POINTS AND ANGLES

Newsletter of the Metropolitan Mathematics Club of Chicago

NCTM Charter 1 Metropolitan Mathematics Club of Chicago 1913

Volume XXXIX February 2005 No. 6

How Multiple Exciting Technologies have Impacted Student Learning

Tom Reardon

BY JOHN DIEHL

Be sure to attend our February dinner featuring a great presentation by Tom Reardon. Tom plans to share how technologies have changed his teaching and has impacted student learning. Tom will illustrate the new TI graphing calculator emulator that he helped to develop. He will also illustrate how SMART Boards have positively impacted his teaching methods and student achievement. Also, Tom will discuss other technologies that have made his classroom more interesting and mathematically powerful.

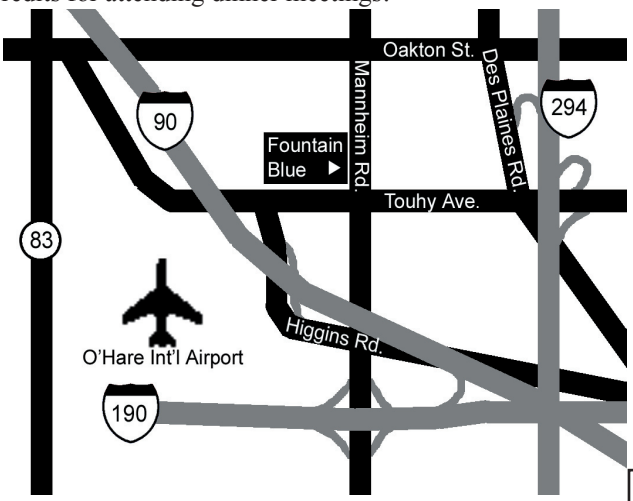
Tom is in his 31st year at Austintown Fitch High school, the12th year as Department Chair, as well as his 25th year at Youngstown State University. He has recently published *How to prepare for the Ohio Graduation Test in Mathematics* by Barron's Publications. Tom has helped develop the TI-84 emulator software and the Symbolic Math Guide -- a TI software APP that assists students to learn algebra.

Don't miss this opportunity to see some of the latest technology.

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

Date: Friday, February 11, 2005
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 7, by noon, please!
TO RESERVE:
Call Lee Ann Swanson at (630) 570-8421 or email: lswanson@hinsdale86.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 11, May 13

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Points from the Interior

Teachers As Political Advocates

BY GWEN ZIMMERMANN

If you subscribe to Jerry Becker's listserv, you probably saw the article that discussed one person's belief that the best measure of how successful public education has been is the SAT. Basically, an analysis of SAT scores over time indicates that last year's results were some of the highest in 30 years. Mathematics scores were the highest in 36 years! This is in spite of the fact that more students from diverse backgrounds took the SAT than ever before. So why is it that teachers are frequently targeted by the public, the media, and government officials as "lazy" and schools are considered to be "failing" our youth?

We all know that these claims ignore the fact that our student populations are diverse, funding is inequitable and inadequate, and we are asked to do so much more than "teach" our students. Regardless of the benchmark that is used to measure the effectiveness of public education, as a community, teachers are not very good at advocating for ourselves. Of course, part of this is due to the fact we have so little time after our professional responsibilities. But the fact remains, if we do not advocate for ourselves, who will?

After choosing to avoid the political front for many years, NCTM has begun to develop position papers that address some of the hot topics, such as "high quality" education, basic skills, and high stakes testing to name a few. They have even gone so far as to prepare an "Advocacy Toolkit." (The Advocacy Toolkit is available at no charge from NCTM. Go to nctm.org for more information.)

So how does one become an advocate for mathematics education? First, we must stay informed. It is difficult to speak to others about current issues if we are not knowledgeable about what those issues are. Next, be proactive and choose your audience. This can be done by making a presentation to your local Board about NCTM's Principles and Standards or informing a group of parents what research supports as best practice. Consider providing the local media with news releases when the mathematics team does well or students are doing a unique mathematics project in your class. Advise the local media when you present a workshop at a conference or when you receive recognition for your work as a teacher. Another way to be an advocate is to write a letter in support or rebuttal to an editorial in the paper. In this way you are helping provide information about mathematics education that may not otherwise be known.

We have a choice to make. We can continue to read about "education bashing" and wish the public better understood mathematics education. Or we can become advocates for ourselves and educate the public about the reality of what is important and what is really happening in many of our classrooms. Let's spread the word about the great things we do.

