

# POINTS AND ANGLES

Newsletter of the Metropolitan  
Mathematics Club of Chicago

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Metropolitan  
Mathematics  
Club of  
Chicago



Volume XL

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No. 6

## Using Dynamic Technology to Investigate Intriguing Real World Questions

Kristen Clegg

By RICH RUKIN

The learning of mathematics can be very powerful when it comes from a student's natural curiosity and desire to explore. The world around us is the perfect catalyst for posing some of the most intriguing questions. When students are provided with the opportunity to explore these situations through the use of dynamic technology, they can take this exploration to a much deeper level. Through dragging and manipulating data, shapes, tables and formulas, students can really dig into "what if" questions and can begin to make visual conjectures about some very essential mathematical concepts. At the February meeting, Kristen Clegg will be sharing with us this world of dynamic mathematical explorations.

Kristen Clegg is a National Board Certified Teacher in mathematics. She taught math at both the middle and high school levels for eight years in Schaumburg and now works full time as an educational consultant. Throughout her classroom experience, she infused engaging activities into her teaching of various levels of mathematics spanning from pre-algebra through AP Statistics. Kristen holds a Masters in Curriculum Development from DePaul University with a focus on constructivist learning in mathematics. Kristen's consulting experience began as a national trainer of dynamic math software and has now evolved into consulting independently and with numerous educational companies in an effort to help educators learn how to engage students in powerful learning experiences. For the past five years, Kristen has developed and presented summer week long workshops for teachers from around the Chicagoland area focusing on various methods of creating engaging mathematics classrooms. She is also a regular presenter at ICTM, MMC, NCTM, and numerous educational conferences and workshops.

We would like to thank Prentice Hall Publishing for sponsoring the February meeting. They will be providing complimentary hors d'oeuvres on February 10.

REMEMBER!! You can earn CPDU credits for attending dinner meetings!

Date: Friday, February 10, 2006  
Time: 5:30 p.m. Doors Open  
6:00 p.m. Social Hour  
7:00 p.m. Dinner and Talk  
Place: Fountain Blue Banquets &  
Convention Center  
2300 Mannheim Rd.  
Des Plaines, IL  
(847) 298-3636  
Cost: Members \$31  
Nonmembers \$37

RESERVATION DEADLINE  
Monday, February 6th, by noon,  
please!

To RESERVE:  
Call Evanston Math Department at  
(847) 424-7600 or  
email: [reservations@mmcchicago.org](mailto:reservations@mmcchicago.org)  
Requests for special meals must be made  
in advance.



From Southbound I-294 &  
Eastbound I-290:  
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; Exit at  
Touhy Ave. & Lee Rd.; Walk East on Touhy  
to Mannheim Rd.

Future Meetings:  
March 10, May 5

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## Points from the Interior

BY JOHN DIEHL

Greetings! I hope you were able to attend our January meeting and hear Robin and Tim share thoughts on The Rules of Engagement. Also, I am so pleased that we had over 500 attendees at our MMC Saturday workshop. I hope you are planning to join us for the February meeting. Kristen is always informative and an outstanding speaker. Please see additional information in this newsletter on all three of these events.

Robin and Kristen were, of course, speakers from our own MMC membership, as were so many of the presenters at the Saturday workshop. It is very gratifying to see the talents of our members at work. We should also extend a big thanks to those who made the Saturday workshop. Thank you, Mary and Carol for being Conference Chairs, and Gwen for being the site

coordinator, and to everyone else who helped plan, publicize, organize, or speak. It once again shows the power of our MMC to do great things for mathematics education.

The fact that we have done so much for our profession leads me to suggest a challenge to us as individuals and as an organization. My challenge is to continue to promote mathematics. Not just to teachers, or future teachers, or to the honors students...but to everyone. Let's celebrate the discipline and promote it.

For example, I am pleased to see the television program, Numb3rs, has become popular. The show portrays the mathematician in a very positive way, and contributing in a very important way. I hope we too can portray mathematicians in a positive way. And if you can incorporate the show in some way to reinforce the view, that's an extra bonus.

