Points & Angles

Newsletter of the Metropolitan Mathematics Club of Chicago
Volume XLVI No. 7 June2017

2017 - 2018 MMC Program Info

Mark Your Calendars For September 8, 2017
Our Speaker Will Be Po-Shen Loh!

The first Friday Night Dinner Talk of the 2017-18 school year is on September 8th at the Fountain Blue. The MMC is excited to present a talk by Po-Shen Loh, Carnegie Mellon University mathematics professor, founder of expii.com, and head coach of the USA International Math Olympiad team. Professor Loh will be talking about Math and Creativity.

Mark your calendars for this first talk, as well as these other exciting talks:

- 10/27/17 - Rico Gutstein: Curriculum and Instruction Professor, UIC
  Co-Founder, Teachers for Social Justice

- 12/15/17 - Eugenia Cheng: Author and Scientist in Residence
  at the School of the Art Institute of Chicago

- 1/19/18 - P.J. Karafiol: Mathematics Educator and Prinicpal at Lakeview High School in Chicago, Presidential Award Winner

- 3/16/18 - Esther Song: Lindblom Math and Science Academy,
  ICTM's Most Promising New Teacher of 2014

- 5/11/18 - Zalman Usiskin: Director of UCSMP, International
  Mathematics Education Leader

Points From The Interior

By Carrie Fraherr

While it has been a great experience being the president of MMC for a year, I am excited to pass the reins to Matt Moran. Matt has planned an exciting schedule of speakers for our new season of dinner meetings. See the schedule in this issue and place them on your calendar now so you do not miss anything. Friday nights at MMC are an excellent way to network, recharge your energy for math education, and connect with friends. You are sure to hear some great talks in the 2017-2018 season!

I hope that some of you readers are interested in getting more involved in our organization. As past-president, it will by my job to find people to run for open board positions and the presidency for 2018-2019. It has been great to get to know so many people who are passionate about math education and help to plan events to bring them together. Please contact me at cfraher@glenbrook225.org if you are interested in taking a more active role at MMC in the future. The number of board meetings is very manageable.

In addition to our new schedule of dinner meetings, please note the new format of the MMC Summer Workshops. There is an engaging line-up of speakers and you can build any schedule you would like from a series of half-day sessions. Please see the insert inside this newsletter and sign up. Early August is a great time to hear new ideas and get planning for the upcoming school year.

After you take some time to relax and enjoy the summer, be sure to write a proposal for a talk at the MMC Conference of Workshops. You can begin submitting proposals on our website in July. We all have knowledge and techniques to share. You can present alone or with a colleague. Our participants really come prepared for an active exchange of ideas and not a lecture. Whether it is your first presentation or your hundredth, this Saturday event is a wonderful experience.

I am so grateful for the dedicated people that keep this organization going through service and membership. We are lucky to be in an area with so many opportunities for professional growth. Please invite some colleagues when you attend a dinner meeting and check if one of our schedule posters, with a new one coming to you in September, is prominent in your workplace. I love getting ideas on Twitter and in the math blogosphere but those experiences do not replace the real connections that you gain as an active member of MMC.

Have a wonderful summer! I hope to see you in August at our Summer Workshops and throughout the year at our MMC events.

May Talk Summary

By John McConnel

Noted mathematician and mathematics educator Hyman Bass spoke on "Some Scenic Routes and Dangerous Curves in School Mathematics" at the MMC meeting on May 19. The title of his talk reflects his concern that many students encounter mathematics instruction organized about independent topics. He believes that organization of curriculum through mathematical silos impedes children's understanding of mathematics. We need teachers who can connect ideas and lead students down scenic mathematical paths. He used seven examples from his capstone course for preservice teachers to show how simple ideas can yield deep questions. I found more than a few surprising.

