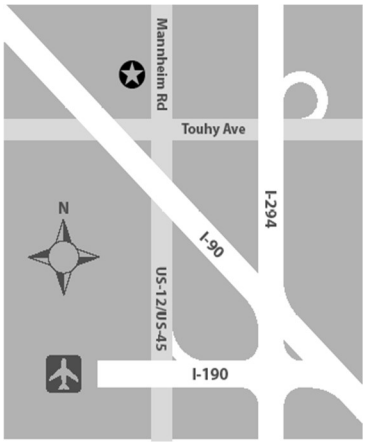
Points & Angles

Newsletter of the Metropolitan Mathematics Club of Chicago
Volume XLIX No. 1 Aug./Sept. 2019

Catalyzing Change: Putting the Recommendations Into Actions

September Speaker
Robert Berry



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.

Friday, September 13, 2019
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, September 9
Online at mmcchicago.org
or by phone at 847-486-4291

Our September MMC talk centers on the key recommendations from *Catalyzing Change in High School Mathematics: Initiating Critical Conversations*. Participants will unpack case studies related to Catalyzing Change. This talk will focus on how states and school districts can take a systemic approach towards equitable teaching, common pathways, and changes in curriculum. The goal of this session is to initiate conversations grounded in the steps that must take place to bring about and give support to necessary changes in school mathematics.

Robert Q. Berry III is a professor in the Curry School of Education at the University of Virginia, with an appointment in Curriculum, Instruction, and Special Education. Berry teaches mathematics methods courses in the teacher education program at the University of Virginia. Additionally, he teaches graduate level mathematics education courses and courses for in-service teachers seeking a mathematics specialist endorsement. He is a former middle school teacher and was twice named Teacher of the Year in Virginia.

Equity issues in mathematics education are central to Berry's research efforts within four related areas: (1) understanding Black children's mathematics experiences (mathematical identities and agency); (2) measuring standards-based mathematics teaching practices; (3) unpacking equitable mathematics teaching and learning; and (4) exploring interactions between technology and mathematics education.

Catalyzing Change (cont.)

Berry has extensive experiences in classroom observation and is the lead developer of an observation instrument, *Mathematics Scan*, which measures standards-based mathematics teaching practices. Robert Berry received his Bachelor of Science degree from Old Dominion University, earned his master's degree from Christopher Newport University, and holds a Ph.D. from the University of North Carolina at Chapel Hill.

Points from the Interior

by Matthew Moran

Greetings MMC Members,

I am excited to announce the MMC schedule for the 2019-2020 school year. We have a great program in store that is packed with professional development that you won't want to miss. Leading off the year on September 13 is current NCTM President, Dr. Robert Berry. Dr. Berry will be talking to us about Catalyzing Change: Putting the Recommendations into Actions.

We are very pleased to have Dr. Eugenia Cheng returning to MMC on November 1 to talk to us about The Art of Logic in an Illogical World. I saw Dr. Cheng deliver a talk on her new book (*The Art of Logic in an Illogical World*) a few months back, and as you might expect from the Scientist in Residence at the School of the Art Institute of Chicago, she had some compelling things to share.

On December 6, we will be hosting Dr. Bridget Tenner from DePaul University to talk about Bijections: Sometimes It Counts Not to Count. Dr. Tenner will be presenting a general interest math talk with interesting examples of bijections.

On January 24, we will be hosting one of our very own, Douglas O'Roark, Executive Director of Math Circles of Chicago. Doug will be talking to us about The Future of Math Enrichment, and if there is anyone you want to hear this talk from, it is Doug.

The MMC Conference of Workshops will be held on Saturday, February 1, 2020, at Adlai Stevenson High School. This is a huge opportunity to hear several talks from some of the brightest minds in math education in one day. Don't forget to get your talk proposal in soon, if you'd like to speak at the conference this year.

Back by popular demand, we are delighted to have Eli Luberoff, founder of Desmos, coming back to MMC on March 6. Eli will be talking about Creating Interesting Ways for Students to be Right and Wrong. Eli will also, again, be presenting Saturday workshops the day after his Friday dinner talk. Eli is an innovator who is thinking deeply and with integrity about technology in the mathematics classroom.

Last, but certainly not least, we have our biennial Dr. Zalman Usiskin talk. It is MMC tradition that Dr. Usiskin gives a talk every other May, and this May 15, we will be treated to a talk about Some Great Middle and High School Mathematics Lessons Few People Teach. We will be getting into some deep cuts of mathematics curriculum.

So that is our official program for the year, but wait, there's more! The MMC is honored to be co-hosting the NCTM Centennial Meeting with ICTM. This giant conference and celebration of math education will be held from April 1- 4 at McCormick Place.

Good luck with your school year!

June Dinner Meeting Talk – Tom Dick

by Carrie Fraher

A mixed crowd of newcomers to USACAS and friends from decades of meetings gathered in a ballroom at the Renaissance Chicago North Shore Hotel in Northbrook on June 14 for a dinner meeting. The speaker sparked our interest with a quote from Paul Lockhart's "Mathematician's Lament" about how we should celebrate mathematics as an art form because it has beauty and aesthetics. Tom Dick promised to connect these concepts with a jaw dropper theorem that was not new. It had been proven in the mid-19th and mid-20th centuries with a new proof coming out two years ago. He admitted that when he first heard of the theorem, he doubted its truthfulness.

