# Points & Angles

Newsletter of the Metropolitan Mathematics Club of Chicago Volume XLVIII No. 1 Sept 2018

# **Starting the School Year, Prepared to Fail at Teaching**

# September Speaker Sheila Hardin





Friday, Sept. 14, 2018 Doors Open/Social Hour: 5:45 PM Dinner & Talk: 7:00 PM

#### Fountain Blue Banquet & Convention Center 2300 Mannheim Rd., Des Plaines 847-298-3636 \$43 for Members, \$49 for Nonmembers

**Reserve by Noon, Monday Sept. 10** Online at www.mmcchicago.org or by phone at 847-486-4291

From I-90 & Southbound I-294: Exit at I-190 West to O'Hare; Exit onto North Mannheim Rd.; Take Mannheim Rd. North 2.25 miles.

From Northbound I-294: Exit at West Touhy Ave.; Take Touhy Ave. to Mannheim Rd.; Turn right on Mannheim Rd.

Public Transit: Take the CTA Blue Line to the Rosemont Bus Terminal; Take Pace Bus #223 to Touhy Ave. & Lee Rd.; Walk East on Touhy to Mannheim Rd. The current movement of a growth mindset in education stresses that when students make mistakes there are the greatest opportunities for learning. This means that reflection on error is one of the best teachable moments. Or maybe we should say one of the best "learnable" moments. Sheila Hardin has spent her career embracing this idea as applied to teaching, even long before we had the growth mindset terminology. Sheila not only accepts that teaching is a vocation that guarantees moments of failure in multiple forms, but she knows that reflection on your teaching failures is an opportunity to improve. Sheila will model how we can all use self-reflection to better both our time in the classroom and how we approach our teaching. Using specific math problems, Sheila will show how teachers of all experience levels can learn not to dwell negatively on failure but rather to use these moments to improve going forward, as she has in her own journey of reflection.

Sheila Hardin has taught mathematics at Oak Park and River Forest High School for over twenty years. She has been a leader of teachers in many forms. Sheila is devoted to her work as a leader of professional development in the area of racial equity, with involvement both in and out of OPRF. She has been the leader of numerous professional learning committees for the Mathematics Department and the school as a whole. One of her greatest commitments to OPRF is as a leader for the Faculty Senate for which she is currently President. She is highly involved professionally in mathematics education, including giving presentations at numerous conferences including NCTM and MMC. Sheila is also an AP Calculus Reader. In all her endeavors, she brings a zeal for learning which fosters her propensity to lead. We are so lucky to have Sheila in Chicagoland, and this will be proven undoubtedly on Friday, September 14<sup>th</sup> at Fountain Blue. The one type of failure that won't improve your teaching is the failure to attend. Make MMC a priority. Bring a colleague or two.

### **Points from the Interior** by Mary Wiltjer

I've joked for the last year that I am now the President of MMC because I lost the election. It's mostly a joke because I ran unopposed, but it is also an attempt to distract myself from the deep sense of responsibility I feel for our beloved club. MMC has been such an important part of mathematics education in America for over 100 years. MMC has consistently brought people, and therefore ideas, together. We are the professional envy of the country. But times are tough on all sorts of professional organizations, and MMC is hardly immune. It is a time to consider what is most important to us and what we can change for the better.

In that spirit, we are trying a few changes. One change is to have a couple meetings at a location that is less expensive and a little less fancy. We are going to have two meetings at the Elks Club in Des Plaines. We will have lower prices for those meetings (\$30 for members, \$35 for non-members), but we will still have dinner and a speaker. While the fancy chandeliers and chair covers won't be there, we will have a great family style meal to encourage community. We will still be having four meetings at Fountain Blue.

Another exciting change this year is to have our three out of town speakers run workshops on the day after the dinner meeting. There will be a dinner meeting as you'd expect on Friday, and then the same speaker will run more informal workshops held at a school and available to everyone the next day. Workshops will not be repeats of Friday, but will follow and build on their themes. I figured if we had the speakers in town already, why not ask for the moon? Fortunately they all said yes. More details to follow soon. Our local speakers are all regular presenters at our own Conference of Workshops, so don't miss the opportunity to see them again there in January.