I am also enjoying the way that the number puzzles, Sudoku, have become so popular. Now, I know these puzzles don't require higher mathematics, but let's face it: a number puzzle requiring logical deduction is becoming very popular, and not with just math persons. Check out the number of books and magazines at your local bookstore! I see this as another chance to promote mathematics for enjoyment and logical thinking as an enjoyable recreation!

So whether it be one of these new interests, an old favorite, or another new idea, let's all try to promote mathematics and mathematicians in a positive way. What is one of the best? Simply this: be proud of what you do! Share your enthusiasm with students, parents, friends, and colleagues!

Hope to see you and the next meeting...and be enthusiastic!

John

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# The Rules of Engagement

Robin Levine-Wissing and Tim Wierenga

January 13, 2006

BY ILENE HAMILTON AND RAY KLEIN

On Friday January 13th, the MMC was LUCKY to be treated to a rendition of “The Rules of Engagement”; not the movie version starring Samuel Jackson and Tommy Lee Jones but rather the classroom version starring Robin Levine-Wissing and Tim Wierenga. Robin related that when Tim evaluated her teaching at Naperville North, it was the first time she had been evaluated not with regard to what she was doing but rather as to what the students were doing in the classroom. She stated that her teaching began to change at this time. The “rules” that she and Tim espoused were:

- \* When students are engaged, they are in control.
- \* Discussions and questions should involve all students in higher-order thought processes.
- \* Students should take ownership of assessment information.

Six levels of student engagement were explained, relating to student-engaged instruction, teacher-directed instruction, and teacher-disengagement from instruction. The audience was then asked to examine video clips (many humorously staged) and analyze which levels were represented. Toward this end, it was explained that teacher directions to assignments, either verbal or written, can have a large impact on which level is attained. Another audience activity emphasized how this could be accomplished. This led to a lively audience discussion concerning the effects of group-work on student learning.

The discussion then moved to techniques of student engagement in exploring problem solving strategies. A number of techniques were given; in each case the emphasis was on moving away from teacher controlled activities towards student controlled activities. This involved group reflections, group discussions, and student explanations of their strategies and led naturally to techniques used for student engagement in test preparation.

Another audience activity involving preparation for the Advanced Placement Statistics test was presented. The students, like the audience, were asked to solve an AP problem and then examine sample solutions to this problem. Given the scoring rubric, the students were then asked to grade each of the sample solutions and state reasons for their scores. The grades and reasons were then compared within their groups. Success stories from Robin’s classes were shared.

In all of the examples presented during the evening and in all student engaged activity, it was emphasized that student reflection was of utmost importance. At the end of class, students need to reflect on where they presently are, where they need to be, and how they can close that gap. This allows students to take ownership of their work and their learning.

The audience of MMC enjoyed a delightful discussion about the teaching of mathematics. The interaction with the audience was lively, and the insight given by these two veteran teachers was invaluable. We were indeed LUCKY on this Friday the 13th to be treated to a wonderful presentation.

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POINTS AND ANGLES

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The official club website: <http://www.mmcchicago.org/>

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## RESULTS OF MMC MATH CONTEST NO. 21 Frequent Flyer Freddie's Flights

The goal of this year's contest, found in the December 2005 *Points and Angles*, was to create the longest possible route starting and ending at  $(0,0)$  that stops at each of the other 99 lattice points in and on the square with vertices  $(0,0)$ ,  $(9,0)$ ,  $(9,9)$ , and  $(0,9)$ , and such that no leg of the route contains (passes over) another point of the route.

Only seven entries were received by the deadline. Two other entries were received late. One of these entries, knowingly sent in 4 days late, would have won the contest. So we distinguish between the *winning entries* and the *best entry*. The small number may have been due to the fact that the contest deadline was at a time when some schools were not yet back in session after the holiday break. Also, the contest itself was hidden inside the December issue and may have been overlooked by many people. And, of course, the problem itself may have seemed daunting.

The entries' total lengths were very close. The three winning entries:  
First prize (\$100): Emily Hyun, a 9th-grader at New Trier H.S, total length 747.76.  
Second prize (\$60): Dennis Kriventsov, a junior at IMSA, 744.52.  
Third prize (\$40): Calliope Nicolandis's Freshman Alg. 2 Class, New Trier H.S., 740.31.

