

Points & Angles

Newsletter of the Metropolitan Mathematics Club of Chicago
Volume XLIV No. 9, June 2010

The 2010–2011 Friday Evening Program

Diane Briars
Micah Fogel
Henry (Hank) Kepner
Clark Kimberling
Ray Klein
Melendy Lovett
Dan Teague
Alan Zollman

BY DON PORZIO

Our year will open on September 10th with the current Past-President of NCTM, **Dr. Henry (Hank) Kepner**, who is likely to speak on the Common Core State Standards Initiative (CCSSI). Next up on October 1st will be **Dr. Clark Kimberling** of the University of Evansville, who has been maintaining the Encyclopedia of Triangle Centers (ETC) for many years now. Currently, nearly 3600 different triangle centers have been cataloged by Dr. Kimberling.

The December 10th meeting brings **Diane Briars**, president of the National Council of Supervisors of Mathematics (NCSM) and former Chicago area resident, back to town to discuss Leadership. Our final meeting is May 6th when **Melendy Lovett**, senior vice president of Texas Instruments and president of TI's worldwide Education Technology business.

The speakers for the remaining four meetings (order to be determined), on November 5th, January 14th, February 11th, and March 11th, are: **Dr. Dan Teague**, an Instructor of Mathematics at the North Carolina School of Science and Mathematics who has spoken twice previously at MMC; **Dr. Alan Zollman**, an Associate Professor at Northern Illinois University and also outgoing president of the School Science and Mathematics Association (SSMA); **Ray Klein**, now retired from Glenbard West High School after *many* years of teaching (though he still finds time to teach a class or two for NIU), who back in September 2002 at the MMC dinner meeting spoke about the TI-89, plans to talk about the TI-Nspire (CAS) calculator; and **Dr. Micah Fogel** of the Illinois Mathematics and Science Academy (you knew that I just had to bring in one of the "big guns" from my school).



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 10, 2010

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

Fountain Blue Banquets & Convention Center

2300 Mannheim Rd., Des Plaines
(847) 298-3636
\$34 for Members, \$39 for Nonmembers

Points from the Interior

BY DON PORZIO

Here's hoping that everyone's summer has started out well and that your batteries have started to recharge as you recover some from your efforts of the last school year.

I am very excited about our program for next year as, with some luck and a bit of arm twisting, I managed to gain commitments from a quite diverse range of speakers. As this issue of *Points & Angles* goes to press, I have not quite pinned down all 8 of next year's speakers to specific dates, nor have I received the titles of their presentation. That will just have to wait for our September issue. I can, however, give you names, a few dates and some idea of what topics the speakers may address.

Our year will open on September 10th with the current Past-President of NCTM, Dr. Henry (Hank) Kepner, followed on October 1st by Dr. Clark Kimber-

ling of the University of Evansville, who maintains the Encyclopedia of Triangle Centers. The December 10th meeting brings Diane Briars, current president of the National Council of Supervisors of Mathematics. The final confirmed date for one of next year's speakers is our final meeting on May 6th with Melendy Lovett, senior vice president of Texas Instruments and president of the TI's worldwide Education Technology business.

This leaves 4 meetings, on November 5th, January 14th, February 11th, and March 11th, where speakers are yet to be assigned. The speakers on those dates will be Dr. Dan Teague, Dr. Alan Zollman, Ray Klein, and Dr. Micah Fogel

More information about the speakers is on the front page of this issue and in the list of speakers on the following page. You'll learn more about all of these talks in the September *Points & Angles*. Until then, enjoy your summer everyone.

Our year will open on September 10th with the Past-President of NCTM, Dr. Henry (Hank) Kepner.



Points & Angles, Volume XLIV No. 9, June 2010

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2010–2011 Speakers

Diane Briars. Current president of the National Council of Supervisors of mathematics, speaking on Leadership, December 10, 2010.

Micah Fogel. Teaches at the Illinois Mathematics and Science Academy.

Henry (Hank) Kepner. Current Past-President of NCTM. Likely to speak on the Common Core State Standards Initiative (CCSSI), <http://www.corestandards.org/>, September 10, 2010.

Clark Kimberling. University of Evansville, maintains The Encyclopedia of Triangle Centers (ETC), <http://faculty.evansville.edu/ck6/encyclopedia/ETC.html>, October 1, 2010.