Now you must be wondering: who are these people and when do we get to party with the Elks? I think we have a program to be proud of. We are opening the school year with Sheila Hardin, who is both an incredible teacher and a highly talented teacher of teachers. She is always so thoughtful about her own practice, from the small details to the large scope of experience her students have. She is appropriately opening our year with a talk on how you approach teaching knowing you will fail. Be ready to leave inspired with ways to be better for your kids and yourself. In November, I am excited to have Gail Burrill speaking. She has wowed us before and will again. Gail's focus is in tune with the NCTM "Catalyzing Change" focus. She is going to help us see how this aligns with the joy of mathematics and statistics. Gail will also be running a workshop on related topics on the Saturday following her talk. December brings one of MMC's favorite sons, John Benson, sharing some really magnificent mathematics, which will of course include some super cool problems. Be prepared to be blown away. You know there will be no lack of enthusiasm on John's part. In January, you will get the pleasure of learning what an impressive speaker Past President Matt Moran is. We are impressed by how well he runs a meeting, so don't miss seeing him in a long form. Matt is addressing machine learning, and how as educators we need to be both informed and concerned. On January 26, we are hosting the annual MMC Conference of Workshops at the University of Chicago Laboratory Schools. In March, we are so lucky to have Eli Luberoff, the creator of Desmos, speaking and running workshops. Eli is such a dynamic speaker with an important message. He will have us consider how to use technology to stimulate student thought rather than replace student thought. At national conferences it is hard to find a seat when Eli speaks, but MMC will be able to squeeze everyone in. To round the year off, we are bringing back Annie Fetter in May. Annie is brilliant at bringing out the intuitive nature and powerful thought in students. She was the one who first asked us to use noticing and wondering as a way to help students think about mathematics, and she also answered our questions at the Math Forum. Annie is another speaker who is planning to run a workshop or two on the Saturday following her dinner meeting talk. And in this spirit of experimentation, MMC is also co-hosting a dinner meeting with MEECAS on June 14, 2019, the Friday night before the USACAS Conference. This meeting has the perfect speaker for the event in Tom Dick, who will be weaving conics, cubics, and CAS to reveal a powerful theorem. It will be a great finale for our year.

While I hate for summer to end, I can't wait for this year at MMC. It will encourage all of us to be open to growth and change. Mathematics education cannot be stagnant, as we have much to improve. Likewise, MMC must be prepared to lead. We can only do that well if we are open to new ideas while being wise and reflective about our past experiences. Please hang the enclosed poster in a prominent place where all your colleagues will see it. Don't forget to put the dates in your calendar and invite a friend to join you (see information about the incentive program in this newsletter).

Make MMC a priority this year, just as MMC has made mathematics education a priority for over a century. See you on September 14!

# May Dinner Meeting Talk – Zal Usiskin

by Nicolette Norris

At the May dinner meeting we were treated to Zal Usiskin's 26<sup>th</sup> dinner talk at MMC. Zal is our May speaker every other year (do the math!). Zal treated us to a comparison between the many facets of mathematics and the facets of a diamond. Just as the facets of a diamond are what make it beautiful, the facets of mathematics give it beauty. We usually think of the facets of mathematics in terms of content or process. Zal chose to focus on more qualitative facets, including beauty, precision, unity, elegance and others. The importance to us as teachers is that these qualitative facets create motivation for our students and may ultimately determine how much mathematics a person learns. Zal's talk was more than a discussion of the topic. He entertained us with his musical (vocal and keyboard) skills and even had us singing along at one point!



Beauty – Zal gave us several examples of beautiful facets of math, including the Law of Sines (both planar and spherical), Fibonacci numbers, Pythagorean theorem, etc. He also pointed out examples of math that are messy and ugly, but quoted the famous English mathematician G.H. Hardy, "...Beauty is the first test; there is no permanent place in the world for ugly mathematics."

Unity and Isolated cases – Zal showed us how complex numbers relate to vectors, matrices, solutions for polynomials, Fibonacci spirals, and many things in the world around us. He also pointed out that there are cases where a pattern seems to emerge, but then there will be an isolated case that does not follow the pattern, reminding us that not all cases follow a unified pattern.

Predictability and Paradox — Perhaps related to the unity facet is the predictability of mathematics. Math is consistent and doesn't change. However, within that predictability are paradoxes in real world data that cause us to question math's reliability and predictability. Zal illustrated with some population data that at first made no sense until we investigated further.

Predictability and Surprise – Zal pointed out that, although math is predictable, sometimes results surprise us with unexpected outcomes. One such example is the seven-sided polygon. The heptagon does not have the symmetry of other regular polygons, such as hexagons or octagons, but he showed us some surprising properties of this asymmetrical shape.

Elegance and Inelegance — Zal illustrated notational elegance with a discussion of why our base 10 system is the best of all possibilities, particularly when compared to Roman numerals. He went on to illustrate inelegance with a description of the solution to the four-color problem. The proof of this problem required a computer to handle the inelegance. He also pointed out that most elegant proofs require sophistication, which he illustrated with the geometry of triangles.

