curricula. (Ware 406)

Block III: 1:15-2:15 pm

One hour session with Annie Fetter: Noticing and Wondering in Grades 6-12

What does Noticing and Wondering look like in the middle and high school grades? We'll try it ourselves, look at some examples generated by students, and strategize about different ways we might use it with our own curricula. (Ware 406)

Breakout Sessions

Block I 9:45-10:45 am

9:45-10 am

K-5 Differentiated Instruction

Using routines and small groups to differentiate instruction. Have you been trying how to set up centers in your classroom in order to differentiate instruction? Come see what we've done, share your own ideas, and ask questions. **Focus: K-8**

Katrina Mills and Kathleen Early, Park School (Ware 100)

Instructional Strategies

Learn about some instructional strategies which work well for math classrooms, shared by a Penn Fellow. Come ready to share your own good ideas for how to introduce new material, practice current material, review prior material, and assess students in fun, collaborative, and interactive ways. If time allows, we will discuss some of the theory that supports these practices. **Focus: 9-12**

Patrick Owens, Milton Academy (Ware 112)

Algebra I and Geometry Course

In its second year at Milton, this course uses Algebra 1 curriculum to teach the traditional topics of a mid-level Geometry course. Come hear what's been tried and offer your suggestions. **Focus: 9-12**

Jeanne Jacobs, Milton Academy (Ware 401)

Precalculus Video Project

In my Precalculus Honors class this fall we did open-topic video projects that were intended to increase student's engagement and curiosity in math. The students were instructed to construct a video selling an idea or promoting a product for a specified audience in an area of personal interest. I got everything from raising awareness about genetic disorders, to predicting the future world conflicts, to redesigning the Nutella & Go packs to increase revenue for the company. In each of the projects the students had to back their propositions with mathematics and effectively convey their conclusions to the intended audience. The results were amazing and I would love to share! **Focus: 9-12**

Mackenzie Chaput, Tabor Academy (Ware 403)

Visualizing the Fundamental Theorem of Calculus

Come to see a visual presentation of the Fundamental Theorem of Calculus (Part I). **Focus: 9-12**

Thomas Harding, Shady Hill (Ware 408)

Twitter for Math Educators

Join #MTBos with me! We all use social media in different ways. In those few spare moments to glance online, why not check your Twitter account for ideas to improve your teaching? Start tweeting today, join the Math Twitter Blogosphere (#MTBos) and help yourself and others reflect on practice, ask good questions and grow. **Focus: K-12** Heather Sugrue, Milton Academy (Ware 200)

10:05-10:20 am

5th Grade PBL (Project Based Learning)

I will share the experiences in a 5th grade "STEM Projects" course in which the project was a true catalyst for eliciting student engagement and mathematical learning. In one project, students were the benefactors of 500 flower bulbs. They analyzed different areas on campus to create a pollinator garden. In doing so, they calculated areas, crafted scale drawings and embraced their role as agricultural engineers. **Focus: K-8**

Kathleen Malone, Derby (Ware 100)

Generating Discussion Through Error Analysis

Get your students talking and understanding more through comparison exercises. Look at multiple solution methods to determine which is correct, which more efficient, and which is better. This has proven to be highly effective in MS and HS math classes. **Focus: 6-12**

Rick McCready, Boston Prep (Ware 112)

Visualizing Trigonometric Ratios

Do your students have a firm understanding of trigonometric ratios? Consider the ratios as measurable distances within the Unit Circle - how did the Babylonians/Egyptians come up with these tables? The intent is to take the mystery out of trigonometry: why is $\tan 90^\circ$ undefined? Which is greater, $\sin 30^\circ$ or $\tan 30^\circ$? Why is $\tan 210^\circ$ positive? **Focus: 9-12**

Hal Pratt, Milton Academy (Ware 401)

CANCELLED!