Ray Klein. Retired from Glenbard West High School. Likely to speak on the TI-Nspire (CAS) calculator.

Melendy Lovett. Senior vice president of Texas Instruments and president of TI's worldwide educational technology business, May 6, 2011.

Dan Teague. Instructor of Mathematics at the North Carolina School of Science and Mathematics.

Alan Zollman. Associate Professor of Mathematics Education in the Department of Mathematical Sciences at Northern Illinois University, outgoing president of the School Science and Mathematics Association (SSMA).

Board Report: 23 May 2010

BY STEVE VIKTORA

The Board of Directors met on 23 May 2010.

Sheila Hardin reported that the club seems to be in good financial health at present. We have not received the final bills for May yet, but it appears that the balance sheet for the year will be slightly in the black.

Mary Wiltjer reported a membership of 511, of whom 15 were first year members, 52 were retired members, and 54 were student members. She reported that not only were the student and first year members electronic members, but about 48 others were voluntary electronic members.

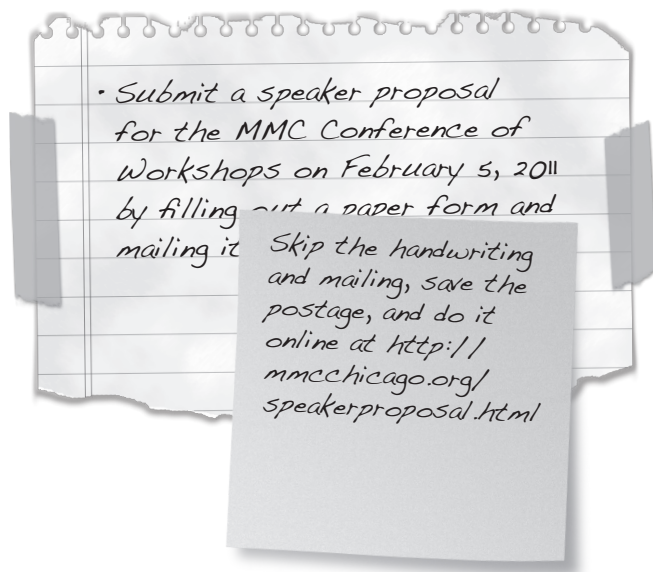
Don Porzio presented the list of speakers and dates for the meetings next year.

Mary Wiltjer and Carol Nenne reported that the date of the annual conference of workshops had to be changed to 5 February 2011. They appealed for people to volunteer to speak.

The MMC centennial year is 2013–2014, and the Board decided to begin planning for the celebration. Mary Wiltjer agreed to chair a task group to prepare for this festivity.

The next meeting of the Board is scheduled for 26 August 2010 at 6:00 PM at Braxton Seafood Grille in Oak Brook, IL. Members of the club are welcome to attend any Board meeting, but please contact Don Porzio at dporzio@imsa.edu before 19 August if you plan to attend. Because this is a dinner meeting, you would be expected to pay for your meal.

The MMC centennial year is 2013–2014.



The Shape of Geometry and the Geometry of Shape

By GEORGE PRYJMA

In 2001 we witnessed the dawning of a new millennium; humanity will wait a thousand years for the dawning of the next one. Halley's Comet visits our skies every 76 years—its next appearance is in 2062. Fortunately the Mathstar Usiskin comes to enlighten, edify, and entertain the May meeting of MMC every two years. A few weeks ago we were privileged and delighted to welcome Zalman for his 23rd MMC talk; the 15th every-other-year presentation since this wonderful tradition began in 1982.

Introduced as a man who needed no introduction, Zalman provided a very, very brief autobiography, The few readers who are not familiar with his plethora of accomplishments in mathematics education (a truly stellar career) may google Zalman Usiskin. I did and was greeted by 63 pages and 629 individual entries! Wow.

What is the shape (condition, health) of Geometry today in the United States? One way to measure it is asking, "How much are our students learning?" Amazingly, we know next to nothing about what our students know about Geometry. We do know that on international tests of mathematics, our students do poorly in Geometry and especially badly in measurement. If these topics were excluded from testing our students would easily rank in the top tier of mathematics students from developed nations.

