Minnesota State High School Mathematics League

Newsletter

Issue #26 June 8, 2021

A message from the Executive Director, Tom Young

Tis the end of the 2020 – 2021 school year and for many, not a moment too soon. It has been a stressful time to be an educator. I tip my cap to you all.

But things are looking up! The mass vaccinations have started to win the battle of COVID 19 and the state is loosening restrictions. Next fall is starting to look more normal. (Insert sigh of relief.) Our plan is to go back to in-person meets for the 2021 – 2022 season.

During the summer, we have two events that we work on: Summer Math Institute and the Summer Coaches Conference. **More detailed info on both SMI and the Coaches Conference later in the newsletter.**

Also later in the newsletter, find introductions to our new Associate Director, Lisa Olson, and our new Head of the Problem Writing Team, Colin Gardner-Springer.

Check out the sixth entry in our continuing series highlighting previous Math Leaguers. **If you know of former students that would like to share their experiences, pass their names along.**

If you haven't already, please take the survey regarding student fees and the possible need for a scholarship fund to help students who otherwise wouldn't participate in Math League. This is information needed to explore starting such a scholarship funded by the computer software company, Jamf. Details later in the newsletter. Link there and here

Survey for scholarship

GO MATH TEAM!

Some students and coaches Zooming for ARML Practice. Check out results later in newsletter!

Introducing Lisa Olson
the new Associate Director

Lisa Olson will be working with Dana Koletar for the next year to eventually become the next Associate Director of the Minnesota State High School Mathematics League.

She has a background in Mathematics Education and has worked for the Minnesota Twins the past 10 years where she helped create Learning Through Baseball, a unique educational experience where Target Field is the classroom in which students engage in fun and learning through the power of baseball.

She pours her creativity into DIY projects, woodworking, painting, and gardening. She loves to travel, cross country ski, play pickleball, and solve puzzles.

Introducing Colin Gardner-Springer
the new Head of the Problem Writing Team

Colin's been hooked on math ever since participating in a citywide math competition as a 10th grader. As a student his proudest achievements were being a two-time IMO medalist in high school and a Putnam Fellow in university.

For the past several years Colin's enjoyed working to encourage a passion for mathematical problem solving. He's been an assistant coach of Minnesota's All State Math Team, coached the local middle school math team, and is on the MN Junior High Math League board. He also coaches several Minneapolis FIRST Tech Challenge robotics teams. Professionally he's a software consultant.

Colin looks forward to working with the irreplaceable Tom Kilkelly and the incredible problem writing team to continue to motivate and challenge interested high school students of all backgrounds and abilities.

Congratulations to these retirees!!

Terry Hewitt

Bemidji High School

- 36 years of teaching math at Bemidji High School.
- Started the AP Calculus program in 1995 and taught it for 26 years.
- Started the Math League program at BHS in 1990 (Northern Lights inaugural)
- 31 years as Bemidji's math league coach.
- Served as a member of the math league board for over 20 years.
- Served on the executive committee for a couple of years.
- Helped coach the ARML team in 2001.
- Rarely missed a summer coaches conference.

I truly have enjoyed my 36 years of teaching as well as my involvement in math league. It is very satisfying to know that many of my former students are excelling in math related fields. My highlight in math league was in 2001. We were in the lead during the whole state tournament until the team event. We made a mistake and the late Marlys Henke's team, St Paul Central, beat us by 3 points or by one team event problem. So, we had to accept 2nd place, but it was such a fabulous year for us.

I have been blessed to have so many talented and hardworking students over the years! I plan to still be involved with teaching math. I am most likely going to work as an adjunct at Bemidji State University or some other post-secondary institution. My wife and I also plan to spend some time near her family in North Carolina during the winter months. I will always be a supporter of Math League and may even show up when you don't expect me!

Sherrie Blundell

Eagan High School

This is bittersweet for me. I am retiring after 33 wonderful years of teaching something that I love - math. But you all get that. Math for us is enjoyment. It is challenging and exciting. But, combine that with a classroom full of teenagers and it gets even better. Top that off with 200 mathletes from all over the state and it is awe inspiring.

Coaching the Eagan math team for the last 14 years has been a great pleasure for me. I have been inspired by these bright students, I have been challenged by many of the problems, and I have been honored to work with exceptional coaches. I will miss the math bowl and the spaghetti dinner but I will take with me many fond memories (and many math team t-shirts).