He gave his first topic, division with remainder, a fresh perspective with the statement, "Modular congruence is the foundation of linear measurement." When we measure a length a in units b, we know that we can count up the units to length a or so close to a that we can't squeeze in another unit. If we have used q full units, the length a can be represented $a = q\,b + r$ where r is the leftover distance, or remainder. It must be true that $0 \le r < b$. When $b = 1$, then $0 \le r < 1$. This argues for writing remainders in integer division problems as fractions. For example, the answer to the division problem $38 \div 4$ should not be written as "9 r 2" (a dangerous curve) but rather as $9\ 2/4$ or $9\ 1/2$. Forms with fractions emphasize the measurement concept underlying division.

Place value is a fundamental concept that has been taught in a variety of ways in elementary and middle school. When I started teaching in the late 1960's, almost every book provided some sections on arithmetic with different bases like base 2, base 3, base 5, but rarely with bases larger than 10. Bass took my breath away with a question that challenges understanding of place value: "Write the base 1000 representation of 48, 547, 623, 791, 105." This is one of those questions that has a very easy answer, but requires to think deeply about the meaning of place value. It would be a good question for any math class in middle school or high school.

I was surprised by Professor Bass's brief allusion to a subtraction problem (38 – 52) in which he asked "if someone wrote -26 as an answer, was he right? Explain." He emphasized that the error was due to neglect of place value. I thought that this algorithm deserved a positive instance. A wonderful Annenberg video 15 years ago showed how third graders who have a sense of negative numbers can use that knowledge in an effective, intuitive algorithm for multidigit subtraction. They reasoned $8 - 5 = 3$ and $30 - 50 = -20$. So, $38 - 52 = -20 + 3$ or -17. Although Bass wanted his example to illustrate the importance of place value in algorithms, his use of an error situation may have left the impression that using negative numbers in elementary subtraction was a dangerous curve. To the contrary! In one of his NCTM articles (2003), Bass provided more detail on the algorithm and compared it favorably to the traditional multi-digit subtraction method.

The 2003 paper features criteria for comparing algorithms (worth reading). And comparisons were one of his major points in the talk. His final big point was that teachers should ask, "what proof (or solution) do you like best?" Those in the MMC audience who had to learn the original version of Bloom's Taxonomy will recognize this question as the highest Bloom level of complex cognition: evaluation. Bass compared two proofs of the formula for the sum of angles of a polygon. He showed the common approach of partitioning a convex n-gon into $n - 2$ triangles, then summing 180° for each triangle. This gave the expression $(n - 2) \cdot 180^\circ$ for the sum of the interior angles. He then contrasted this traditional approach with a "walk-around" proof using one exterior angle at each vertex. He completed one revolution (360°) as he walked around an imaginary polygon on the floor. If each interior angle and a corresponding exterior angle sum to 180°, then the sum of these pairs is $n \cdot 180^\circ$. But we are interested only in the sum of the interior angles, so must deduct his rotation. The sum of interior angles can then be expressed as $n \cdot 180^\circ - 360^\circ$. The exterior angle method of proof doesn't require knowing that the sum of angles of a triangle is 180°, and, indeed, offers a proof of the same.

Bass took us on the scenic route with "proofs without words." His very last demonstration showed a development of the Pythagorean theorem from diagrams. His argument only required similarity and rescaling. I like nifty proofs of the Pythagorean Theorem, but I was stuck on his previous example. Bass had showed drawings on squared paper of a unit wide sidewalk around a square pool. He colored in the drawings to show many ways a person could partition the figure to deduce a formula for the area of the sidewalk from the length of a side of the pool. This is a good classroom activity, but he had more in mind. What if the pool morphs to a cube, and the "sidewalk" covers all faces? One of the 2-D partitions proved to be best for generalizing to higher dimensions. This was definitely the start of a scenic route. I drove home with visions of sidewalks dancing around hypercube pools.

Reference.

Hyman Bass (2003) Computational Fluency, Algorithms, and Mathematical Proficiency: One Mathematician's Perspective. Teaching Children Mathematics. NCTM. pp. 322-327.