Another measurement of the shape of Geometry is enrollment trends in Geometry. 40 years ago, 50% of students took Geometry; today that number

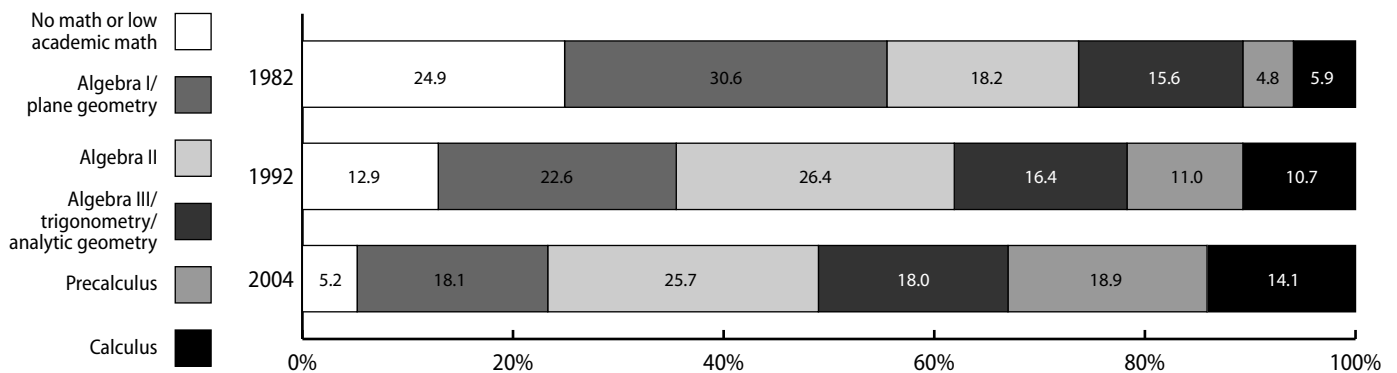
is 80%. What about how many students succeeded in Geometry well enough to continue their studies of mathematics? These data are encouraging. Whereas in 1982 44% took at least one mathematics course beyond Geometry, in 2004 that percentage rose to 77%. This increase was due in part to the raising of high school graduation requirements and more stringent requirements for admission to colleges and universities. The graph below provides a summary of mathematics courses enrollment trends.

Since we don't really know how much students learn in Geometry, we instead can examine the materials that students use in their study of Geometry. Because most Geometry is taught in a one-year course generally insulated from other topics and because teachers tend to follow their Geometry textbooks more closely than texts in other math courses, it may be easier to examine materials used to teach Geometry.

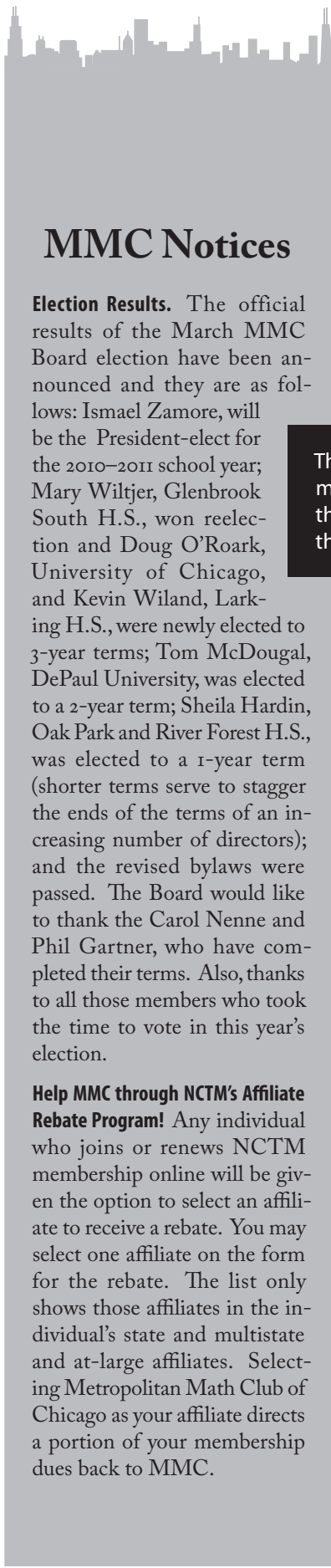
While algorithms in courses like Algebra must occur in a logical sequence (for example, solving linear equations must precede solving systems of linear equation), in Geometry various topics may be taught in varying orders. The substitute or student teacher may assume what has preceded the day's topic in Algebra class, but must find out what students have learned in preparation for the day's lesson in Geometry. Learning is very much facilitated by linking old knowledge to new.

