

Points & Angles

Newsletter of the Metropolitan Mathematics Club of Chicago
Volume XLVI No. 4 Jan. 2017

Geometry In Construction: A Contextualized Approach to Teaching Mathematics

January Speakers

Maryjoy Heineman
& Matthew Kaiser



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, Jan. 20, 2016

5:30 PM Doors Open, 6:00 PM Social Hour
7:00 PM Dinner & Talk

Fountain Blue Banquets & Convention Center

2300 Mannheim Rd., Des Plaines
(847) 298-3636

\$43 for Members, \$49 for Nonmembers

Please note: Dinner meetings can only be paid by cash or check. No credit cards are able to be accepted at this time.

Reserve by Noon, Monday Jan. 16

Online at www.mmcchicago.org
or by phone at (847) - 486 - 4291

On January 20th, we get the opportunity to hear from two teachers from Evanston Township High School. They are in their fourth year of teaching Geometry In Construction.

Maryjoy Heineman received her B.S. in Materials Science and Engineering and B.A. in Mathematics from the University of Illinois at Urbana-Champaign in 2005. She received her M.A. in Mathematics Education from DePaul University in 2009. She began her teaching career at Warren Township High School and moved to Evanston Township High School where she has taught for the last 10 years. She has piloted several teaching initiatives including teaching partnerships with the Special Education department and Geometry in Construction. She received the ICTM Promising New Teacher Award in 2010 and the ETHS Teacher Excellence Award in 2016.

Matthew Kaiser received his B.A. in Special Education from Illinois State University in 2004. In 2012, he earned a M.A. in Curriculum and Instruction from The American College of Education. In 2004 he began his career teaching at Frost Junior High in a self-contained classroom. After that he was an inclusion Special Education teacher at Elmwood Park High School for 2 years. During that time, he went back and earned an endorsement in Career and Technical Education. Ultimately changing teaching careers, Matthew went on to teach at Prospect High school in Automotive and Engineering. In 2010 he started at Evanston High School where he has taught for the last 6 years autos, engineering, welding, architecture, and Geometry in Construction.



Points From The Interior

By CARRIE FRAHER

Happy New Year! Do you have any teaching resolutions? Do you want to take more time to explore new ideas? Would you like to network with more math teachers? As we say goodbye to 2016, are you looking to re-energize your classroom and give students more ownership of their learning? You've come to the right place! MMC is a great organization to meet other people who are interested in math and exchange ideas. But wait, there's more! Get your registrations ready for the MMC Conference of Workshops (2/28/17 at Evanston HS) where you can get a chance to work on all your teaching resolutions and have some fun learning with other teachers. The online deadline is January 13th. The line-up of presentations is impressive, and it's sure to be an informative and enjoyable day.

About this time, many of you are giving semester exams and this can lead to an examination of our grading procedures. Is the time you spend grading leading to beneficial feedback to your students? Could any of your graded assignments be replaced by chances for students to self-evaluate or peer-evaluate? Our MMC members have diverse opinions on this topic – from traditional to Standards Based Learning. I hope you get a chance to discuss this with some colleagues over a dinner meeting or lunch at the Conference of Workshops.

When am I ever going to use this? If you want to answer this question, come out to our dinner meeting on January 20th when Maryjoy Heineman and Matt Kaiser talk about their experiences putting Geometry into action. It's a beautiful collaboration between Evanston Township High school, the city of Evanston and Community Partners for Affordable Housing. Their classes actually built a house that will be sold through CPAH. The class aims to bring Geometry to life and I'm excited to hear about the difference they are making for their students and community. There'll be something for anyone who wants to bring some true applications into their math curriculum.

Thanks to all the folks that came out to our December dinner meeting "A Finite Look at Infinity." We had a lively crowd and an entertaining speaker. I was thrilled to see so many former students of Jeffrey Bergen gather to learn more math from him and reunite with some classmates (See the photo below). I hope that some of our new attendees will continue to attend our meetings. The beef dinner did not disappoint and Fountain Blue looked festive with their holiday decorations. Past President Pat Trafton will be announcing the slate for our next elections. If you were not able to get involved this year, please consider joining us in the near future. The opportunities that we enjoy as math educators in the Chicago area are brought to us by a fabulous group of volunteers. We would love to welcome you into a more active role in MMC. If you want to get more involved, please e-mail me at cfraher@glenbrook225.org for more information.



USACAS¹⁰
(2)CAS OR NOT(2)CAS

Attend the TENTH INTERNATIONAL Conference on CAS in Secondary Mathematics
Come explore the future of mathematics education!

