



A message from the Executive Director, Tom Young

# A Call to Action

Help **maintain** the League by  
finding your replacement when you retire.

Help **expand** the League  
by encouraging a neighboring school to start.

## A message from Colin Gardner – Springer, Head of Problem Writing Team (HPWT)

“Practice isn't the thing you do once you're good. It's the thing you do that makes you good.”

— Malcolm Gladwell, *Outliers: The Story of Success*

With the State Tournament complete, now is the time to set goals and make a plan for next season. As with everything else, the harder you work, the more you succeed, and the more opportunities arise. Progressing from participating in Math League to qualifying for the All State Math Team, or AIME, or USAMO, is largely a factor of time spent preparing.

Luckily there are a wealth of materials available, for instance:

- 40+ years of Math League archives available at the league scoring site (over 1000 events!)
- AMC competition archives at [aops.com/wiki/index.php/AMC\\_Problems\\_and\\_Solutions](https://aops.com/wiki/index.php/AMC_Problems_and_Solutions)
- And many other contest collections, e.g. at [aops.com/community/c13\\_contests](https://aops.com/community/c13_contests)

A few tips:

- Practice regularly, e.g. 15 minutes every day.
- Review provided solutions, even for solved problems, which could lend additional insight
- Use resources across a variety of difficulty levels, e.g. you could switch between Math League, AMC 8, AMC 12, and AIME problem sets.
- Keep track of “stumpers”, trying again a few weeks or months later (the goal being to remember the solution method, not the answer)
- Especially at first, take as long as needed ... there's no need to rush.
- Work with others when possible
- Have fun!

I was delighted to attend this year's State Tournament. Those were, by design, very demanding problems. I hope everyone left feeling challenged while also pleased with their accomplishments. Well done!

Finally, a heartfelt “Thank You” to everyone who helped put together these meets behind the scenes, particularly our talented problem writing team and expert proofreaders. I am grateful for your help as I transitioned into this role, and can't wait for next year!

# Coach in a Box Initiative

*An initiative to find more Math League participants in High Schools in Minnesota.*

The Minnesota State High School Mathematics League is launching the initiative “Coach in a Box” to expand the number of students who reap the benefits of participation.

Currently, 166 high schools and over 2,500 students participate in the Math League. We know that there are many more students across the state who would benefit, grow in their confidence, and understand more mathematics, if there was a team at their school. We have seen that enthusiastic coaches start a team, find those students, and create a culture of mathematical “coolness.”

Our approach is to incentivize coaches and schools to create a Math League team. Our “Coach in a Box” will provide many tools for a new coach to find success while coaching a team. The “Coach in a Box” will provide:

- \$500 stipend for the coach for the 1st year
- \$500 grant to the school to assist with team development for the 1st year
- \$250 stipend for a coach from another school to mentor the new coach for the 1st year
- Resources and materials for the new coach to use to navigate the League procedures and topics
- Resources and materials for the new coach to use to recruit students and create a culture of coolness
- A thumb drive which houses the resources
- Access to a website that also houses the resources

*If we can find enthusiastic coaches, students will follow!*

If you are interested in starting a new team or donating to the effort, please contact Tom Young, the League’s Executive Director.

Email: [tomyoungmathman@gmail.com](mailto:tomyoungmathman@gmail.com) or 763-568-0118

Go Math Team!

# The Impact of Math Team

The call went out in the summer of 2020 to Math League alumni to Share Your Story. Here is one alumnus who shared

## Brian Cornell

2001 Graduate of Spring Lake Park HS

**Undergraduate Degree:** BS Computer Science from Northwestern

**Graduate Degree:** MS Computer Science from UNC Chapel Hill

**Current Job:** Currently a Staff Software Engineer at Google.



## The Impact of Math Team

Math team and later ARML were game changers in my high school experience.

I always had a hard time feeling a sense of belonging in high school, but math team gave me that place to belong and later lead. I finally had a group of people with whom I felt like I could be myself, and on a weekly basis. Getting to lead as a co-captain my senior year gave me some valuable guided leadership experience with projects like getting team T-shirts made.

At ARML, this sense of belonging developed even further, and really helped me understand that I wasn't alone. For the first time, I was far from the best at math in my peer group. In addition, a lot of the events required real collaboration, something that has been a core necessity in my current job as a software engineer. I made long term friends and was introduced to a variety of skills and interests there, leading me to take college classes like Number Theory just for fun, even though the credit didn't help my degree.

After getting my MS in computer science, I went to work at Google, where I've been working ever since. I have used my math skills here to tackle Calculus combined with linear algebra for 3d rendering of Google Maps, develop patented algorithms for map rendering, and explore and develop algorithms around multilateration and multi-dimensional interpolation.