So, what is the shape of Geometry textbooks?

Percentage of high school graduates who completed different levels of mathematics courses: 1982, 1992, and 2004



Data from: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88/92), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004." Quoted in Dalton, B., Ingels, S.J., Downing, J., and Bozick, R. (2007); *Advanced Mathematics and Science Course-taking in the Spring High School Senior Classes of 1982, 1992, and 2004* (NCES 2007-312); National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education; Washington, DC; p. 13.



MMC Notices

Election Results. The official results of the March MMC Board election have been announced and they are as follows: Ismael Zamore, will be the President-elect for the 2010–2011 school year; Mary Wiltjer, Glenbrook South H.S., won reelection and Doug O’Roark, University of Chicago, and Kevin Wiland, Lark-ing H.S., were newly elected to 3-year terms; Tom McDougal, DePaul University, was elected to a 2-year term; Sheila Hardin, Oak Park and River Forest H.S., was elected to a 1-year term (shorter terms serve to stagger the ends of the terms of an increasing number of directors); and the revised bylaws were passed. The Board would like to thank the Carol Nenne and Phil Gartner, who have completed their terms. Also, thanks to all those members who took the time to vote in this year’s election.

Help MMC through NCTM’s Affiliate Rebate Program! Any individual who joins or renews NCTM membership online will be given the option to select an affiliate to receive a rebate. You may select one affiliate on the form for the rebate. The list only shows those affiliates in the individual’s state and multistate and at-large affiliates. Selecting Metropolitan Math Club of Chicago as your affiliate directs a portion of your membership dues back to MMC.

Thanks to all those members who took the time to vote in this year’s election.

Of the 70 Geometry textbooks reviewed for this talk, the majority provide a formal treatment of congruence only for triangles and/or other polygons. In 28 other textbooks, other figures are defined as congruent. Regarding similarity, 28 state that similar figures have the same shape, 10 mention that all circles are similar, and the others limit the concept of similarity to polygons. Many students think that only polygons, segments, and angles can be congruent! While the theorems are virtually identical to those in textbooks written decades ago, often there is little attention given to the deductive system. One text gives an activity to help understand the concept of congruence, but never defines congruence. Another, in Chapter 4, states that figures are congruent if related by reflections, rotations, or translations, and promises these will be studied in Chapter 12. In Chapter 12, perhaps written by someone else in the committee of authors, there is no mention of these transformations. Some textbooks are an incoherent mixture of disconnected chapters with inconsistent content.

Do the Common Core Standards (CCS) give hope for improvement? While the CCS do include coordinates, transformations, and modeling in Geometry, they sadly omit the structure of Geometry. While a standard states, “Prove theorems about lines and angles,” and lists theorems including those related to parallel lines crossed by a transversal, how can students prove these if the words *postulate*, *axiom*, and *assumptions* are not even mentioned in the standards? Zalman, however, does love the standard, “Understand that criteria for triangle congruence (ASA, SAS, and SSS) can be established using rigid motions.” He is thrilled that, “Finally, after 40 years, a national body in the U.S. recognizes that transformations are a pathway to fundamental ideas in geometry.”

Quoting Professor Usiskin, “So, if you are asking me to summarize the current shape of school geometry, I would say that the ingredients for an extraordinary experience are in most of our books and in the common core standards, but recipes for putting the ingredients all together are not common knowledge. I do not fault the authors of these books and writers of the CCS for not being able to put it all together—it is only relatively recently in historical terms that transformations, applications, coordinates, and geometry technology have been viewed as ingredients in the geometry classroom important enough to be part of the fundamental framework of the course, and not just

See May Talk Summary, page 6

May Talk Summary, continued from page 5

cute add-ons to satisfy some special interests.”