MMC Scholarship Winners

By Laura Kaplan

The scholarship committee was able to choose among outstanding candidates for the MMC scholarship, which is awarded to a high school senior who will pursue a career in mathematics education. In addition to the MMC Scholarship, the Filliman Family was again generous enough to offer two scholarships in memory of Dennis and Paula Filliman, longtime active members of MMC.

MMC Scholarship:
Holly Cunningham, Evanston Township High School, sponsored by Richard Agin
Holly will be attending the Princeton University where she will major in Applied Mathematics. She counts her senior year math course – AP Advanced Topics in Mathematics – as a favorite with Combinatorics and non-Euclidean Geometry memorable topics. She looks forward to teaching high school students where she can foster excitement and encourage creativity in problem solving.

Filliman Scholarships:
Jacob Kelleher, Oak Park River Forest High School, sponsored by Sheila Hardin
Jacob will be attending Boston College and will study Secondary Education with a focus in Mathematics.He chose Calculus BC as a favorite due to the teacher who taught it being "the best teacher ever". Jacob hopes to teach high school where looks forward to supporting his students and watch them achieve their goals as his teachers have done for him.

Alex Schoeny, Glenbard West High School, sponsored by Melissa Dudic
Alex will be attending University of Pennsylvania, where he will major in Mathematics. In the past four years, he's enjoyed the challenge of Calculus BC and also the different thinking required in Geometry and Computer Science. Alex is looking forward to teaching high school or college mathematics where he hopes to inspire "ah-ha" moments in his students.

From Left To Right: Sheila Hardin, Jacob Kelleher, Richard Agin, Holly Cunningham, Alex Schoeny, Melissa Dudic

MMC Summer Workshop Descriptions

See the insert for more details about how to register. Below, are the descriptions for all the possible options:

Tuesday, August 1st from 8:30am to 11:30am

•Geometry as a Problem Solving Course, Part 1: Organize your Geometry class so your students learn problem solving while they learn geometry. At the same time, many of them will become excited about the class as well as proficient at solving difficult geometry problems. Participants will do a lot of geometry. This session will focus on problems with numerical answers. (You do not need to take Part 2 to take this workshop.)

•Teaching Calculus AB: The AB Stands for Absolutely Blissful ... we will spend 3 hours investigating some of the core topics in AP Calculus AB. Activities & techniques for teaching limits, derivatives, area and more will be happily investigated.

Tuesday, August 1st from 12:30pm to 3:30pm

•Geometry as a Problem Solving Course, Part 2: Organize your Geometry class so your students learn problem solving while they learn geometry. At the same time, many of them will become excited about the class as well as proficient at solving difficult geometry problems. Participants will do a lot of geometry. This session will focus on methods of teaching proofs as well as several interesting topics that might not be part of the standard curriculum. (You do not need to take Part 1 to take this workshop.)

•Coding: This 3-hour class will introduce participants to coding on the TI-Nspire handheld. (With some minor changes, a TI-84 Plus CE could also be used.) Topics to be discussed will include programming basics, assigning values to variables, conditionals, and loops. Mathematical examples for each of these topics will be presented. Experience in coding is not required.

Wednesday, August 2nd from 8:30am to 11:30am

•Teaching Algebra: Explore an introduction to graphing and linear functions to help concepts make sense to students. Help your students be active problem solvers. Geared to middle school through freshman algebra.

•Probability, Part 1: After a short review of combinatorics, we will see problems and do activities related to the basic probability concepts (sample space, intersection, union, conditional probability, etc.). (You do not need to take Part 2 to take this workshop.)

Wednesday, August 2nd from 12:30pm to 3:30pm

•Intro to Desmos: Been hearing about Desmos but not sure what it is or where to start? Come to this workshop and learn about this free online, yet powerful, tool that is changing math education. Beginners welcome! (You will use your own laptop or tablet in this workshop.)

• Probability, Part 2: We will see problems and do activities related to probability concepts including conditional probability, expected value, combinatorial probability, and some geometric probability. (You do not need to take Part 1 to take this workshop.)