My favorite math quote, attributed to Albert Einstein, "Not everything that counts can be counted, and not everything that can be counted, counts." I know what does count; teamwork, problem solving, coaching, and the need that this math league fulfills for some of our students. That counts.

Steve Jones

Math teacher Mankato West 1983 – 2021
Math League Coach 1985 – 2021

I started teaching in 1983. I have always wanted to give students a background in mathematics that is better than the HS curriculum I had. I came from a small rural School in Minnesota and when I got to college I was unprepared for the level of thinking that was expected. I felt a need to give back to students a better experience their first semester.

My second year Wayne Roberts was trying to expand the League out into southcentral MN. I jumped on the chance to start a team and again found out how far my students were from competing with the best from across the state and across the country. It took me some time to develop a culture that being good at math and liking to compete with others mathematically was OK.

Mankato West has had some limited success in the Minnesota Valley conference with first place finishes in 1995-96, 1997-98, 1998-99, 2007-08, 2012-13, 2013-14, 2014-15, 2015-16, 2019-20, and 2020-21. We have had number of individual students have success. Jim Fowler finished 2nd in the state rankings in 1998-99 and Nick White was tied for 3rd in 2015-16. When the league went to sections and three classes Mankato West has had more success at the State meets; finishing 2nd in 2018-19, 3rd in 2019-20, and 1st this year.

I hope I have had a positive impact on the students I have worked with. I believe preparing the next generation for the unknowns they will face is important work. I am glad I have been able to be a small part of it.

The Impact of Math Team

The call went out last summer to Math League alumni to Share Your Story. Here is one alumnus who shared:

Abra Brisbin

2000 Graduate of Spring Lake Park HS

Undergraduate: Carleton College
BA in Mathematics

Graduate Degree: Cornell University
PhD in Applied Math

Currently works as : Math Professor at University of Wisconsin-Eau Claire

Formerly worked as: Biostatistics Research Fellow at Mayo Clinic

The impact of Math Team on my life and learning:

The Minnesota High School Math League had a profound impact on my life in high school and beyond. Math team practices and competitions gave me a place to spend time with my friends, and meet new friends, where intelligence and hard work was valued. In addition to solving practice problems for the competitions, we ate doughnuts, taught each other math tricks, and played Sprouts. This reinforced the idea that math was a source of fun; it could be playful. Our high school allowed us to "letter" in math team, giving institutional credence to the notion that math skills were valued and a way to show school spirit. Our math team coaches mentored and encouraged us, even holding a team practice at the house of one of the coaches during spring break.

Math team provided an affirmation that I was smart; on one occasion, I remember a girl a year ahead of me saying, "Abra, you're a math goddess," because I had earned *one* of our team's total of three points on a particularly challenging conic sections test. Hard work and perseverance were a key part of that equation. On that conic sections test, the only person on our team who had missed the 1-point question was brilliant--he was doing High School Math League while still in middle school--but he had skipped most practices that month. While I was disappointed by the loss of a point for our team, I felt that both the middle-schooler and I had learned an important lesson about the value of practice.

Math team also helped me learn how to deal with setbacks. I had to learn to handle the disappointment of feeling like I'd let myself down by making a careless mistake. Attending the State competition each spring, I realized that while I was a pretty good problem-solver, I was very far from being the best. I focused on seeing this as a hopeful sign--that there's always more to learn--and on having fun. You don't have to be the best to do good, worthwhile work. While the State meet was a competition against other teams, it was also a challenge to see how well I could do personally. This emphasis on personal growth rather than competition influenced my choices of college and grad school, as well as the teaching style I now use with my own students.

I've been fortunate to have a family and teachers who were very supportive of women in math. Therefore, math team was one of my first opportunities to observe the effects of societal biases involving women in math. At the regular math meets, featuring team members and alternates from teams of all levels, women were just slightly underrepresented--about 40% of the participants were female. At State meets, featuring the top teams from across the state, and where students couldn't just "drop in" to grab a doughnut and take a test on a whim,

closer to 20-25% of the participants were female. And in the on-stage competition, featuring the top 10 students in the state? Many years there were no females at all. One year, two girls made it into the on-stage competition, and promptly faced twice as much pressure as the boys, because the reporters with video cameras were watching their every stroke of the pen.