In the second part of the talk, Zalman convinced us that, “the geometrical idea of shape provides a way of conceptualizing the geometry experience—a conceptual glue, if not a logical glue for seeing how the four ideas—transformations, applications, coordinates, and technology (TACT)—determine the value of a geometry course in today’s world and with today’s mathematics.” There are 3 distinct geometrical definitions of *shape*: synonym for *figure*; type of figure (example: the *shape* of a window is rectangular); *shape* as a property of similar figures (two figures have the same shape if and only if they are similar, congruent if they have the same *shape* and size).

The major advantage of transformation definitions of congruence and similarity is that neither concept is restricted to segments, angles, triangles, and other polygons. Individual definitions for congruence or similarity of figures are no longer needed. The (novel to students of traditional Geometry texts) theorem that all parabolas are similar can be easily proven using appropriate distance-multiplying transformations. No special parabola-specific theorem or definition is needed. Similarly, transformation proofs are available for theorems that all exponential and logarithmic curves are similar and those of the same base are congruent!

In the 1970s two powerful theorems about graph-

ing were introduced by Coxford and Usiskin to mathematics textbooks: the Graph Translation Theorem and the Graph Scale-Change Theorem.

The Graph Translation Theorem. In a relation described by a sentence in x and y , the following two processes yield the same graph:

- (1) replacing x by $x - h$ and y by $y - k$; and
- (2) applying the translation

$$T(x, y) = (x + h, y - k) \text{ to the graph of the original relation.}$$

Because translation is a distance-preserving transformation, students may deduce that certain ellipses are congruent and that the sine and cosine graphs are congruent, et cetera.

Examples of some corollaries that follow from the Graph-Translation Theorem are listed below, at the left.

The Graph Scale-Change Theorem. In a relation described by a sentence in x and y , the following two processes yield the same graph:

- (1) replacing x by $\frac{x}{a}$ and y by $\frac{y}{b}$; and
- (2) applying the scale change

$$T(x, y) = (ax, by) \text{ to the graph of the original relation.}$$

As is the case with the Graph Translation Theorem, this is a powerful theorem with many useful corollaries that are important precursors for the study of integrals in calculus and assist in the understanding of graphs of all functions.

Dr. Usiskin stated, “You may now see where I am going in this talk. I began by noting that geometry courses today lack cohesion. Transformations bring cohesion to the geometry course by providing a concept that unifies the ideas of congruence and similarity. They also do something else that relates to shape—they get you thinking about figures as a whole, something that is often lost when approaches solely have students thinking about the sides and angles of figures.”

M.C. Escher, in his tessellations of lizards, birds, and other non-polygonal shapes, showed that congruent figures need not be the standard shapes of Geometry nor need they be described by equations.

While teaching an “Applications of Geometry”

Corollaries that follow from the Graph-Translation Theorem

Shape of graph	Parent	Offspring (image)
line	$y = mx$	$y - y_0 = m(x - x_0)$ (Point-Slope)
line	$y = mx$	$y - b = mx$ (Slope-Intercept)
circle	$x^2 + y^2 = r^2$	$(x - h)^2 + (y - k)^2 = r^2$
parabola	$y = ax^2$	$y - k = a(x - h)^2$
sine wave	$y = \sin x$	$y = \sin(x - c)$
parabola intercepts	$ax^2 = c$ $\Leftrightarrow x = \pm \sqrt{\frac{c}{a}}$	$a(x - h)^2 = c$ $\Leftrightarrow x = h \pm \sqrt{\frac{c}{a}}$ (Quadratic Formula)
exponential	$y = b^x$	$y = ab^x$
logarithmic	$y = \log_b(x)$	$y = \log_b(ax)$

course early in his career, Zalman had his students go outside and identify geometric figures. He expected they and he would see tires as circles and lamp posts as cylinders. Instead they saw that the weight of a car caused its tires to be oblate, lamp posts that were tapered and bent frustums of cones, and car windows that were not rectangles. "For the first time I saw the world in the detail somewhat like an artist sees the world, and it hit me that every physical object is a geometric object." We simply don't have names for all these objects.

The availability of drawing technology (Dynamic Geometry software like Cabri, Geogebra, or Geometer's Sketchpad) is a major innovation that has implications for what we mean by shape. Dr. Usiskin provided a variety of examples, including the validity of Varignon's Theorem for a "quadrilateral" with overlapping sides! Students should use these dynamic tools to discover theorems that are not visually obvious and that are not traditional theorems. For example, students may discover that in an equilateral triangle the sum of the distances from any interior point to the three sides equals the length of the triangle's altitude.

