

# POINTS AND ANGLES

Newsletter of the Metropolitan  
Mathematics Club of Chicago



Volume XLII

May 2008

No. 8

## Will You Be Teaching Your Great-Grandmother's Algebra?

Zalman Usiskin, The University of Chicago

By PHIL GARTNER

Zalman was scheduled to speak on the topic “Are You Still Teaching Your Grandma’s Geometry?”, but the recent (March 2008) report of the National Mathematics Advisory Panel of the U.S. Department of Education has him wondering whether, if you follow the panel’s advice, you will be teaching your great-grandmother’s algebra. So he has changed his topic and will give a scientifically-based (to use the language of evidence considered valid by the panel) critique of the report.

Zalman Usiskin is professor emeritus of education at the University of Chicago. He is the director of the University of Chicago School Mathematics Project and one of the principal investigators of the NSF-supported Center for the Study of Mathematics Curriculum. Since 2004, he has been directing the development of the third edition of the UCSMP curriculum for grades 6–12. Zal first spoke to MMC in May 1969 and received the first MMC Distinguished Life Member Award in 1984. He has served on the Boards of MMC and NCTM. He received a Lifetime Achievement Award in 2001 from NCTM and the Glenn Gilbert National Leadership Award from NCSM.

Come see why Zalman Usiskin has been speaking for MMC every even-numbered year since 1982. This meeting marks the 21<sup>st</sup> time he has been invited to speak (although it will be his 22<sup>nd</sup> talk—he once gave a talk on the spur of the moment when the speaker did not show!). He is sure to entertain and inform. Come to hear Zalman, meet our scholarship winners (whose dinners and parents’ dinners will be paid for by Texas Instruments), and enjoy some complimentary appetizers courtesy of the Wright Group.

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

**Date:** Friday, May 9, 2008  
**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, May 5, by noon, please!

**TO RESERVE:**  
Call 847-486-4690 or email  
reservations@mmcchicago.org  
Day or night, leave a voicemail.



**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; Exit at Touhy Ave. & Lee Rd.; Walk East on Touhy to Mannheim Rd.

INSIDE...	
March Talk Summary . . . . .	2
Board Report. . . . .	3
MMC Problems. . . . .	4
Points from the Interior. . . . .	5
Membership/Change of Address. . . . .	5
Notices & Reminders . . . . .	6

# Las Vegas: A City Built on Probability and Statistics

BY JENNY WEXLER

After dinner and a special Cherries Jubilee dessert, a good-sized crowd of Chicago area math folks were entertained by Dave Thiel's thorough discussion of Las Vegas and the probabilities behind the games offered by casinos. Originally from Montana, a teaching job brought Dave to Las Vegas more than twenty years ago, and he is clearly enthusiastic about the mathematical lessons to be learned from the gambling industry in what he refers to as "the probability capitol of the world."

Dave started off his talk by sharing a little history about Las Vegas. For example, the self contained casino-hotels that Las Vegas is now known for began just before World War II, in 1941. The business in Las Vegas has grown from 200-room casino-hotels in the 1940s to the current mega-resorts with more than 3000 rooms. Most recently, casinos have begun to incorporate residences (casino condominiums) into their hotels. In 2006, approximately \$170 billion was wagered in Las Vegas,

resulting in revenue of \$12.6 billion. Clearly this is big business, and probability and statistics explains how Vegas casinos make their money.

The rest of the evening was spent delving into some of the table games (roulette, craps) and machines (slots, video poker) that provide entertainment for guests and revenue for the casinos. Dave started at the roulette table, which he uses as an introduction game with students because it uses simple probability and independent trials. This game set the tone for differentiating between the probability of winning any given bet and the expected value of betting over time. Bettors who place bets on "black" or "odd" at a roulette table have nearly a 50% chance of winning, but the expected value over time is a loss of about 5¢ on the dollar. A bettor who stakes his or her chances on a single number on the wheel has only a 2.6% chance of winning that bet, but can expect the same 5¢ loss on the dollar over time.

Dave moved onto slots, where again some machines may have a greater than 50% chance of winning on a given bet, but still have a negative expected value for the bettor. The house advantage may be as low as 1%, though most are 5–8%. These machines do a tremendous volume—up to ten or twelve bets per minute—and that's where the casinos make their profit. In 2006, approximately \$137.9 billion was gambled at slot machines in Las Vegas, resulting in revenue of \$8.3 billion. When working with students, the mathematics of slot machines brings up the "multiplication rule" (probability of  $X$  and  $Y$  both happening), and also permutations. Simulating runs of 1000, 10,000, or more games with the computer program Fathom provides an opportunity to talk about probability distributions as well.