Thursday, August 3rd from 8:30am to 11:30am

•Desmos Activity Builder: Functions Come Alive: Come learn (or expand your learning) about Desmos activity builder. Students can create and interact with functions while teachers observe and respond to results in real-time. Focus will be on graphs, transformations, and graph matching of functions in a typical Algebra 2 class. (You will use your own laptop or tablet in this workshop.)

•Talking Trig: Explore some activities that help students build meaning to trigonometry and strengthen comprehension through conversation. During this workshop, sinusoids, unit circle, basic identies, and possibly polar coordinates will be played with and discussed.

Thursday, August 3rd from 12:30pm to 3:30pm

•Transformational Geometry: This workshop will look at the development of Transformational Geometry through technology. Although the instructor will use CABRI Geometry on the TI-Nspire calculator for demonstrations, any electronic platform that includes the transformational geometry tools can be used. Both the HOW of transformational geometry and the USE of transformational geometry will be discussed and explored. (While TI-Nspires will be available at the workshop, feel free to bring in your own device of choice. Participants will do best if somewhat familiar with the platform they decide to use).

•Teaching Calculus BC: This workshop will take a dive into some of those topics specific to AP Calculus BC, such as logistics, polars, parametrics, vectors, and even series. A heavy emphasis will be on AP free response questions. (If you are new to BC but want to try out the "deep end," feel free to jump in.)

MMC Election Results

By Patricia Trafton

Congratulations to our newest elected MMC members.

Mary Wiltjer was elected as the new President-Elect.

The following members are elected to the MMC Board of Directors and will be serving a 3 year term from 2017 - 2020:

- Susan Brown
- Serg Cvetkovic
- Peter DeCraene
- Sheila Hardin
- Matthew Moran

Thank you to everyone who was interested in running as well as every member who voted. If you have interest in running in a future election or would like to be involved in the orginization in another way, please contact Carrie Fraher at cfraher@glenbrook225.org for more information.

MMC Board Report

By Lynn Bond

The MMC Board of Directors met on May 21, 2017 at Pat Trafton's home. The 2016-17 Board wrapped up the year with various reports and with appreciation to departing members for their valuable service to MMC.

The 2017-18 Board convened, welcomed new members, elected officers, and appointed committee chairs. New positions include:

- Points and Angles Editor: Jeff Harding
- Conference of Workshops Coordinators: Nicolette Norris, Karen Lopez, and Rose Sterr
- Social Media: Nancy Powell
- Scholarship: Susan Brown
- ICTM/NCTM Liaison: Pat Trafton
- Community Relations: Serg Cvetkovic

The dinner speaker line-up for 2017-18 was presented. Summer Workshop details are being finalized. The MMC Conference of Workshops is planned for February 10, 2018. Speakers are needed, and those interested can fill out a speaker form online. The slate for Directors for next year's election is already under development. Contact Carrie Fraher if interested. More information on all of these events is available at mmcchicago.org.

The next Board meeting will be Wednesday, August 23, 2017 at 6:30 pm at Glenbrook South High School. MMC members are welcome to attend any Board meeting. Please contact Carrie Fraher if you plan to attend.

Online Interactions

"like" us on Facebook!

http://www.facebook.com/MMCChicago

Do you use Twitter?

Use #mmcchicago to tag your tweets and communicate with other MMC members on twitter!

MMC is now a charity on Amazon Smile. If you shop on Amazon, go to smile.amazon.com. This is the same Amazon website with the same products and prices, but a portion of the money spent goes to a charity of your choice. You can list "Metropolitan Mathematics Club Of Chicago" (not the MMC abbreviation) as your charity, and the MMC will get a donation every time you make a purchase.