Saturday and Sunday June 24-25, 2017
Hawken Upper School, Gates Mills OH (approximately 27 miles from CLE Airport)

Optional Saturday evening tour to Rock and Roll Hall of Fame –more details will be posted online
More information available at <http://usacas.org>

Organized by MEECAS (Mathematics Educators Exploring Computer Algebra Systems)

December Meeting Summary

By PETER DeCRAENE

Carrie Fraher introduced the speaker by asking everyone in the crowd who had been taught by Dr. Bergen to stand, and around two dozen people immediately rose to their feet, happy to acknowledge their connection to and appreciation for Dr. Bergen's work. Dr. Bergen began his talk by explaining that he hoped we would find the ideas he presented both fun and mind-boggling. Classes exist for "Art Appreciation" or "Music Appreciation"; there should also be classes for "Math Appreciation" and as teachers we can include some of these kinds of ideas in our classes.

Many people, even if they tend to not be interested in math, are fascinated by big numbers. For example, the chances of winning the Powerball lottery are 1 in 292,201,338. The biggest payoff for winning the Powerball (after rolling over a few times) was \$1.586 billion. In another example of big numbers, Dr. Bergen stated that the odds of creating a perfect bracket for March Madness just by guessing is 1 out of 9,223,372,036,854,775,808. To understand this large of a number, if you filled out this many brackets and piled up the stack of paper, the pile would reach to the sun. And back. 3000 times.

We can build lessons and activities around these kinds of numbers. Dr. Bergen suggested the following questions for classroom use (among many others throughout the talk):

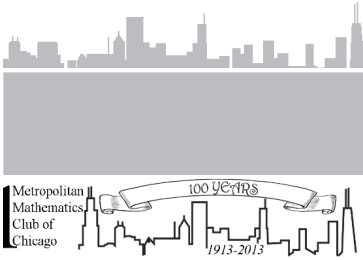
- Compute the odds of winning powerball
- Make up your own lottery type game and compute the odds of winning
- Working backwards, start with a large number and create a game where the probability of winning is 1 out of that number
- Compute the probability of a rollover in your lottery game based on the number of tickets sold: 100 million, 200 million, etc

While large numbers can be really interesting, mathematicians tend to be more interested by the infinite than by large numbers. Dr. Bergen presented a quote by David Hilbert, "The infinite! No other question has ever moved so profoundly the spirit of man," and explained that while Hilbert might be a little over-stating the idea, understanding infinity is a fairly recent and somewhat controversial topic in mathematics. Georg Cantor first proposed his ideas about infinity in the late 19th century, and other mathematicians responded with disdain. Henri Poincare, for example, called Cantor's work a "great disease". But the ideas are "infinitely interesting" because when studying the infinite, the boundaries between math, philosophy, and religion begin to fade. (In talking about the history, Dr. Bergen's enthusiasm was as engagingly infectious as his jokes were wonderfully terrible.)

Dr. Bergen presented the classic problem of Zeno's Paradox which seems to imply that motion does not exist. Using much more recent techniques of algebra on infinite sums we can resolve the apparent paradox. But we must be very careful about how we perform algebra on infinite sums. For example, if we consider the sum $B = 3 + 30 + 300 + 3000 + 30,000 + \dots$ and perform the exact same steps we would use to find the fractional equivalent of a repeating decimal, we find a very interesting and disturbing result!

Dr. Bergen continued with Hilbert's Hotel, where "There's always room for one more," illustrating the scenario with a narrative fresh for those already familiar with it and insightful for those new to the ideas. Through the example, he demonstrated that the cardinality of the positive integers is the same as the cardinality of the non-negative integers and is the same as the cardinality of the integers all together. (The manager at the hotel is very clever, and knows how to squeeze in additional guests.) The cardinality of the positive integers is also the same as the cardinality of the rational numbers. (Here the manager is just showing off, because now the infinitely many guests each get infinitely many rooms!) But the total of real numbers between 0 and 1 (The "Continuum") is most definitely infinitely larger than the set of positive integers. The Continuum cannot stay at Hilbert's Hotel. Cantor's Diagonalization Argument for this last point was used by Alan Turing to solve the Halting Problem in the field of Computer Science.

Dr. Bergen closed his talk with Cantor's Continuum Hypothesis from 1878, again marveling at how recent these ideas are compared to much of the math we usually study. The Continuum Hypothesis states that there does not exist a set which is simultaneously larger than the positive integers and smaller than the Continuum. Kurt Godel showed in 1940 that the hypothesis cannot be proved false (so it must be true, right?) but in 1963 Paul Cohen showed that the hypothesis cannot be proved to be true (Logic can be funny this way). Godel went on to prove that in any system of logic, there will always be statements that simultaneously cannot be proven true and cannot be proven false. So philosophy, religion and math come together again, with math showing that there are things which we can never know for sure. Except that Jeff Bergen is a master at explaining complex ideas, is well-loved by his students, and continues to be a positive influence on math education.