SEE THIEL, PAGE 3

MMC BOARD OF DIRECTORS		Term
Conrad Wayne President	Chicago State University, Chicago	2006-2009
Phil Gartner President-Elect	Glenbrook South High School, Glenview	2007-2010
Rich Rukin Past President	Evanston Township High School, Evanston	2005-2008
Steve Viktora Secretary	New Trier High School, Winnetka	2005-2008
Ron Vavrinek Treasurer	Illinois Math and Science Academy, Aurora	2006-2009
Mary Wiltjer Membership Coordinator/Conference Co-Chair	Oak Park and River Forest High School, Oak Park	2007-2010
Carol Nenne Conference Co-Chair	Lemont High School, Lemont	2007-2010
Ilene Hamilton Community Relations/Development	Stevenson High School (Retired), Lincolnshire	2005-2008
Bob Ruzich NCTM/ICTM Representative	Fenton High School, Bensenville	2006-2009
Jenny Wexler Board Liason	New Trier High School, Winnetka	2006-2009
Martin Funk Webmaster	New Trier High School, Winnetka	2007-2008
Ismael Zamora Scholarship Chair	Hinsdale South High School, Darien	2007-2010
George Pryjma Historian	Northeastern Illinois University, Chicago	2007-2008
Paul Cristmas Publicity/Posters	Buffalo Grove High School, Buffalo Grove	2007-2008
Isaac Greenspan P&A Editor	University of Chicago, Chicago	2007-2008

## POINTS AND ANGLES

Volume XLII, Number 8, May 2008

Points and Angles, published nine times per school year, is the official publication of the Metropolitan Mathematics Club of Chicago. Founded in 1913, the Metropolitan Mathematics Club is the National Council of Teachers of Mathematics' first affiliate. The official club website: [HTTP://WWW.MMCCHICAGO.ORG/](http://www.mmcchicago.org/)

Correspondence may be directed to the editor:

Isaac Greenspan  
Chicago Math, NFP  
1400 Devon Avenue Suite 344  
Chicago, IL 60660  
[ilg@chicagomath.org](mailto:ilg@chicagomath.org)

## Board Report—Meeting of 10 March 2008

BY STEVE VIKTORA

Mary Wiltjer reported a club membership of 639, of whom 88 are students, 50 are retired, 17 are first-year teachers, and 17 are e-members.

Ron Vavrinek reported that the club is financially secure, but there are some issues that will need to be addressed in the near future. The treasurer's report was accepted.

Phil Gartner presented the almost completed schedule of speakers for next year. Because there are still some details to be settled, the schedule cannot be released at this time.

Bob Ruzich informed the Board members that NCTM will present MMC and three other affiliate groups with a certificate honoring us for our gold level status, a classification that indicates that more than half our members

also belong to NCTM. There is a higher level than gold, but no affiliates qualify for it.

Most MMC members receive occasional email reminders from Mary Wiltjer. However, if you do not receive these reminders and want to receive them, please email Mary Wiltjer at [mwiltjer@oprfs.org](mailto:mwiltjer@oprfs.org) as soon as possible.

The next meeting of the Board is scheduled for 18 May 2008 at a private home at 4:00 PM. Members of the club are welcome to attend any Board meeting, but please contact Conrad Wayne at [cwayne4833@sbcglobal.net](mailto:cwayne4833@sbcglobal.net) before 11 May if you plan to attend. Because this is a dinner meeting, you would be expected to pay for your meal.

---

### Thiel

CONTINUED FROM PAGE 2

We played a little Blackjack, officially called Twenty-One, at our tables with cards from the Mirage, and Dave talked about the house advantage in this game, which in part depends on the fact that the player must decide whether to hit or stay before the dealer makes his play. There is strategy in this game, but even an expert player will lose 1% on average. Card counters, however, have 0.5–1.5% advantage over the house, which is why casinos will refuse service if they identify someone counting cards. The mathematics behind Blackjack provides an opportunity for students to work with conditional probability, dependent events and, if you talk about card counting, work with signed numbers as well.