~~**Unit Starters for Algebra II and Precalculus**~~

~~Looking to liven up your math class? During this presentation we will discuss the steps necessary to build a climate of collaboration and discovery through the use of unit starters and discovery activities. Sample activities will be provided for conic sections, sequences and series, right and oblique triangle trigonometry, radians, and more. **Focus: 9-12**~~

~~Tara Plassmann, Norwell Public Schools (Ware 403)~~

The Calculus Underlying Precalculus

All of the rules of exponents and logs and all of the trigonometric identities can be derived from calculus, by defining the natural log, the exponential function, and sine and cosine as solutions to the basic differential equations, $D(f) = 1/x,\ D(f) = f,$ and $D^2(f) = -f$, respectively, where D stands for derivative. Built into this approach, we also get for free how to take the derivative of each of these fundamental functions. Furthermore, Euler's Identity follows straight from this approach. The theory behind this approach is that the solution set to a polynomial form differential equation of order n is a vector space of dimension n, which can be spanned by a basis of vectors constructed using the n roots of the associated nth degree characteristic equation, given by the fundamental theorem of algebra. **Focus: 9-12**

NOTE: THIS SESSIONS RUNS FOR 35 MINUTES, from 10:05-10:40 am

Michael Kassatly, Milton Academy (Ware 408)

Interesting Zooms & Multiple Representations with GeoGebra

Click here to see some examples that can (relatively) easily be made with GeoGebra and shared online. Come learn some techniques that will help enable you to make your own applets like these examples. Instructional videos for each of these applets will be available in the shared Google drive for future reference. **Focus: 9-12**

Chip Rollinson, Buckingham Browne & Nichols (Ware 200)

10:25-10:40 am

K-2: Going Deeper with Enrichment: In this K-2 discussion, we will focus on going deeper rather than wider with enrichment in the classroom. We will present how we do this using the Investigations curriculum. There will be some student work shown and we will end with a collaborative effort for sharing resources. **Focus: K-8**

Nancy McCuen and Jerrie Moffett, Milton Academy (Ware 100)

Math Competitions

Come to learn about competition opportunities for students, both as part of a team and as individuals. The talk will focus on grades 6-12. **Focus: 6-12**

Beth Blumberg, Western Mass ARML (Ware 112)

Essential Questions in Geometry

In this era of object storage, statistical shape analysis, digital logic circuits, DNA origami, and computational vision, perhaps we should we rethink the essential questions posed to our high school geometry students. With the help of Google Images, we will brainstorm questions like "What is geometry?" "What is proof?" "What is shape?" and others. **Focus: 9-12**

Martha Jacobsen, Milton Academy (Ware 401)

Three Good Honors Precalculus Problems

1) Modeling the changing tides and then using the model & your TI table
2) Creating and using a ceiling and remainder function from the greatest integer function
3) An interesting exploration into rotated conics (connecting messy Algebra 2 with calculus and technology)

Focus: 9-12

Christine Oulton, Buckingham, Browne & Nichols (Ware 403)

Encouraging Students (Especially Girls!) in Computer Science

At BB&N, about 20% of all students take AP Computer Science before they graduate. Almost half are girls. In this session, I will share what we do in and out of our math classes to generate this kind of interest. In addition, there will be time for teachers to share successes and challenges with programming in their schools. **Focus: 9-12**

Mark Fidler, Buckingham Browne & Nichols (Ware 200)

Block II 11 am - 12 pm

11-11:15 am

Coaching Models in K-5

We've been using a math coaching model for the past few years at the Park School. I'll share how it works and the changes we've seen in the classroom. **Focus: K-8**

Katrina Mills, The Park School (Ware 100)

Written Reflections

This presentation will focus on distributed practice through written reflections. The focus will be on the educational theory behind distributed practice and feedback, but will also include practical elements including a reflection description and sample reflections. **Focus: 9-12**

Stephen Sacchetti , Loomis Chaffee (Ware 112)

Strategies to Help Students who Struggle with Math

I have taught many lower level Algebra 1 classes, including 30+ student "repeater Algebra 1" classes. I will cover instructional strategies that enabled students to learn the material. Ideas shared will focus on Algebra 1 but can span grade levels. **Focus: 6-12**