The first section of the talk was Construction, Constraints and Conics with Dynamic Geometry. The TI-Nspire was used as the platform for the following investigations. An inscribed circle was created, allowing us to experiment with many different triangles without a new construction. Dynamic measurements corresponded to each new triangle. Next, we experimented with selecting different constraints and locking them. When area was locked, all new triangles created were forced to have the same area as the original. This was familiar to many in the audience as we observed that each point could only move on a path parallel to the base, proving the area formula for triangles. Tom Dick turned on Geometry Trace and experimented with locking the perimeter. The trace yielded an ellipse, which was a clever way to reinforce the definition of the foci. He drew a triangle and a line parallel to each side. This created 3 parallelograms and 3 triangles. Using dynamic geometry, we were able to see an investigation of the point where the area of the triangles would be equal to the area of the parallelograms. This formed an ellipse inside the triangle where the ellipse was tangent to each side. The Steiner Ellipse can be found through this area division property. If you're curious, you may want to investigate this further, two ellipses are named after Steiner and sometimes this one is called the Steiner Inellipse.

In the second section of the talk, Tom Dick examined cubics, the simplest curve with an inflection point. After asking the audience if the graph of a cubic has to have at least one inflection point, he used calculus to prove it and once again took advantage of dynamic geometry to show 4 different cubics graphed with their derivatives.

After we were prepared by the first two sections, Tom Dick began to delve into the Siebeck-Marden Theorem. Using dynamic CAS for a cross representation, he defined a cubic:

$$(z-a)(z-b)+(z-a)(z-c)+(z-b)(z-c).$$

He then made different quadratics formed by choosing each possible pair of the roots from p(z) and adding all three pairs together. This was a derivative application of the product rule.

Considering the cubic function, 1st derivative, and 2nd derivative, Tom Dick challenged us to reason about how the zeros of all three functions were related. A Rolle's theorem application states that the interval that contains the roots of the cubic will also contain all roots of the derivative.

Next, he graphed the cubic on the complex plane, so he was able to show examples with non-real roots. If you make a triangle from 3 points, the inflection point will be at the centroid. At this point, the crowd started drawing cubics in the air and shouting, "Yes!" I felt like I was at a baseball game and a walk-off home run had just been scored. Tom Dick reminded the crowd that he hadn't even reached the Siebeck-Marden Theorem yet, and everyone settled down a bit.

Next up was a complex cubic with complex coefficients. All roots will be complex and the derivative process won't change. The inflection point was still the average of the three numbers or the centroid of the triangle. The zeros must be inside the triangle because of a generalization of Rolle's Theorem and the foci of the Steiner Ellipse.

June Dinner Meeting Talk (cont.)

I can't even come close to describing in words the beauty of this talk because the elegant dynamic images and CAS work was so convincing. If you get a chance to see Tom Dick give this talk at a conference in the future, don't miss it! The dinner talk was a perfect prelude to the amazing and beautiful mathematics that can be witnessed at a USACAS conference like the one that followed in Highland Park on June 15-16. Please visit the meecas.org website for more information on getting involved in the next conference.

Board Notes

By Beth Ann Ball

The MMC Board of Directors met on Sunday, May 19, 2019, at 2 p.m. at a home in Palos Park, IL.

The 2018-2019 board concluded the academic year, and the 2019-2020 board was welcomed in. The officers and committee chairs for the upcoming year were voted upon. Plans were made for the upcoming MMC Conference of Workshops at Stevenson High School on February 1, 2020, as well as the Centennial NCTM Annual Meeting being held in Chicago on April 1- 4, 2020. The Program of Speakers for 2019-2020 was announced, including a return engagement by Eli Luberoff from Desmos followed by Saturday workshop opportunities.

The next MMC Board meeting is being held on Wednesday, August 21, 2019, at Glenbrook South High School in Glenview, IL. MMC members are welcome to attend any board meeting. Anyone interested in attending the next board meeting, please contact Matt Moran at matthew.j.moran@gmail.com.

Follow MMC on Social Media!

A Puzzle to Start the School Year:
Mathematical Word Permutations

By Zalman Usiskin

Find the pair of words whose letters are permutations of each other (some people call them anagrams) and both with mathematical connections. Clues are given at left and at right. As a hint, the order of the clues is by the length of the answers, and those of the same length are ordered alphabetically by the letters in the words themselves arranged alphabetically. Two answers include hyphens.