Dave shared with us the rules, probabilities, and expected values for craps, Keno, and video poker as the evening continued, and he provided a thorough handout for each game. As he brought his talk to a close, he talked about the role of variability. Casinos don't worry too much about one bad day: the table and machine games are unpredictable in the short run (someone may win a ton) but very predictable in the long run (the house will always win). Generally speaking, the house takes are somewhat small on a percentage basis—maybe as low as half a percent—so the casinos rely heavily on volume. Games such as Keno, which take longer to play (one game every 10 minutes), have a higher percentage advantage for the house (25–35%) because the casino

can't do the volume business that they can do at a slot machine or craps table. Similarly, full blackjack tables lose the casino money, because each hand takes longer when dealing out to a lot of people. Regardless of the game, the bottom line is that at the end of the day, the house will be ahead.

Since the Las Vegas casinos' profit relies on the volume of business, casino owners work hard to both attract customers and also to retain them. This is where the "comps" come in, such as free cocktails, buffets and rooms. Of the \$12.6 billion in revenues, approximately \$2.3 billion goes into these comps. There's another kind of "expected value" at work here—casinos determine "player value" according to the formula: (average bet) × (hours played) × (bets per hour) × (house advantage). Comps are generally 10% to 30% of player value. A high roller, with a value of perhaps \$5000, may receive complimentary airfare and a hotel suite, whereas if you're just there for a little fun and have a player value of perhaps \$5 to \$10, all you'll get is a free cocktail.

At the end of our evening with Dave Thiel, members of the audience received some "comps" of our own—cards and dice from our hands-on work at our dinner tables and a drawing for some fabulous Vegas mugs, coasters, and other memorabilia. Thank you, Dave, for a fun and memorable talk!

Dave Thiel's PowerPoint presentation and PDF versions of rules sheets and probability worksheets on all of the games discussed in his talk are available on the web at: <http://home.earthlink.net/~davestats>

## MMC Problems March, 2008

BY MICHAEL KEYTON (KEYTON@IMSA.EDU)

1. How many times during a 12 hour period on an analog clock are the minute hand and the hour hand both pointing at minute subdivisions?
2. In degrees, what is the smallest angle at one of these times and when does this occur?
3. For those of you who have a particular fondness for  $30^\circ$  and  $60^\circ$ , at what times does this occur?
4. Prove: For each multiple of  $6^\circ$ , there are exactly two times when the hands are pointing at minute subdivisions and form this angle.
5. To end with a classic: I am looking forward to the golf season. On my last vacation, it rained on 9 days. Fortunately, whenever it rained in the morning, the afternoon was sunny; and when it rained in the afternoon, the next morning was sunny. I was able to play golf 15 times (every morning and afternoon it was sunny). How many days was I on vacation?

## MMC Website to Post Teacher Openings

Our webmaster, Martin Funk is adding a link to the MMC website, [HTTP://WWW.MMCCHICAGO.ORG/](http://www.mmcchicago.org/), that will list math/computer science position openings that are submitted to him. They will be listed under the following guidelines:

1. It may be used to post math/computer science position openings.
2. The listing must be kept brief: name of the school or district, specific position(s) available, and contact person and contact information (website and/or phone number)
3. The listing will be for 2 months but may be extended by the person making the initial posting. Martin would appreciate it if a position is filled before the 2 months are up, that you contact him so he may remove the posting at that time.

Send your position postings to Martin Funk at [funkma@newtrier.k12.il.us](mailto:funkma@newtrier.k12.il.us). While you are at it, check out the MMC website's new look (thanks to Martin!)



### Attend the FIFTH U.S. Conference on CAS in Secondary Mathematics

Come explore the future of mathematics education!

- Discover how secondary and middle school teachers are using CAS in their own classrooms.
- Get classroom tested ideas developed for CAS-enhanced classrooms.
- Learn what other countries are doing with CAS.
- Interact with prominent CAS pioneers from the USA and beyond.

**June 28–29 at New Trier High School (Northfield)**

Details, on-line registration, and hotel information available at <http://meecas.org/>. For more information, contact Ilene Hamilton at [ihamilton@district125.k12.il.us](mailto:ihamilton@district125.k12.il.us), Dan Hall at [dhall@elmhurst205.org](mailto:dhall@elmhurst205.org), or Pat Bowler-Johnson at [bowlerjp@newtrier.k12.il.us](mailto:bowlerjp@newtrier.k12.il.us).

Organized by MEECAS (Mathematics Educators Exploring Computer Algebra Systems).