MMC Membership and Change of Address Form

Mail completed form and check to:

MMC
7339 W. Ibsen St.
Chicago, IL 60631

NAME

PREFERRED CONTACT
Check one: ☐Home ☐Work

HOME ADDRESS

CITY | STATE | ZIP

HOME PHONE | HOME E-MAIL

EMPLOYER

WORK ADDRESS

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

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 $

TOTAL AMOUNT OF CHECK $

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

Make check payable to *MMC*

Upcoming Events

Index

Aug. 1 - 3	MMC Summer Workshops
Fri., Sept. 8	Po-Shen Loh
Fri., Oct. 27	Rico Gutstein
Fri., Dec. 15	Eugenia Cheng
Fri., Jan. 19	P.J. Karafiol
Sat., Feb 10	MMC Conference Of Workshops
Fri., Mar. 16	Esther Song
Fri., May 11	Zalman Usiskin

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.

Mailing Label

Metropolitan Mathematics Club of Chicago
c/o MMC
7339 W. Ibsen St.
Chicago, IL 60631

Stamp

MMC Summer Workshops 2017

MMC is offering a variety of 3-hour workshops this summer on August 1st, 2nd, and 3rd at Glenbrook South High School.

You can take any combination of workshops
(except two at the same time on the same day).

SCHEDULE OF WORKSHOPS

(Descriptions of Workshops on Page 5 in this Newsletter)

	Tuesday August 1st	**Wednesday August 2nd**	**Thursday August 3rd**
8:30am – 11:30am	• Geometry as a Problem Solving Course, Part 1 with John Benson • Teaching Calculus AB with Sheila Hardin	• Teaching Algebra with Carol Nenne • Teaching Probability, Part A with Rich Rukin	• Desmos Activity Builder: Functions Come Alive with Joe Karlovsky • Talking Trig with Cory Gilroy & Neva Curry
12:30pm – 3:30pm	• Geometry as a Problem Solving Course, Part 2 with John Benson • Coding with Ray Klein	• Intro to Desmos with Paul Christmas • Teaching Probability, Part B with Rich Rukin	• Transformational Geometry with Ray Klein • Teaching Calculus BC with Mary Wiltjer

*No workshop (even Parts 2 or B) require participation in another workshop.

- **All workshops are just $25 (for members) or $30 (for non-members).**
- **Take up to six over the 3 days or as few as one.**
- **To register complete the last page of this document and mail in (to given address) with a check made out to "MMC" for your complete registration.**

MMC SUMMER WORKSHOPS 2017

August 1st through August 3rd at Glenbrook South High School in Glenview

TO REGISTER YOU WILL NEED TO PRINT THIS PAGE & MAIL IT IN.

Complete the form below. Send form and check (made out to MMC) to address at the bottom of the page.

Circle clearly ALL the workshops you'd like to attend. (Only 1 at same time & date.)

	Tues, Aug 1st	Wed., Aug 2nd	Thur., Aug 3rd
8:30 – 11:30 am	**Geometry as ..., Part 1** **Teaching Calculus AB**	**Teaching Algebra** **Probability, Part A**	**Desmos Activity Builder** **Talking Trig**
12:30 – 3:30 pm	**Geometry as ..., Part 2** **Coding**	**Intro to Desmos** **Probability, Part B**	**Transformational Geometry** **Teaching Calculus BC**

DESCRIPTIONS OF WORKSHOPS ON PAGE 5 OF THIS NEWSLETTER.

TO REGISTER YOU WILL NEED TO PRINT THIS PAGE & MAIL IT IN.

Name _____

Home address _____

_____

City _____ State _____ Zip _____

Phone number _____

**Cell phone number _____

School _____

**Email (required)_____

****Because this takes place in early August, we need phone numbers and emails that we can reach you at in summer please.**

TOTAL NUMBER OF WORKSHOPS YOU ARE ATTENDING: _____

MEMBER COST PER WORKSHOP $25/ NON-MEMBER COST $30. COST PER WORKSHOP _x_____

YOUR TOTAL COST: _____

No purchase orders and No credit cards accepted. Only checks please.

Send check made out to **MMC** for the amount of your total cost to:

MMC
7339 W. Ibsen Street
Chicago, IL 60631

Any questions? Email Mary at **mwiltjer@glenbrook225.org .**

PLEASE SHARE THIS WITH OTHERS. ALL TEACHERS ARE WELCOME!!