The best entry, by Daniel Summerhays, a sophomore at Duke University, and his father John, is on the next page. Its total is 755.49.

Honorable mention goes to Anjulich Gang, a 9th-grader at Stevenson H.S., with a length of 738.56. The three other on-time entries had total lengths of 664.32, 195.11, and 74. The surprisingly low score of 74 is due to a careless error on the entry form, for the rest of the entry indicates that the sum would have been 742.67 if calculated and recorded correctly. The other late entry had a total of 739.65.

We hope that all of you who worked on this contest or used it in your classes found it to be a fun activity. Please address any comments to Zalman Usiskin, University of Chicago, 6030 S. Ellis, Chicago, IL 60637.

MMC Contest No. 21  
Daniel and John Summerhays' best entry

(0,9)•21	•15	•17	•13	•11	•7	•9	•5	•1	•3 (9,9)
•19	•50	•48	•44	•46	•42	•40	•38	•34	•36
•23	•52	•77	•73	•71	•69	•65	•67	•63	•32
•27	•54	•75	•90	•88	•86	•84	•80	•61	•30
•25	•56	•79	•94	•92	•97	•99	•82	•59	•28
•29	•60	•81	•96	•98	•93	•91	•78	•57	•26
•33	•58	•83	•87	•85	•89	•95	•76	•55	•24
•31	•62	•64	•66	•68	•72	•70	•74	•51	•22
•35	•37	•39	•41	•43	•45	•47	•49	•53	•20
(0,0)•0=100•2	•4	•6	•8	•10	•12	•14	•16	•18 (9,0)	

There are only 27 lengths of legs possible fitting the constraints of the contest. The frequencies of these lengths in the Summerhays' entry are in the following table.

Length	1	$\sqrt{2}$	$\sqrt{5}$	$\sqrt{10}$	$\sqrt{13}$	$\sqrt{17}$	5	$\sqrt{26}$	$\sqrt{29}$
Frequency	0	2	4	4	5	0	1	6	4
Length	$\sqrt{34}$	$\sqrt{37}$	$\sqrt{41}$	$\sqrt{50}$	$\sqrt{53}$	$\sqrt{58}$	$\sqrt{61}$	$\sqrt{65}$	$\sqrt{73}$
Frequency	4	0	5	6	6	2	2	3	0
Length	$\sqrt{74}$	$\sqrt{82}$	$\sqrt{85}$	$\sqrt{89}$	$\sqrt{97}$	$\sqrt{106}$	$\sqrt{113}$	$\sqrt{130}$	$\sqrt{145}$
Frequency	5	6	10	1	6	5	2	6	5

## MMC Problems for February

Three lines in a plane that intersect at the same point are said to be concurrent. This is particularly interesting to some of us when the lines contain the vertices of a triangle. The ancient Greeks had discovered three cases of concurrence: (1) the medians (at the centroid), (2) the angle bisectors (at the incenter), and (3) the altitudes (at the orthocenter). One other case of concurrence, but not through the vertices, was known; i.e., the perpendicular bisectors of the sides (at the circumcenter). Lines through the circumcenter can be drawn through the vertices to make this point like the other three.

For each point four other associated points of concurrence can be created. For  $\triangle ABC$  with point  $P$  on  $AB$ ,  $Q$  on  $BC$ , and  $R$  on  $CA$  with  $CP$ ,  $AQ$ , and  $BR$  concurrent at  $X$ . Prove the following:

(A) Construct parallels through  $P$  to  $BC$  intersecting  $AC$  at  $K$ , through  $Q$  to  $AC$  intersecting  $AB$  at  $M$ , and through  $R$  to  $AC$  intersecting  $BC$  at  $N$ . Prove:  $AN$ ,  $BK$ , and  $CM$  are concurrent. Repeat but construct the parallels through  $P$ ,  $Q$ , and  $R$  to the other available sides. This produces two more points of concurrence associated with  $X$ .