1. mathematician George David Birkhoff to Garrett Birkhoff	_____	_____	sum
2. base of the decimal system	_____	_____	total
3. something measured per unit of something else	_____	_____	weight of an empty container
4. $(x, y) \rightarrow (x + ky, y)$	_____	_____	split evenly
5. number of ancient wonders of the world	_____	_____	multiples of two
6. cubic meter	_____	_____	certain networks
7. the commandment "Thou shalt not steal."	_____	_____	altitude
8. case that includes many special cases	_____	_____	expand
9. measure of arc to the equator	_____	_____	distance above sea level
10. pair	_____	_____	make 8 times as large
11. tally again	_____	_____	not clockwise
12. map used in hilly areas	_____	_____	cube found in salads
13. splits on many rulers	_____	_____	most off the ground
14. -3 or 1/3, to 3	_____	_____	1 – cosine in old texts
15. *Mathematical ____ in Nine Sections* by Qin Jiushao in 1247	_____	_____	repeats
16. 2nd component of an ordered pair in the plane	_____	_____	distributed equally
17. shape of delta	_____	_____	sign in calculus
18. number of interstate from Michigan to Texas	_____	_____	number of interstate from Muskegon to Detroit
19. procedure to solve a problem	_____	_____	certain exponent
20. simple fraction with numerator and denominator less than 10	_____	_____	multiplicative inverse of the same simple fraction

Answers will be in the next issue of *Points & Angles.*

Thank you to Zalman Usiskin for his contribution of this original puzzle for all MMC members to enjoy!

Interested in joining the MMC Board of Directors?

If you have been a member in good standing for at least two years,
MMC wants you to run for the board.
Contact Mary Wiltjer at mwiltjer@glenbrook225.org for more information.

The MMC Conference of Workshops **is back in 2020!**

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

The conference will be on Saturday, February 1, 2020, at Stevenson High School in Lincolnshire, 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 or Rose at nickianorris@gmail.com or rsterr@benet.org.
- Fill out the speaker form online at mmcchicago.org no later than September 30.

TURN IN YOUR PROPOSAL TODAY AT mmcchicago.org!

2019-2020 MMC Dinner Meeting Incentive Programs

"Bring a Friend" Nights: Bring someone who has never attended an MMC dinner meeting, and introduce them to MMC! Both you and your guest(s) will receive $5 off your dinner costs. There is a limit of 2 guests 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 13 (Robert Berry)
December 6 (Bridget Tenner)
November 1 (Eugenia Cheng)
January 24 (Douglas O'Roark)

"New(er) Teacher" Program: Are you a teacher in your first 5 years of teaching? If so, you can take advantage of this incentive! Pick up a new(er) teacher card at registration and bring it back to be verified each time you attend a dinner meeting. Attend 3 meetings this year, and get your 4th meeting at half price!

Thank you to our generous members who are sponsoring these programs.

Please be sure to register all attendees using the reservations link on the website.
Mention the incentive when you check in at the meeting to take advantage of these programs.

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.

MMC Membership and Change of Address Form

Mail completed form and check to:

MMC
7339 W. Ibsen St.
Chicago, IL

NAME

PREFERRED CONTACT
Check one:
☐Home ☐Work

HOME ADDRESS

CITY | STATE | ZIP

HOME PHONE | HOME E-MAIL

EMPLOYER

WORK ADDR

CITY | STATE | ZIP

WORK PHONE | WORK E-MAIL

ELECTRONIC-ONLY MEMBERSHIP
Check the box below for electronic-only membership. You will receive an email with a direct link to each issue of Points & Angles when it is posted on the web site, often before paper copies are mailed. You will no longer receive Points & Angles by mail.
☐Electronic-Only Membership

FORM USE
Check one:
☐New Membership ☐Renewal
☐Former Member ☐Change of Address

* The student and 1st-year teacher memberships are only available as electronic-only.

MEMBERSHIP TYPE
Check one:
☐1 year ($35) ☐student*, 1 yr ($22)
☐2 years ($65) ☐1st yr teacher*, 1 yr ($22)
☐3 years ($90) ☐retired, 1 yr ($28)

MEMBERSHIP COST $

DONATIONS
SCHOLARSHIP FUND $

SPEAKER FUND $

Make check payable to *MMC*

TOTAL AMOUNT OF CHECK $

Upcoming Events

Fri., Sept. 13	Robert Berry	**Catalyzing Change: Putting the Recommendations into Actions**
Fri.-Sat., Oct. 18-19		**ICTM Conference, Peoria**
Fri., Nov. 1	Eugenia Cheng	**The Art of Logic in an Illogical World**
Fri., Dec. 6	Bridget Tenner	**Bijections: Sometimes It Counts Not to Count**
Fri., Jan. 24	Douglas O'Roark	**The Future of Math Enrichment**
Sat., Feb. 1		**MMC Conference of Workshops, Lincolnshire**
Fri., Mar. 6	Eli Luberoff	**Creating Interesting Ways for Students to be Right and Wrong**
Sat., Mar. 7	Eli Luberoff	**Desmos Workshops**
Wed.-Sat., April 1-4, 2020		**NCTM Centennial Annual Meeting: Celebrate 100 Years—Looking Back and Moving Forward, Chicago**
Fri., May 15	Zalman Usiskin	**Some Great Middle and High School Mathematics Lessons Few People Teach**

Send upcoming event items to sburnett_308@yahoo.com 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
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