Math team taught me that these things could be fun and interesting, and that I wasn't the only person to think so. Math team was critically important to me and I was very well supported by my team and school. My senior year, the ARML competition in Iowa was the day before and morning of my high school graduation. Rather than forcing me to choose, my coaches and school were able to arrange for a middle school teacher to fly me back in a private plane right after the competition. We landed in the local county airport where my parents picked me up and drove me straight to my graduation.

I'll never forget that, and the feeling that not only did I belong, but people really cared. With three kids of my own now, I hope they are able to find the same level of belonging and support as I was.

# Summer Coaches Conference 2022

## Hall of Fame Induction      Dates: August 11 - 12

We've had to postpone our 40-year celebration due to the pandemic. We are planning to hold a celebration this August honoring our new Hall of Famers and toasting to another 40 years!

Details are still being worked out, but *expect to see Footloose at the Chanhassen Theater!*

*Make plans to attend!!*

### 2022 Summer Math Institute

June 26 – July 1 Residential Camp for 10<sup>th</sup> – 12<sup>th</sup> graders

June 27 – July 1 Day Camp for 7<sup>th</sup> – 9<sup>th</sup> graders

The League is offering two one-week programs of the Summer Mathematics Institute in 2022.

For students entering grades 7-9 in fall of 2022, the topic is **Infinity** and is taught by Annie Perkins.

The other is for students entering grades 10-12 in fall of 2022. The topic is **Writing and Solving AAML Power Contest Questions**. Zach Sheffert is the instructor

Sign Up!

# The Roberts Award Scholarship

The Roberts Award Scholarship(s) were established in honor of the League founder, Dr. Wayne Roberts of Macalester College.

The Scholarship(s) are offered to help offset the costs for students interested in attending an out-of-state math opportunity. They are offered once each year. A set amount of funds will be available each year, and multiple awards are possible.

**Deadline to apply for this season is April 30, 2022**

Applications can be found on our web site at: [http://mnmathleague.org/?page\\_id=1033](http://mnmathleague.org/?page_id=1033)

## State Tournament Recap

### Team Results

#### CLASS A

1	Marshall School	St Louis River A	41
2	St. Agnes School	Tri-Metro A	40
3	Blue Earth Area HS	MN Valley A	40

#### CLASS AA

1	International Sch MN/Eagle Ridge	Canterbury	AA	71
2	St. Croix Lutheran HS	Tri-Metro	AA	48
3	Mahtomedi HS	Classic Suburban	AA	47

#### CLASS AAA

1	Wayzata HS	Southwest Suburban	AAA	103
2	Mounds View HS	North Suburban	AAA	96
3	Edina HS	Southwest Suburban	AAA	94

**Math Bowl Champion:** Linden Lee, Mounds View

**Season All Around Winner:** Linden Lee, Mounds View

**Video Prize:** Damsgard School Watch video at [2022 Winning Math League Video](#)

## Problem Corner

an effort to spur conversation

If you'd like to contribute a problem or send in a solution, email [tomyoungmathman@gmail.com](mailto:tomyoungmathman@gmail.com)

Student solutions encouraged!

## Newsletter #32 Puzzler:

In the kindergarten there is a big box with balls of three colors: red, blue and green, 100 balls in total. Once Pasha took out of the box 30 red, 10 blue, and 20 green balls and played with them. Then he lost five balls and returned the others back into the box. The next day, Sasha took out of the box 8 red, 18 blue, and 48 green balls. Is it possible to determine the color of at least one lost ball?

**Solution 1:** If he didn't lose a red ball, he would be left with  $30 + 18 + 48 = 96 > 100 - 5$  balls, which is a contradiction. Thus, he lost a red ball

**Solution 2:** Yes. Pasha took out 30 red balls, so there were originally at least 30 red balls in the box. After Pasha lost 5 balls, Pasha took out  $8 + 18 + 48 = 74$  balls from the remaining 95 balls. This leaves 21 balls in the box. However, Pasha took out only 8 red balls, and we know there were originally at least  $30 - 8 = 22$  additional red balls, so 1 of the lost balls must be red

**Solution 3:** We see that initially we had 48 (green) + 30 (red) + 18 (blue) + 4 (unknown colored) balls. Now no matter how many balls were lost from the four unknown- colored balls at least 1 was lost from the other 96. But we note that on the 2<sup>nd</sup> day all the 48 + 18) green and blue balls were still intact. So this 1 ball must have been red.

## Newsletter #33 Puzzler:

**Source:** Baltic Way 2018, Problem 6

Let  $n$  be a positive integer. Elfie the Elf travels in  $\mathbb{R}^3$ . She starts at the origin:  $(0, 0, 0)$ . In each turn she can teleport to any point with integer coordinates which lies at distance exactly  $\sqrt{n}$  from her current location. However, teleportation is a complicated procedure: Elfie starts off *normal* but she turns *strange* with her first teleportation. Next time she teleports she turns *normal* again, then *strange* again... etc.

For which  $n$  can Elfie travel to any point with integer coordinates and be *normal* when she gets there?