(B) Let  $E$ ,  $F$ , and  $G$  be the midpoints of  $AB$ ,  $BC$ , and  $AC$  respectively. Reflect  $P$ ,  $Q$ , and  $R$  in the midpoint of their respective sides to produce  $T$ ,  $U$ , and  $V$ . Prove:  $CT$ ,  $AU$ , and  $BV$  are concurrent. (This point is called the isotomic conjugate of  $X$ .)

(C) Reflect  $CP$  in the angle bisector of  $\angle ACB$  to intersect  $AB$  at  $E$ , reflect  $BR$  in the angle bisector of  $\angle ABC$  to intersect  $AC$  at  $F$ , and reflect  $AQ$  in the angle bisector of  $\angle CAB$  to intersect  $CB$  at  $G$ . Prove:  $CE$ ,  $BF$ , and  $AG$  are concurrent (This point is called the isogonal conjugate of  $X$ ).

Michael Keyton  
keyton@imsa.edu

## MMC Conference of Workshops

**On January 28<sup>th</sup>, another great conference was had, & we know who's to blame for that!**  
**All the speakers** (because what would there be if you weren't so generous with your time and talents),  
**the attendees** (because with whom do you share if you're not there),  
**Paul Christmas** (because materials really are important),  
**Isaac Greenspan** (because without the forms and the mailings how would you even know to come),  
**all the volunteers** (because how would we get our folders and such),  
**Hinsdale Central High School** (because it would be really cold without a warm, generous place),  
**Gwen Zimmermann** (because without her there would be no Hinsdale and all the wonderful things that happened there, including lunch, technology, lights, etc.),  
 and our hero, **John McConnell**, without whom we couldn't do our job).  
 (If we forgot you, sorry ... but still thanks so much!)

-Carol & Mary

Once again, MMC is sponsoring a \$1000 scholarship to a graduating high school senior who intends to become a mathematics teacher. Students must be sponsored by a current member of MMC. The application should be sent along with an official school transcript, a letter of recommendation from the sponsoring teacher, and an essay explaining why he or she wants to become a mathematics teacher. The application and guidelines are posted on the web site at [www.mmcchicago.org](http://www.mmcchicago.org). The winning student and his or her parents will be invited to the May 2006 dinner meeting to receive the award.

All materials are due by March 17, 2006 and should be sent to:

Phil Gartner  
 Glenbrook South High School  
 4000 W. Lake Ave  
 Glenview, IL 60026

MMC Membership and Change of Address Form

Mail to: MMC  
 415 S. Ridgeland Ave. #2  
 Oak Park, IL 60302

Make check payable to MMC.

Please use a different form for each person.

Name \_\_\_\_\_

Membership:     New  Renewal

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Choose one:

1 year                      (\$20)                      \_\_\_\_\_

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3 year                         (\$50)                      \_\_\_\_\_

Phone \_\_\_\_\_

1<sup>st</sup> year teacher           

School \_\_\_\_\_

retired                         (\$10)                      \_\_\_\_\_

Address  \_\_\_\_\_

student                       

Phone \_\_\_\_\_

Donations:

Scholarship Fund                      \_\_\_\_\_

E-Mail \_\_\_\_\_

Speaker Fund                              \_\_\_\_\_

Check preferred mailing address above.

Total amount of check:                      \_\_\_\_\_

Change of Address

# NOTICES & REMINDERS



WE NEED YOU! VOLUNTEER!!

Volunteer to help at the NCTM Regional Meeting in Chicago September 20-22, 2006

It takes great people like you to make the conference a success! Contact either Gwen Zimmermann (gzimmerm@hinsdale86.org) or Laura DiMarco (ldimarco@hinsdale86.org) for more information. (or phone 630.570.8421)

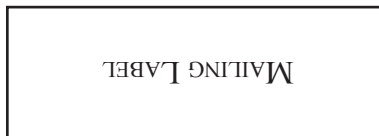
## NCTM ANNUAL MEETING

April 26 -29

St. Louis, Missouri

If you would like a notice or reminder to appear in POINTS AND ANGLES, please email the text you would like to appear to kristenclegg@comcast.net no later than the date of the MMC meeting preceding the issue in which you would like it to appear. All notices are subject to editing.

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



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