Professor Usiskin concluded his superb talk saying, "A geometry course that integrates transformations, coordinates, applications, and technology in these ways will have shown students that the shapes of geometry and the important concepts of congruence and similarity include all figures, drawings, and graphs, both abstract and real. It is more likely to have coherence and relevance. The types of shapes that are studied in a geometry course are a measure of the shape that the course is in; the more shapes that the geometry covers and the more ideas that relate to the shapes of figures, the better the shape of the geometry." He then thanked MMC for giving him the honor of again being invited to speak to us.

I thank Zalman very much for providing me with both the text of his scholarly talk and the supporting PowerPoint slides. The talk was received enthusiastically and the Fountain Blue had to set up 4 additional tables to accommodate the overflow crowd anxious to hear Zalman speak!

Upcoming Event Details

**USACAS6, New Trier High School,
Northfield Campus, Northfield, IL,
June 26–27.** Sixth U.S.
conference on CAS.
Registration is \$250.
<http://usacas.org/6>



**MMC Summer Workshops, Glenbrook
South High School, Glenview, IL, Au-
gust 2–4.** What are the most im-
portant concepts in the courses
you teach? What are some
effective ways for students to
learn these concepts? Spend
some time this summer explor-
ing answers to these questions.
This is a rich opportunity for
newer educators to learn how to
tackle teaching Algebra, Geom-
etry, or Algebra II. From activi-
ties to theory, from hands-on
to technology, from content to
curriculum, learn from some of
Chicago's best teachers.
<http://mmcchicago.org/>



Scholarship

BY ISMAEL ZAMORA

Bryan Ciesiulka was this year's MMC scholarship winner. Bryan was nominated by James Fox and attends Nequa Valley High school. He plans to attend Marquette University this fall and pursue math education.

Kelly Malinowski and Natasha Tharwani were our Filliman Scholarship winners. Kelly was nominated by William Roloff and attends Lake Park High School. She plans to attend the University of Illinois this fall. Natasha is currently a student at New Trier High School and was nominated by Pat Bowler-Johnson. Natasha will be attending the University of California, Berkeley this fall.

Congratulations to this year's Scholarship winners. Thanks to Timothy Filliman and his wife Deana for attending and presenting the Filliman scholarship awards, to the Filliman Family for their continued support of MMC, and to Texas Instruments for awarding our winners new TI-Nspire CAS calculators and for covering the cost of the dinners for our winning families. Special thanks go out to the selection committee for all their hard work in helping select our winner. The members of the committee are George Pryjma, Linda Korbus, Lisa Parker and Christina Bennett. Also thanks to everyone who donated to the scholarship fund and continues to support our future math educators.

Winners:

- Bryan Ciesiulka
- Kelly Malinowski
- Natasha Tharwani

Moving Forward on Many Fronts

BY HENRY (HANK) KEPNER

This is a pivotal time in the evolution of mathematics education. The world of mathematics is expanding rapidly, with new areas of knowledge and applications finding their way into every corner of our daily lives. And as individuals enter the workforce, their competence in mathematics must increase at the same rate.

The challenge—and one that NCTM gladly accepts—is to provide a pathway to mathematical competence for both present and future generations.

NCTM has made a commitment to expand its focus on reasoning and sense making to support teachers in preparing students to reason, conjecture, and justify at every stage of their math journey. Reasoning and sense making will be emphasized in NCTM's upcoming publications and professional development. A new focused initiative on high school mathematics will include materials on reasoning in statistics and probability, algebra, and geometry. This initiative will foster expanded perspectives on the role of reasoning for all students—not just students in the science, technology, engineering, and mathematic fields—and a focused look at the role of various technologies in a learner's reasoning process.

Although the primary focus of NCTM's reasoning effort is on high school and preparation for college and career, the Council's work recognizes the importance of emphasizing reasoning and sense making in mathematics for all students, from prekindergarten through postsecondary experiences.