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

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Challenging the Mathematically Gifted

Susan Brown and Virginia Highstone, York High School

presented to MMC on 1/14/2005

BY HARLAN GOLDBERG

Although the weather was cold on this night, Mary Witjer's introduction of her colleagues warmed the room. Mary said that she has always been impressed with Sue and Virginia because any conversation they have in mathematics continues. The two women shared the fruits of these conversations with us tonight.

How can we challenge the gifted? Their research and practice lead to the following conclusions:

- Pose tasks the students don't know how to do.
- Call on resources which are not purely mathematical.
- Engage students' preferred thinking modes of generalization, abstraction, and analysis.

How can this be done? Is acceleration of students enough? "No!" was their response. Students tend to miss too much math and the connections which result. In time, they also tend to broaden and develop other interests. It is also felt that "speeding up" does not lend itself to engaging girls' thinking styles.

What would work? First, one has to characterize what a "gifted" student is. It's not just the kid who knows all the answers and enjoys school, but ones like Bill Gates, for example, who asks questions, enjoys learning, is persistent and resourceful, and has a preference for the complex. The gifted are thinkers with an innate sense of justice and who are lovers of the truth. How can we tend to the needs of these individuals?

After posing brief descriptions of four types of students—from the "cheerleader" type to the "body- pierced" rebel, our presenters asked the group to vote on who we would recommend to the gifted program. As it turns out, all four qualify. We were informed that these people were former students in the program, and currently all are quite successful individuals!

Sue and Virginia do not offer a course, but a 4-year program for students. The focus of their presentation was the use of:

- Technology—to offer support in understanding, for exploration and synthesis, and to reveal the beauty of math.
- Problem Solving—with rich, layered problems that are open-ended, complex and interconnected, and require technology.
- Writing—to require a need to build a technological vocabulary which links to the curriculum, and demonstrates analysis, synthesis, summarization, and reflection.

A few comments regarding the aforementioned focal points. Technology, the tools of which range from graphing calculators to Mathematica software, need to be available to all, with printed materials on their uses. Students are taught how to use these tools, and they do not have to be "geeks" in order to be competent in their applications. Problem solving encourages different approaches, making connections, and trying to see the BIG picture. This is accomplished with collegiality, hard work, and critical thinking, where the responsibility in completing the task rests with the students. An underlying theme to all of problems moves them along on the road to calculus. Writing begins in the first year of the program and becomes more sophisticated as the program progresses. Students eventually write quarterly essays on various topics, such as "How are functions used in one's particular real-world profession?". They progress to technical papers on bits of theory, such as trig and the unit circle, prime numbers, or Markov Chains! All require incorporation of the use of some type of technology, from colored pen and pencil, to Sketchpad, to Mathematica.

Each topic closed with "Kid Pix"--examples from student work. From appreciation of the power of various software, to the efficiency of the math relating music and exponents, to the study of Marie Antoinette's biorhythms on her last day (splitting headache!), students demonstrate their ability to think logically, think with the ability to generalize, and think theoretically. Students learn to focus, gain expertise, and develop an enthusiasm for and deeper understanding of math.

It was quite clear in their "gift " to us this night, that Sue and Virginia continue to have these conversations about math. Years of working on a program for the mathematically gifted have paid off. In challenging these students, it was said that ". . . if we want [them] to be inquisitive, we have to allow them to discover that they have to discover something about a problem." These kids are fortunate to participate in such a program, and we are equally as fortunate in having Sue and Virginia as colleagues.

For questions or more details of their presentation you may contact Sue or Virginia at: sbrown@elmhurst205.org or vhighstone@elmhurst205.com

RESULTS of MMC MATH CONTEST NO. 20:
Tired of the Same Old Answers

Three or Four Entries Tie For Best!

The goal of this year's contest, found in the December 2004 Points and Angles, was to find 10 numbers which when added to, subtracted from, multiplied by, or divided by each other or themselves generate sums, differences, products, and quotients that include as many of the integers from 1 to 100 as possible.

A total of 35 entries were received. Four of these entries identified 10 numbers whose sums, products, differences, and quotients include 89 of the numbers from 1 to 100. These entrants split the total winning prize of $100: Miena and Dan Hall, he being a teacher at Romeoville H.S. in Bolingbrook (two entries); the Lake Zurich Programming Class taught by Ann Heltzel, Lake Zurich H.S., and Ben Simon, a 10th-grade student at Evanston Twp. H.S.