Unchanging and eternal, universal and evanescent — Mathematics is viewed as eternal and unchanging, but certain processes in math are anything but eternal. The example Zal used was arithmetic and how it has changed in process and symbols over history and how it is different around the world today. Hard and easy, with difficulty and ease — Zal extended his comparison of math to diamonds by pointing out that the element carbon can be hard if structured as a tetrahedron in a diamond, or soft if structured in planes as in graphite. Mathematics can also be both hard and easy depending on how we structure it or what tools we use. For example, rigorous approaches to solving linear equations can make easy processes hard.

Utility and irrelevance — Mathematics supplies easy ways of attacking real world problems. If it didn't, why would we have it? Zal pointed out artificial problems in algebra that create difficult solutions, while students can solve the same problems more simply without algebra. Those kinds of problems lead to the question, why is Algebra important to learn? They also can lead many people to consider mathematics irrelevant.

Precision and inaccuracy — Mathematics is precise in thinking and in results. However, real life is often not precise and prone to inaccuracy. Gathering and reporting data often has inherent inaccuracies. At times when we report data we use precise numbers, such as population census numbers to the accuracy of one person, where the actual data is not precise at all.

Deduction and Circular reasoning — Deductive reasoning is the heart and most revered facet of mathematics. We like to say that everything we use in mathematics has been deductively proven. However, every proof starts with axioms or postulates that we assume to be true. The reasoning we use is circular and depends on those assumptions being true. What if they are not?

Algorithms and Creativity — These facets describe two opposite modes of thinking that are important to mathematics. Algorithms are rules that lead us to solutions to problems and are inherently not creative. However, we often arrive at algorithms by finding creative solutions to problems. The two activities may represent opposite facets, but are still connected.

Zal concluded by summarizing his multi-faceted exploration of mathematics, pointing out that the opposites we observe are important to explore: "Mathematics, like diamonds, possesses a richness of structure far beyond what can be detected by the casual observer. When we look at the gloomy facets of this structure, we become even more in awe of the brighter side. We wonder how, if mathematics is so abstract, it can be so relevant. Why, if the foundations are so shaky, does deduction give us such reliable conclusions? How, with so many isolated results in diverse areas, can we explain the unity of mathematics? Why is a discipline that seeks precision and strict rules for its procedures a stage for so much creativity? What's behind the beauty and elegance of some mathematical theorems and theory and why aren't others this way?" Zal suggested that struggling with these questions builds our faith in mathematics, which was the purpose of his talk!



### **USACAS 2019**

MEECAS and Highland Park High School will co-host the 11th USACAS Conference. While still emphasizing CAS, this expanded **technology** conference will broaden our view of Computer Algebra Systems to include various technologies in Mathematics, STEM, and Science Education. Our motto for the conference will be "find the right tool to solve the problem". This event will be held at Highland Park High School located in Highland Park, Illinois on Saturday June 15 and Sunday June 16, 2019. There will be an opening dinner Friday, June 14, 2019 co-hosted by MMC and MEECAS.

#### Speaker proposals are now being accepted at www.usacas.org.

Any questions can be directed to Ilene Hamilton at ihamilton2341@gmail.com.

# **2018 Scholarship Awardees**

This year two \$2,000 scholarships were awarded to 2018 graduating seniors through MMC. The Filliman Family Scholarship, funded by the family of long-time MMC members Paula and Dennis Filliman, went to Madeline Gilmore from Rosary High School in Aurora. Maddie was on the Rosary Math Team and had leadership positions in Student Council, Choir and other school activities. In addition, she volunteered as a calculus tutor. In her application she described how her experience as a camp counselor sparked her interest in teaching as a career. Maddie will be attending the University of Illinois and was nominated by her teacher Jessica Wilkin. The MMC Scholarship was awarded to Ethan Williams from Glenbrook South High School in Glenview, where he had wide experience as a tutor. He was part of the Math Team and his team won the Relay Competition at the ICTM State Meet. In his application Ethan discussed how lack of confidence can be the biggest hurdle that students face in learning mathematics. He was nominated by his teacher Mary Wiltjer and is headed to the University of Chicago.



Sponsor Jessica Wilkin with Awardee Madeline Gilmore from Rosary High School, Aurora



Awardee Ethan Williams with Sponsor Mary Wiltjer from Glenbrook South High School, Glenview

# Follow MMC on Social Media!





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# The MMC Conference of Workshops is back in 2019!

# To repeat the excellence, WE NEED YOU TO PRESENT!!

The conference will be held on Saturday, January 26<sup>th</sup> at University of Chicago Laboratory Schools in Chicago, IL

- Workshop format: 75-minute sessions where participants are actively involved.
- Looking for speakers from all grades K – 14.
- New speakers are welcome.
- · Co-presentations are encouraged.
- · Various topics needed.
- Encourage other potential speakers to fill out the online speaker form.
- We'll have coffee, carbohydrates, and calculators. What else could a workshop need? You!!
- Have questions? Contact Nicolette, Rose or Karen at <u>nickianorris@gmail.com</u>, <u>rsterr@benet.org</u>,
- Fill out the speaker form online at <u>www.mmcchicago.org</u> between July 1<sup>st</sup> and September 30<sup>th</sup>.