Of course, my experience in Math League is 20+ years old, so hopefully things are a bit better now. But this drop-off in the percentage of women as you reach higher levels in math is reflected in graduate school and in faculty positions. I've worked to ameliorate this effect for myself by choosing schools and jobs where women are well-represented and where collaboration is highly valued, and by participating in programs such as the George Washington University Summer Program for Women in Math. I've worked to ameliorate the effect for younger mathematicians by striving to serve as a good role model, volunteering at the UW-Eau Claire Sonia Kovalevsky Day (it's fun, you should come next year!), and doing research on the representation of women in different fields of math.

Based on the great experience I had in Math League in high school, I continued participating in math competitions in college. My friends and I wore teal capes and called our team the "Chocolate Slinkies" in honor of the snacks and toys we brought to competitions. We really lived up to the idea that while it's nice to win prizes, the important thing is how much fun you have along the way!

For a long time, I avoided taking statistics in college. I loved the puzzle-solving aspects of math that I knew from Math League, and I had a stereotype that statistics would be too dry. Then I fell in love with using math to understand genetics. I discovered that advanced statistics involves a lot of creativity and puzzle-solving. (For an approachable example of a statistics brain-bender, check out Simpson's Paradox.) In grad school, I studied applications of statistics to genetics, and loved it. Now, as a professor, I do research in statistical genetics as well as research that uses statistics to study how students learn math and statistics best. I love getting to introduce students in my classes and my research group to the joys of math and statistics.

I chose to work at a teaching-focused college with lots of undergraduate research because I admired the work of my high school teachers and college professors. Plus, I get to write problems for the annual UW-Eau Claire High School Math Meet. It's also open to teams from Minnesota, so please join us sometime!

All State Team Summary: ARML Competition

On June 5th, 156 teams and over 2000 students from the United States, Canada, China, Taiwan, Hong Kong, South Korea, Australia, Chile, Colombia, and the Philippines competed in the 2021 ARML competition, sponsored by the D.E. Shaw group. The contest packet is here.

Minnesota All-State Math Team mathletes, 4 teams of 15 mathletes and one short team of 11 mathletes (Orange), were among the 2000+ who competed. Only the regions of the San Francisco Bay Area (11 teams), Chicago (7), and New York City (6) fielded more teams than Minnesota. Our 71 mathletes, and our 5 teams, scored well, each competing at the topmost Division A level. Here is a recap of their performance:

Of the 80 teams that competed in Division A, Minnesota Gold finished 12th overall, Minnesota Maroon 35th, Minnesota White 63rd, Minnesota Red 78th, and Minnesota Orange 79th.

In particular, the Minnesota Gold team finished tied for 9th in the Team Round (35 of 50 pts) tied for 17th in the Power Round (45 of 50 pts), tied for 1st in the Relay Round (50 of 50 pts), and 15th in the Individual Round (79 of 150 pts).

The highest-placing Minnesota mathletes in the Individual Round were Minkai Li (grade 11) and Nathan Mihm (12), who tied for 71st (7 of 10 pts; overall average of all participants was 3.57); Kenneth Chen (grade 10), Matthew Chen (10), Linden Lee (10), and Tri-Captain Jason Wang (12), who tied for 177th (6 of 10 pts); and Michell Cao (10), Eric Chen (10), Evan Erickson (11), Andrew Hale (12), Jonah Kramer (12), Luke Patefield (11), Adwin Shi (10), Kevin Yang (11), Andrew Zhang (10), Austin Wang (6), and Jerry Zhang (10), who tied for 381st (5 of 10 pts), and Anvaya Ajay (11), Lex Byrne (12), Sasha Hydrie (12), Nikhil Jain (11), Garv Khurana (10), Sneha Kundu (7), Alexandra Levinshteyn (10), Ethan Lu (7), Henry Scheible (11), Aurora Wang (10), Robert Zhang (10), and Henry Zheng (9), who tied for 661st overall. (And special mention to Tri-Captain David Zhang, who scored 3 out of 4 and was on his way to scoring higher when he had to depart early to attend his high school graduation.)

The 80 teams came from these areas:

Location	# teams
Bergen	3
Central Jersey	4
Chicago	7
Eastern Massachusetts	2
Florida	3
Georgia	2
Lehigh Valley	5
Lexington	1
Maryland/ DC	1
Michigan	2
Minnesota	5
Montgomery County	3
North Carolina	3
NYC	6
Orange County	2
Ohio	2
Oregon	1
Phillips Academy	1
San Diego	5
San Francisco Bay Area	11
Texas	3
TJHSST	2
Western Pennsylvania	2
WWP^2	2
zARML	2

2021 Summer Math Institute

June 28th through July 2nd at Augsburg University

The Minnesota State High School Math League is pleased to bring back our Summer Math Institute for 2021!