Ariel Katz, Dedham High School (Ware 401)

Mathalicious and Other Unit Starters for Precalculus

This year in Precalculus, I started each unit with a mathalicious project or lab exploration. Come learn about a few of them that went really well! **Focus: 9-12**

Susan Karp, Milton Academy (Ware 403)

Calculus Projects

I will present two or three fun projects that I have done in my calculus courses. One can be done in any course, and all include technology. **Focus: 9-12**

Kate Donovan, Duxbury High School (Ware 408)

Scratch Computer Science Module for Algebra I/Geometry

Last year, I developed and taught a week long computer science module to teach in all of the Algebra I, Algebra II, and Geometry classes at Loomis Chaffee. The focus of the module was on developing algorithms to solve problems and implementing those algorithms using the Scratch programming language. I tailored the module to fit the algebra and geometry classes different skill sets. The module was a success in its first year of implementation as it helped increase computer science enrollment, introduced younger students to the idea of programming, and emphasized the importance and development of logical problem solving skills that they could use in math class and beyond. Come learn more about it! **Focus: 9-12**

Ashley Hansberry, Loomis Chaffee (Ware 200)

11:20-11:35 am

Probability Discussions in 1st grade

I just taught a probability lesson to first graders involving 3 different spinners. Although the lesson was good and solid, the amazing part to me was the level of discussion that preceded the activity and the follow up discussion. The children had remarkable insights into the probability of various results. I am eager to share this activity with others! **Focus: K-8**

Beth Thiemann, Buckingham, Browne & Nichols (Ware 100)

How Do Students Learn From Making Mistakes?

Counter to what you may believe, showing student mistakes does not make them more likely to err when doing work on their own. Learn more about the benefits of analyzing mistakes together with students. **Focus: K-12**

Nancy Anderson, Milton Academy (Ware 112)

Design Thinking in Math

Do you want to ask your students to apply their understanding to hands-on situations? Do you want to introduce challenges that students need to create solutions through problem solving? Do you want students to test their solutions and improve their designs? Learn about and use design thinking in this workshop. Design thinking will engage and empower your students! **Focus: K-8**

Elaine Hamilton, The Park School (Ware 401)

Workshop My Trigonometry PBL for Precalculus

This fall, my Honors Precalculus classes completed a five-day project on trigonometric applications. I will share my project description, timeline and rubric, along with some student work. Please come with your thoughts and ideas to make this project better for next year! **Focus: 9-12**

Heather Sugrue, Milton Academy (Ware 403)

Statistics Poster Competition for Secondary Students

The annual ASA Poster Competition is open to students of all grades and backgrounds: those with some statistics from their mathematics classes to those in AP Statistics. I have switched my AP Statistics class final project from a traditional written statistical study to group poster projects with great success. The project asks participants to approach a question of their choice from multiple perspectives rather than just a single test of significance. It has the attributes of a great project: group work, students can contribute in many ways, the audience is not their teacher, and they are involved nationally. My presentation will use online and actual posters as I describe the logistics, benefits, and excitement that this project has brought to my classes. **Focus: 9-12**

Al Coons, Buckingham Browne & Nichols (Ware 408)

Flipped Classrooms Action Research

Come learn about an action research project I did last year as part of my M Ed in mathematics. This research project took a close look at flipped classrooms and compared/contrasted the intentional and unintentional

outcomes. **Focus: 9-12** Kathleen Malone, Derby Academy (Ware 200)

11:40-11:55 am

Math Pickle Grades 3-5

We have been using activities from the Math Pickle website to promote perseverance and appropriate struggle in the math classroom. Come learn more about it! **Focus: K-8**
Megan Porter, Shady Hill (Ware 100)

Framing and Making Connections Across Units

We all think about what we will teach, and how to present it best so our students will learn. Come hear about ways to verbalize our thoughts to students so that they can better understand what we do, why we do it, and build connections across the ideas of a given course. **Focus: 9-12**
Terri HerrNeckar, Milton Academy (Ware 112)