### T<sup>3</sup> Regional Conference, June 26–27 Lincoln-Way Central High School

**YOU** are invited to join us in New Lenox, Illinois. This conference is designed to help **YOU** integrate TI Handheld Technology into **YOUR** classroom. This conference is great for both new and experienced users of technology!

- Choose from hands-on and demonstration sessions for new and experienced educators
- Network with other educators from your region
- Receive lots of great classroom activities and ideas
- Exchange ideas with others who are trying new techniques in their classrooms
- Acquire the latest news on TI's educational products

<http://www.lw210.org/T3Conference/>

# Points from the Interior

By CONRAD WAYNE

It is hard to believe that this is my last *Points from the Interior* column. It seems like just the other day that I was listing the highlights of the upcoming 2007–2008 meeting schedule. I would like to start by thanking some board members who have made my year as MMC president go smoothly.

Phil Gartner, President-elect, took care of most of the behind-the-scenes details: making arrangements with Fountain Blue, keeping track of the dinner RSVPs, contacting the speakers, and lining up next year’s speakers.

Mary Wiltjer and Ron Vavrinek made sure your check-in at each meeting went smoothly. They also put in many hours away from the meetings as membership chairperson and treasurer respectively. Mary (there she is again!), Carol Nenne, and John McConnell did another fantastic job of organizing the MMC Conference of Workshops.

Others to thank are Rich Rukin, past-president, who headed the election committee and took care of the

CPDU forms for each meeting; Ilene Hamilton, who arranged for all the corporate sponsors that provided the complimentary appetizers; Martin Funk, webmaster, who has done a lot of updating of the MMC website; Isaac Greenspan, Points and Angles editor; and Ish Zamora, scholarship committee chairperson. Finally, thanks to all those members who served on the various committees and helped with the talk summaries.

One of my responsibilities as past-president will be to organize an election committee and slate for next year. Please be receptive if you are approached to run for a board position or president-elect. Also be ready to volunteer for one of the various MMC committees or write one of the speaker talk summaries.

It has been an honor and a pleasure to serve as your president this past year. I hope to see many of you at the final meeting of the year May 9 as we welcome back Zalman Usiskin for his “umpteenth” May talk.

## 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** \_\_\_\_\_

**Address**  \_\_\_\_\_  
\_\_\_\_\_

**Phone** \_\_\_\_\_

**School** \_\_\_\_\_

**Address**  \_\_\_\_\_  
\_\_\_\_\_

**Phone** \_\_\_\_\_

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

*Check preferred mailing address above.*

**Change of Address**

**Membership:**     New     Renewal

Choose one:

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

2 year                    (\$35)                    \_\_\_\_\_

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

retired                    (\$12)                    \_\_\_\_\_

1<sup>st</sup> year teacher    } (\$10)                    \_\_\_\_\_  
 student                    }

**Donations:**

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

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

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

**Electronic-Only Membership**    *You will receive an email with a direct link to each issue of Points and Angles when it is posted on the web site, often before paper copies are mailed. You will no longer receive Points and Angles by mail.*

## NOTICES & REMINDERS

### Upcoming MMC Event

Friday, May 9<sup>th</sup> — Zalman Usiskin

✉ NEW TOPIC ✉

### Will You Be Teaching Your Great-Grandmother's Algebra?

Zalman was scheduled to speak on the topic "Are You Still Teaching Your Grandma's Geometry?", but the recent (March 2008) report of the National Mathematics Advisory Panel of the U.S. Department of Education has him wondering whether, if you follow the panel's advice, you will be teaching your great-grandmother's algebra. So he has changed his topic and will give a scientifically-based (to use the language of evidence considered valid by the panel) critique of the report.

(see front page)



### T<sup>3</sup> Regional Conference

June 26 – 27, 2008

Lincoln-Way Central High School, New Lenox  
(see page 4)



June 28 – 29, 2008

New Trier High School (Northfield Campus), Northfield  
(see page 4)

### [HTTP://WWW.MMCCHICAGO.ORG/](http://www.mmcchicago.org/)

Old issues of POINTS AND ANGLES, summaries of talks given at MMC meetings, job openings, hints and answers for the MMC problems, and more!

---

If you would like a notice or reminder to appear in POINTS AND ANGLES, please email the text you would like to appear to [ilg@chicagomath.org](mailto:ilg@chicagomath.org) 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.*

MAILING LABEL

METROPOLITAN MATHEMATICS CLUB OF CHICAGO  
c/o MMC  
415 S. Ridgeland Ave. #2  
Oak Park, IL 60302