At the same time, the Council's focus on equity continues to generate a set of resources and strategies for all teachers of mathematics. In addition, a call for research will enable the Council to present several of these efforts on the NCTM Web site in the coming year. Equity is a complex area, and we cannot afford to count out students early in their search for mathematical competence or careers. Just as basketball coaches look for signs of athletic promise and budding talent in children in the elementary grades, we must make every effort to reach and nurture students who will learn more as they mature and are given opportunities to explore their developing interests.

The Common Core State Standards Initiative, launched by the National Governors Association and the Council of Chief State School Officers, began in partnership with the College Board, ACT, and Achieve, Inc. Although teacher organizations were not initially involved, NCTM has provided extensive feedback to the standards writers through numerous means since the first stages of development. The Com-

mon Core State Standards Initiative has provoked extensive discussions within the mathematics education community and beyond. Not all of NCTM's recommendations have been incorporated in the current draft, but rest assured that NCTM will be a major player in helping teachers interpret these standards and prepare for their effective implementation if they are adopted. The latest draft includes almost all of the mathematical and statistical content in NCTM's landmark *Principles and Standards for School Mathematics*. However, concerns remain about grade placement and some student learning trajectories on key concepts. NCTM is working to increase the prominence that the Common Core State Standards give to the Standards of Mathematical Practice—an im-

portant component that addresses NCTM's Process Standards for problem solving, reasoning and proof, connections, representation, and communication.

The Council is moving forward to identify instructional approaches and strategies that will give students access to the technology that is an important tool in learning mathematics, as well as an indispensable tool when they enter college and consider career options. In almost every discipline and career, technology is an essential tool for executing mathematical tasks. It is our job to prepare students to use technology strategically in doing mathematics.

President's Corner column from the April 2010 NCTM News Bulletin, reprinted with permission.

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HOME PHONE	ZIP
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WORK ADDRESS	
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<small>FORM USE</small> Check one: <input type="checkbox"/> New Membership <input type="checkbox"/> Renewal <input type="checkbox"/> Former Member <input type="checkbox"/> Change of Address	<small>MEMBERSHIP COST</small> \$ <small>DONATIONS</small> <small>SCHOLARSHIP FUND</small> \$ <small>SPEAKER FUND</small> \$ TOTAL AMOUNT OF CHECK \$

Make check payable to MMC

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MMC

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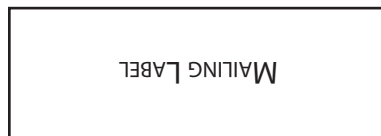


Upcoming Events

- | | | |
|-----------------------|--|---------------------------------------|
| <i>Jun. 15–17</i> | <i>Deerfield, IL</i> | <i>T³ Summer Workshops</i> |
| <i>Jun. 26–27</i> | <i>Northfield, IL</i> | <i>USACAS6</i> |
| <i>Aug. 2–4</i> | <i>Glenbrook South H.S.</i> | <i>MMC Summer Workshops</i> |
| <i>Fri., Sept. 10</i> | <i>Hank Kepner (see 2010–2011 Speakers, page 3)</i> | |
| <i>Fri., Oct. 1</i> | <i>Clark Kimberling (see 2010–2011 Speakers, page 3)</i> | |
| <i>Oct. 15–16</i> | <i>Springfield, IL</i> | <i>ICTM Annual Meeting</i> |
| <i>Fri., Nov. 5</i> | <i>Speaker TBD (see 2010–2011 Speakers, page 3)</i> | |
| <i>Fri., Dec. 10</i> | <i>Diane Briars (see 2010–2011 Speakers, page 3)</i> | |
| <i>Fri., Jan. 14</i> | <i>Speaker TBD (see 2010–2011 Speakers, page 3)</i> | |
| <i>Sat., Feb. 5</i> | <i>Adlai Stevenson H.S.</i> | <i>MMC Conference of Workshops</i> |
| <i>Fri., Feb. 11</i> | <i>Speaker TBD (see 2010–2011 Speakers, page 3)</i> | |
| <i>Fri., Mar. 11</i> | <i>Speaker TBD (see 2010–2011 Speakers, page 3)</i> | |
| <i>Fri., May 6</i> | <i>Melendy Lovett (see 2010–2011 Speakers, page 3)</i> | |
| | <i>(See also “Upcoming Event Details” on page 7)</i> | |

Send upcoming event items to ilg@chicagomath.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.



METROPOLITAN MATHEMATICS CLUB OF CHICAGO
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