The four winning entries included two different sets of 10 numbers. The set

{1,2,3,4,20,33,48,61,75,87},

found by Dan Hall and Ben Simon, generates all but 38, 43, 56, 69, 70, 82, 92, 93, 97, 98, and 100. The set

{1,2,3,5,22,35,49,62,78,90}

found by Miena Hall and the Lake Zurich Programming Class, generates all but 42, 53, 58, 69, 72, 74, 82, 86, 94, 96, and 99.

Seven entrants found sets of 10 numbers that generated 85 or more sums, products, differences, and quotients from 1 to 100. Miles Kaufman, a 12th-grader at Traverse City H.S., Traverse City, MI, and John Wiltshire-Gordon, a 10th-grader at New Trier Twp. H.S., Winnetka, both scored 88. Ric Best, a 7th-grader at Washburn Middle School, Winnetka, and Julia Zimmerman, a 12th-grader at New Trier, both scored 87. Adam Colestock, a graduate student at Northwestern University, scored 86. Daniel Dolnik, a 10th-grader at Stevenson H.S., Prairie View, and Steve Goodman, a teacher at Glenbrook North H.S., Northbrook, both scored 85. All these entrants receive honorable mention.

Other entries had the following scores: 84, 82, 80, 79 (4), 78, 76, 73 (2), 70, 69 (3), 68 (3), 66, 65, 54, 48, 46, 42.

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, 5835 S. Kimbark, Chicago, IL 60637.

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. The winning student and his or her parents will be invited to the May 2005 dinner meeting to receive the award.

All materials are due by March 18, 2005 and should be sent to:

Bill Roloff
Lake Park High School
500 W. Bryn Mawr
Roselle, IL 60172

MMC Problems Feb 2005

from Michael Keyton

Some of my favorite theorems in geometry are Steiner's Power of a Point Theorems. For any line though a point not on a given circle, the product of the lengths of the two segments from the point to the circle is a constant. (In the event the line is a tangent to the circle then the two intersection points are the same.) These theorems occur in Euclid, but Steiner developed an entire branch of mathematics based upon them. Most textbooks present these theorems incorrectly in my opinion. They tend to state that the product of the two segments of one line is equal to the product of another line. This is the method to prove the theorem. However, this is the way that the theorems are given in Euclid, so why complain? Here are four consequences of the theorems, the first two were obtained from a superb source of problems in geometry (F. G.-M., Exercices de Géométrie 6th ed., 1920.); the other two are generalizations I have not seen anywhere. The problem is also to find the constant, explain it in terms of the geometry.

(1) Given points A and B on a diameter PQ of circle O, symmetric with the O, then for any two points C and D on the same semicircle of PQ so that AC and BD are parallel, then AC•BD is a constant.

(2) Given a chord BC in circle O and diameter XY perpendicular to BC, For every point M on BC chord XZ containing M, then XM•XZ is a constant.

(3) Given a circle O and a tangent T. If X in on the line OT then for any line through X intersecting the circle at points A and B, construct tangents at A and B intersecting the tangent through T at C and D respectively, then AC•BD is a constant.

(4) Given a circle O and a tangent T. If X in on the line OT then for any line through X intersecting the circle at points A and B, construct perpendiculars to AB at A and B intersecting the tangent through T at C and D respectively, then AC•BD is a constant.

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 _____

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Check preferred mailing address above.

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Membership: ☐ New ☐ Renewal

Choose one:

☐ 1 year ($20) _____

☐ 2 year ($35) _____

☐ 3 year ($50) _____

☐ 1st year teacher ☐
☐ retired ☐ ($10) _____
☐ student ☐

Donations:

Scholarship Fund _____

Speaker Fund _____

Total amount of check: _____

NOTICES & REMINDERS

THE 2005 CHICAGO AREA ALL-STAR MATH TEAM TRYOUTS

Thursday, March 3, 2005

4 – 10 pm (with a break for dinner)

at Evanston Township High School

All interested high school students welcome.

For more information about the tryouts, the team, or coaching opportunities, visit the Chicago ARML web site at www.chicagoarml.org or email Coach Isaac Greenspan at ilg@chicagoarml.org

3rd Annual USACAS Conference
at
The Westminster Schools
Atlanta, GA
June 25 and 26, 2005

For more information contact:
http://www.westminster.net/USACAS
or Natalie Jakucyn at njakucyn@glenbrook.k12.il.us

NCTM Annual Conference
Anaheim, CA
April 6-9, 2005

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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