Mentoring Programs and Observing Non-Math Teachers

We will share how Milton Academy's mentoring program works, and how it has evolved since its inception. As a mentor who has mentees outside of the math department, come listen to what I have learned by observing in other departments. Bring any thoughts you may have to share as well! **Focus: 9-12**
Becky McCormick, Milton Academy (Ware 401)

Secondary Strategies That Sustain Sense-Making

Elementary math strategies like Fact Families, Area Models, Tape Diagrams, Number Lines, and manipulatives make math meaningful and fun. Why, then, do we use mnemonics, memorized algorithms, and tricks in secondary math instruction? In this session we will consider sense-making strategies that can and should be utilized in secondary mathematics. Participants will consider how Fact Families, a key foundational concept in developing early number sense, can be applied to solving equations. The Area Model will connect multiplying and factoring polynomials. Problem solving strategies, familiar to elementary math students, will be applied to high stakes test questions. Manipulatives will make algebraic concepts more concrete. **Focus: 9-12**
Victoria Miles, Middleboro High School (Ware 403)

STATS4STEM Website

Come learn about the use of my website called STATS4STEM which is funded by the National Science Foundation. In short, it contains a library of questions tailored to for the AP Statistics exam. Custom problem sets can be created and then assigned to students. Once assigned, students get instant feedback and question specific hints. In addition, teachers get a plethora of reports and real-time learning data and graphics.
Focus: 9-12
Eric Simoneau, Boston Latin School (Ware 408)

Java in Geometry

Now in its second year, we are teaching some introductory Java to students in Geometry at Milton Academy over the course of three one-week lessons. Come learn about the modules we have created and how things are going. Your input and ideas are welcome! **Focus: 9-12**
Chris Hales, Milton Academy (Ware 200)

LUNCH 12-1 pm in Wigglesworth Hall

Block III 1:15-2:15 pm

1:15-1:30 pm

Learning to Facilitate Whole-Class Discussions that Focus on the Big Ideas of the Lesson
Productive whole-class discussions help students compare solution methods, attend to mathematical structure, and form generalizations. In this session, educators from one school community will describe how content-based coaching and and team teaching helped them learn how to implement productive whole-class discussion in a Middle School mathematics classroom. **Focus: 6-12**
Jin Lee, Milton Academy (Ware 100)

Classroom Inquiry
Come learn about conducting classroom inquiry! I'm currently a second year fellow in the PRMT program and would be happy to talk about the process of conducting teacher research and how it is helping me to improve my teaching. **Focus: 9-12**
Ashley Hansberry, Loomis Chaffee (Ware 112)

Integrating Art into Algebra I
Thinking about integrating art to go from STEM to STEAM, Park Algebra teachers have designed projects to tap more fully into who our students are as learners. We will share project guidelines, rubrics and exemplars.
Focus: 6-12
Elaine Hamilton and Taylor Horan, The Park School (Ware 401)

Formative Assessments by Cell Phone
Free, Fun, Educational Formative Assessment with Cell Phones/Computers
Attendees see how to very quickly create simple formative assessments before or during class using the free software Poll Everywhere. Students can answer these polls instantly or later by texting or web browsers on cell phones, tablets or computers. My students report increased understanding and lower barriers to engagement. I have found from their responses that my assumptions about what they do and do not understand are surprisingly inaccurate. **Focus: 6-12**
Al Coons, Buckingham Browne & Nichols (Ware 403)

Using Technology to Link Newton's Method to Riemann Sums
This session will explore the use of technology in a calculus course. In particular, we will look at a way to connect Newton's method to Riemann sums using Excel and/or computer programming skills. **Focus: 9-12**

Peter Kahn, Milton Academy(Ware 408)

Flipped Classrooms
Come learn more about a flipped classroom model targeted at high school students, which could also be extended to middle and elementary school students. Bring your ideas and questions! **Focus: 9-12**
Stephen Sacchetti, Loomis Chaffee (Ware 200)