MMC Scholarship Info

By LAURA KAPLAN

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The Metropolitan Mathematics Club of Chicago is offering a \$2,000 scholarship for a high school senior who will pursue a career in the teaching of mathematics. In addition, up to two Filliman Scholarships may also be awarded for the same amount (funded by a gift from the Filliman estate). The selected students, their parents and their sponsoring teachers will be invited to the May 19th MMC dinner meeting at which time the scholarship recipients will be honored. A selection committee of MMC members appointed by the Board will determine the scholarship awards. To be eligible, an applicant must submit the application, have an official transcript sent, and request a letter of recommendation from a member of MMC such that all of the materials are received by March 10, 2017. The committee will establish its own guidelines for evaluating applications, and will make a recommendation to the Board as to the awarding of the scholarship. No member of the selection committee may nominate nor recommend a candidate. A copy of the application is online and was included in a previous issue of Points & Angles. The guidelines used for selection shall be: Demonstration of overall academic scholarship with an inclusion of at least eight semesters of college preparatory mathematics, a statement of the intention to pursue a career in mathematics teaching, indication of participation in extra-curricular activities, especially those that may have a positive influence on a teaching career, a letter of recommendation from a math teacher who is familiar with the applicant's academic performance and his or her potential as a mathematics teacher, and a short response from the candidate (1-2 paragraphs) to each of the following prompts:

- a. What qualities do you possess that will help you in a teaching career?
- b. Describe a teacher who has had an impact on your education.
- c. Was there a time when you struggled with a concept in a math (or other) class? What did you do?
- d. What was your favorite math class? Why?
- e. Describe your favorite math problem. What makes it so great?
- f. What excites you about mathematics?
- g. Why do you want to teach mathematics? This response may be longer than the others if necessary.

** Up to 3 awards are possible based on candidate qualifications. The organization reserves the right to award fewer scholarships if these are not met.

Board Report

By LYNN BOND

The MMC Board of Directors met on November 1st at Oak Park and River Forest High School. The board approved up to \$100 for the purchase of a current version of Quicken software. The ballot for President-Elect and Board Directors was approved. Speakers and dates for 2017-18 dinner meetings are being arranged. Registration is open at www.mmccchicago.org for the January 28, 2017 Conference of Workshops at Evanston High School. The next Board meeting will be Tuesday, February 7, 2017 at 6:30 pm at Glenbrook South High School. MMC members are welcome to attend any Board meeting. Please contact Pat Trafton at p.trafton@comcast.net if you plan to attend.

COMING SOON: The MMC Conference of Workshops!

Save the date: Saturday, January 28, 2017
at Evanston Township High School.

The conference program books have been sent and
the program is also on the MMC website.

Registration is now open on the website.
Registration deadline is January 13

Remember that registration for workshops is done on a
first-come, first-served basis, so register early!

Don't miss this!

T³ Promotional Discount

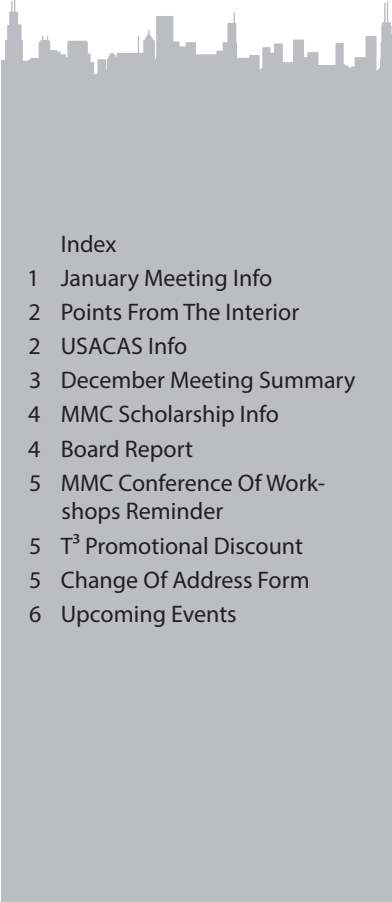
The 2017 T³ International Conference will be held at the Hyatt Regency in Chicago Illinois from March 10-12, 2017. The October 15th deadline for the early bird \$100 registration has passed, BUT don't despair! If you contact Ray Klein at rklein9019@aol.com, he will share a special T³ instructor promotion that will allow you to register for the special \$100 registration fee.

NAME		PREFERRED CONTACT Check one: <input type="checkbox"/> Home <input type="checkbox"/> Work	
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<small>* The student and 1st-year teacher memberships are only available as electronic-only.</small>		SCHOLARSHIP FUND \$	
		SPEAKER FUND \$	
		TOTAL AMOUNT OF CHECK \$	

Make check payable to **MMC**

MMC Membership and Change of Address Form
 Mail completed form and check to:
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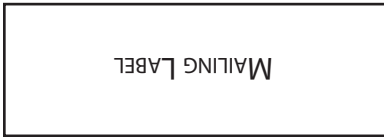
Upcoming Events



Fri., Jan. 20	Maryjoy Heineman & Matthew Kaiser	Geometry in Construction: A Contextualized Approach to Teaching Mathematics
Sat., Jan 28	Evanston Twp H.S.	MMC Conference of Workshops
Fri., Mar 3	Nicole Enzinger	Integers: A Space for Mathematical Play
Fri., May 19	Hyman Bass	Mathematical Variations on Some Familiar School Themes

Send upcoming event items to jomalley@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.



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