The dates this year are June 28th-July 2nd.

The Summer Math Institute is two, week-long programs: **one for students entering grades 7-9 in fall of 2021, and the other for students entering grades 10-12 in fall of 2021.**

This year, the programs will not be residential, due to pandemic restrictions.

This year's offerings are:

Grades 7-9: Knots! taught by Annie Perkins and Liz Lehtola. The program is in-person!

You know prime numbers, but do you know prime knots? Students will explore the relatively new field of knot theory with two mathematical artists. Using algebra, diagrams, string, and other tools, we'll explore both solved and unsolved problems in this branch of topology. A minimum of Algebra 1 and some geometry is necessary background.

Grades 10-12: Probability Theory taught by Zach Sheffert. The program is online.

Students will study the topic of "Probability Theory", covering all the material necessary to solve the probability theory questions on high school contests like MSHSML, AMC, AIME and ARML. Students should have completed Algebra II and be motivated to learn challenging mathematics not taught in the typical school curriculum.

Cost of program if in-person: $300 per student
Cost of program if online: $200 per student

Direct questions to mathleague@augsburg.edu.

Summer Coaches Conference 2021
Date: August 12

We hope your school year is wrapping up well and that you have relaxing summer plans.

We also hope your plans include attending the Math League Summer Coaches' Conference on Thursday, August 12th. It is free for coaches to attend and includes free meals and an evening social event. We are excited to offer tickets to Chanhassen Dinner Theater this year!

The day includes a morning presentation by the new head of the problem writing team, Colin Gardner – Springer, on "The Top Ten Hardest Problems from 2020 – 2021." The afternoon presentation by Executive Director Tom Young is "Tips for Solving Problems and Coaching Strategies." The conference will be topped off by dinner and a performance of "The Music Man" at Chanhassen Dinner Theater.

HOTEL REIMBURSEMENT
Attendees that travel more than 50 miles one way and need to stay overnight can apply for a reimbursement of $50 for the price of a hotel of your choosing. We are not able to provide housing at Augsburg this year.

COVID 19 STATUS
There are no mask requirements as of this writing for Chanhassen Dinner Theaters. Augsburg COVID19 protocols are in flux but may require participants to wear masks during the day.

REGISTRATION DEADLINES:

Register for the conference by June 30th to guarantee up to (2) tickets for our social event at Chanhassen Dinner Theater. Conference attendees can ask a significant other to attend the dinner and evening show with them. After July 15th, our final ticket count will be set and Chanhassen tickets will only be available if someone cancels.

Register by August 1st to be included in our breakfast and lunch meal count. After August 1st, you must provide your own lunch.

Register by August 9th to attend the conference only with no meals provided.

CEUs are available to all for attendees.

Click on this link to register for the conference and social event.

We had expected to have the Hall of Fame celebration this year, but the uncertainty of COVID has caused us to move it to next year's coaches conference. It'll be even bigger and better!

Hope to see you August 12th!

2020 Hall of Fame Class

(in alphabetical order)

Darryl Anderson: Longtime coach at MACCRAY. Many of his math league students went on to become math teachers. He attended all the summer coaches conferences and was eager to keep on learning. Thanks to Darryl, MACCRAY, a small rural district that joined the league early, has remained in the League even when funds needed to be cut.

Tracy Bibelnieks: Executive Director for 7 years, succeeding Wayne Roberts. Tracy moved the League to its current site, Augsburg University. She reestablished the Summer Math Institute, now in its ninth year.

Dan Butler and Mike Huberty: Longtime coaches at Mounds View HS. Dan and Mike established a culture of success and turned Mounds View into a perennial top 5 school.

Gary Kannel: Longtime coach at Holy Family Catholic HS, Division Coordinator, and League Board member. After many others failed at creating a league scoring website, Gary was able to do what the others couldn't – he created our current scoring website. Not only that, he was able to modify the site to allow students online access to the problems, thus allowing the League to operate during the pandemic.

Dana Koletar: Associate Director for 11 years. Dana was a leader with great insights, ideas, and organization, and a willingness to work hard to make the League better and better each year.