1:35-1:50 pm

Journey to Cohesiveness in K-8 Math
The kindergarten team will look at the journey from autonomy to cohesiveness in our math program. We came from somewhat singular pods of sound mathematical practices to educating our students using a proven and effective program that establishes known strategies and common language across the division. As with any new program, we embraced many of its components while finding issues with certain aspects. We will highlight a few of each. **Focus: K-8**
Brendan Farmer and Martha Slocum, Milton Academy (Ware 100)

Want to Present at NCTM 2017?
Have you attended NCTM in the past and thought about presenting? Come learn some tips on how to write a proposal that is more likely to be accepted! **Focus: K-12**
Nancy Anderson, Milton Academy (Ware 112)

Estimation 180
You may have seen or used estimation180.com in your math class before. Come see how an Algebra I class created their own version of this site, and continue to value estimation skills. **Focus: 6-12**
Anne Kaufman, Milton Academy (Ware 401)

Discussion: Coding in Math – What is Possible?
Bring your questions and ideas and talk through what you might be able to add or change in your class to integrate some basic computer programming concepts. We will help talk through what is feasible, and what type of support you may need from your school. **Focus: K-12**
Chris Hales, Milton Academy (Ware 403)

Discussion: Share the Best Three Professional Development Opportunities
Come ready to share! We will create a Google doc where we can post all ideas from this session, which will be accessible to everyone at the conference. Please try to bring suggestions that you know well so we can make an even stronger list of resources. **Focus: K-12**
Heather Sugrue, Milton Academy (Ware 408)

Desmos Tips – Come Ready to Share!
We will share some uses of Desmos in class and encourage participants to share how they use Desmos, which will also include a discussion of using Desmos versus using a graphing calculator. This will naturally lead to a discussion of one-to-one computer/iPad use in the classroom. **Focus: 9-12**

Terri HerrNeckar & emily bargar, Milton Academy (Ware 200)

1:55-2:10 pm

How to Review a Curriculum K-8

This is a presentation about Milton Academy's process for reviewing our curriculum, specifically for the Lower School and Middle School divisions. **Focus: K-8**

Will Crissman, Milton Academy (Ware 100)

Digital Literacy Through Infographics

In the technology age, seeing a visual distillation of information is common. Let's investigate and discuss ways to make our students better consumers of data. Who created the graphic? Is the information meant to inform or persuade (or both)? Should I / how can I follow up to check the validity of the information? We will find specific examples on-line; bringing a computer or smartphone will be helpful. **Focus: 6-12**

Peter Kahn, Milton Academy (Ware 112)

Group Brainstorm – Summer Enrichment Opportunities for Students

Bring your ideas to share about summer enrichment options for students of all grades. We will generate a shared document based on the list created. **Focus: K-12**

Beth Blumberg, Western Mass ARML (Ware 401)

Cool Programming Projects in Math and Beyond

We will showcase some fun, interesting programming projects created by computer programming students at Milton Academy at all levels. **Focus: 9-12**

Chris Hales, Milton Academy (Ware 403)

STATS4STEM – Using R in Stats

Come to learn more about my website called STATS4STEM which is funded by the National Science Foundation. In short, once students and teachers register on STATS4STEM, all users get their own custom RStudio computing accounts. RStudio provides a free web-based access to R, which is a free open-sources stats, math, and computing package. This platform can then be used to infuse computing into math and statistics classes. **Focus: 9-12**

Eric Simoneau, Boston Latin School (Ware 408)

Typesetting in LaTeX

Come to learn about going beyond Word and Google Docs to create professional handouts by typesetting the math notation. We will share tips on how to use LaTeX and how to teach your students to use it as well. No experience required! **Focus: 9-12**

emily bargar, Milton Academy (Ware 200)

2:15-2:30 pm

Open time at top of Ware – ask follow-up questions of available presenters, debrief with others, and plan ways to continue conversations begun today

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