### TURN IN YOUR PROPOSAL TODAY AT www.mmcchicago.org!

# MMC Dinner Meeting Incentive Program "Bring a Friend" nights

Bring someone who has never attended an MMC dinner meeting and introduce them to MMC! Both you and your guest will receive \$5 off your dinner cost. There is a limit of 2 guests per member per meeting for the reduced cost, but you can still invite more people to come with you! This incentive is good for the following meetings:

September 14 (Sheila Hardin) November 16 (Gail Burrill) January 18 (Matthew Moran)

Thank you to our generous members who are sponsoring this program.

Please be sure to register both yourself and your guest using the reservations link on the website and mention the incentive when you check in at the meeting.

Is your membership current? Check your mailing label to see when your membership expires. You can renew by mail with the form below or renew in person at the next dinner meeting.					
NAME HOME ADDRESS		PREFERRED CONTACT Check one: Home Work	Ma	MMC	
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Make check payable to MMC	TOTAL AMOUNT OF CHECK \$				

# **Upcoming Events**

Fri., Sept. 14	Sheila Hardin	Starting the School Year, Prepared to Fail at Teaching
FriSat., Oct.	19-20	ICTM Annual Conference, Tinley Park
Fri., Nov. 16	Gail Burrill	The Wonders and Joys of Mathematics and Statistics:
		<b>Catalyzing Change in School Mathematics</b>
Sat., Nov. 17	Gail Burrill	Workshop
Fri., Dec. 14	John Benson	Magnificent Mathematics: Some of My Favorite Problems
Fri., Jan. 18	Matthew Moran	The Robots are Coming for Your Teaching Job:
		Educational Ramifications in the Machine Learning Age
Sat., Jan. 26		MMC Conference of Workshops, UC Lab Schools, Chicago
Fri., Mar. 1	Eli Luberoff	Technology that Thinks WITH Students, Nor FOR Students
Sat., Mar. 2	Eli Luberoff	Workshop
Fri., May 10	Annie Fetter	Sense-Making, Ideas, Curiosity, and Learning
Sat., May 11	Annie Fetter	Workshop
Fri., June 14	Tom Dick	Cubics, Conics, CAS, and a Curious Connection Called
		"The Most Marvelous Theorem in Mathematics!"
SatSun., Jun	e 15-16	USACAS Conference, Highland Park

Send upcoming event items to mwiltjer@glenbrook225.org no later than the date of the MMC dinner meeting preceding the issue in which the item should appear. All items are subject to editing.

Your membership renewal date appears in the upper right corner of the label

MMC 7339 W. Ibsen St. Chicago, IL 60631

# Metropolitan Mathematics Club of Chicago 2018–2019 Program

September 14, 2018 — Sheila Hardin at Fountain Blue Starting the School Year, Prepared to Fail at Teaching

November 16, 2018 — Gail Burrill\*\* at Des Plaines Elks Club The Wonders and Joys of Mathematics and Statistics: Catalyzing Change in School Mathematics

> December 14, 2018 — John Benson at Fountain Blue

Magnificent Mathematics: Some of My Favorite Problems

January 18,2019 — Matthew Moran at Des Plaines Elks Club The Robots are Coming for Your Teaching Job:

Educational Ramifications in the Machine Learning Age

January 26, 2019 — University of Chicago Laboratory Schools MMC Conference of Workshops

March 1, 2019 — Eli Luberoff\*\* at Fountain Blue Technology that Thinks WITH Students, Not FOR Students

May 10, 2019 — Annie Fetter\*\* at Fountain Blue Sense-Making, Ideas, Curiosity, and Learning

June 14, 2019 — Tom Dick at Renaissance Chicago North Shore Hotel (co-hosted by MEECAS) Cubics, Conics, CAS, and a Curious Connection Called "The Most Marvelous Theorem in Mathematics!"

Doors Open/Social Hour: 5:45 pm; Dinner and Talk: 7:00 pm Fountain Blue Banquets & Convention Center, 2300 Mannheim Rd., Des Plaines, IL Des Plaines Elks Club, 495 Lee Street, Des Plaines, IL

Make your reservations and special meal requests no later than the Monday before the meeting if possible. Reservations can be made online at **www.mmcchicago.org** or by phone at 847-486-4291

\*\* On the Saturday morning following the talks by Gail Burrill, Eli Luberoff, and Annie Fetter, the speakers will be running workshops. Check out the MMC website at www.mmcchicago.org for more information. Reservations will be required for these workshops.

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