David McMayer: Longtime coach at Southwest HS, Division Coordinator, and League Board member. David is the force behind the Minneapolis division, helping to keep it together through tough years. David coached the All State Math team for 6 years, focusing on expanding the opportunities for our All State members.

Curt Michener: Longtime coach at Elk River HS, Division Coordinator, and League Board member. Curt was instrumental in moving the League to its current section format.

Mary Rueter: Longtime coach at St Cloud Cathedral and St. Johns Prep. Here is an endorsement of Mary from fellow coach Ben Thell

> Mary has been a top-notch math team coach for a long time. She has produced outstanding teams at two different schools since I've known her (St. John's Prep and Cathedral). I can't tell you how many times she has brought a team to state or how many team/individual state accomplishments she has. But I do know that it is considerable. Mary has always been instrumental in bringing a high level of competition to the Central Gopher division. Throughout the time I've known her, I've always appreciated the way that I could approach her and pick her brain on how to best help our elite math students realize their potential. Mary is a great coach. Every year at the board of directors meeting and at the summer coaches conference, I've heard the call for nominees for the Hall of Fame or people who should be recognized as they retire. In my opinion, Mary is one of those Hall of Fame coaches.

Jerry Shouts: Longtime coach at Delano HS, Division Coordinator, and League Board member. Participating in math competitions was always popular in Delano. From Math Masters to High School Math League, their rosters were among the largest in the state - and with good coaching, they have always done very well. Jerry Shouts was an integral part of the team of math teachers/coaches in encouraging and celebrating their students' success.

Free Texts from the Summer Math Institute!!

Dr. Ken Suman, a retired mathematics professor at Winona State University, has been our lead teacher in the 10^{th} – 12^{th} grade SMI for the past two years. In 2018, students at SMI studied Counting Techniques and in 2019, they studied the Theory of Equations.

Dr. Suman wrote texts for the classes, specifically with Math League in mind. These texts are a goldmine of information. Dr. Suman has willingly shared his expertise and suggested that the texts be available to all Math Leaguers.

To that end, the pdfs of the texts can be found at scoringmnmathleague.org under the Coaches Corner tab. Then click on Topic Resources and you'll see the links.

Survey for Possible Scholarship Program

As an offshoot of preliminary talks with the computer software company Jamf, we are exploring the idea of setting up a scholarship fund for underserved students. We need more information to share with Jamf to make a better decision as to the need for such a scholarship. Please take the time and fill out the following survey.

Survey for scholarship

Problem Corner

an effort to spur conversation

If you'd like to contribute a problem or send in a solution, email tomyoungmathman@gmail.com

Student solutions encouraged!

Newsletter #25 Puzzler:

(https://paigefashion.com/wiki/invariant-principle-definition/index.html)

Part One: Alice writes the numbers 1, 2, 3, 4, 5, and 6 on a blackboard. Bob selects two of these numbers, erases both of them, and writes down their sum on the blackboard. For example, if Bob chose the numbers 3 and 4, the blackboard would contain the numbers 1, 2, 5, 6, and 7. Bob continues until there is only one number left on the board. What are the possible values of that number?

Part Two: Alice writes the numbers 1, 2, 3, 4, 5, and 6 on a blackboard. Bob selects two of these numbers, erases both of them, and writes down their **positive difference** on the blackboard. For example, if Bob chose the numbers 3 and 4, the blackboard would contain the numbers 1, 1, 2, 5, and 6. Bob continues until there is only one number left on the board. What are the possible values of that number?

Solutions to Puzzler 25

Part One: In this problem, the sum of the numbers on the blackboard is, n. If Bob chooses to erase the numbers a and b, he will write $a + b$ on the blackboard, making the new sum = $n-a-b+(a + b)= n$, so n is indeed an invariant. This means that at any time during the process, the sum of the numbers on the blackboard will be $n=1+2+3+4+5+6=21$, which means that the final number **must** be 21

Part Two: If Bob chooses the numbers a and b, where $a \geq b$, the sum changes from n to $n-a-b + (a - b) = n-2b$. Therefore, the sum always changes by an even number. Originally, the sum of the numbers on the board is $1+2+3+4+5+6=21$, so at any point of the process, the sum of the numbers must be odd. Therefore, the final number cannot be even. Question, what odd numbers are possible?

Newsletter #26 Puzzler - A tough KenKen

http://joemaller.com/3369/solving-a-difficult-kenken-puzzle/