A message from the Executive Director, Tom Young

Hello all!

Newsletter #4 for the 2022 – 2023 season. In it, notice these items:

1. State Tournament Video contest
2. State Tournament T-shirt Design contest **Winning design sent in by freshman Joanna Park (Lourdes)**
3. State Tournament schedule for the day and expectation for attendance
4. **Announcing Po-Shen Loh as guest speaker at State Tournament**
5. *Announcing Documentary of Math Bowl and Math League in general*
6. Summer Math Camp Dates, Teachers, and Topics
7. Summer Coaches Conference
8. **Request for volunteers to serve on committee to examine our practices and suggest changes.**
9. **Legislation to create scholarships for Math League students! See page below!!!!!**

Allow me to highlight a couple of items:

4.   Announcing Po-Shen Loh as guest speaker at State Tournament

Po-Shen Loh, the coach of the USA IMO team, will be our guest at the state tournament. He will be speaking at 10:45 about competitive mathematics and its benefits. All teams that qualify for the state tournament are expected to attend. ***We also want to invite students and coaches, from schools that do not qualify for the tournament, to come to South St. Paul high school on March 13 to listen to Dr. Loh.***

I think students and coaches will be inspired by his talk. Po-Shen is staying the entire day with us. If you find time, say hello!

Here is a link highlighting his philosophy of mathematics teaching: Po-Shen Loh

8.   Request for volunteers to serve on committee to examine our practices and suggest changes.

The continued success of the league is something I reflect on often. While most schools have a vibrant math team, there are some schools that struggle to fill a full team of eight. There are 28 teams with fewer than eight students. As a coach, I remember how difficult it was sometimes to get new students involved. Perhaps it is time for a facelift in the league to make it more appealing to freshman and sophomores. **I am looking for volunteers to serve on a committee to examine our practices and suggest changes that will make the League more vibrant.**

One idea that I will pursue for next year is the creation of a Math League "Escape Room in a Box." My vision is that each team would receive a box (briefcase?) with an escape room theme to use as the coach sees fit. One thought is it could be used as a recruiting tool.

Send me ideas! Remember we want to create a culture of coolness!

North Suburban Meet 5

Totino Grace

Blaine

Notice anything about Irondale's knight?

Spring Lake Park

Irondale

Congratulations to everyone on a GREAT regular season!!!!!

Parnassus Prep

1. **State Tournament Video contest**

   See ad later in the newsletter

2. **State Tournament T-shirt Design contest**

   We have a winner!! Joanna Park from Lourdes

3. **State Tournament schedule for the day and expectation for attendance**

   All schools that qualify for the state tournament are expected to arrive before 10:30. Students and coaches will be attending a talk by the coach of the USA IMO team, Po-Shen Loh. Also, teams will be guests for lunch. The rough schedule is as follows

   > 10 - 10:30 Invitational test
   > 10:45 - 11:25 Po-Shen Loh talk
   > 11:30 - 12:30 lunch
   > 12:45 - 2 Math Bowl
   > 2 - 5 Events A - D, Team event, and awards

   Events will be administered as they were last year. Students will take events A through D in the cafeteria. Each team will have their own homeroom.

4. **Announcing Po-Shen Loh as guest speaker at State Tournament**

   We are honored to have Po-Shen Loh as our guest speaker for the state tournament. He is an American professor of mathematics at Carnegie Mellon University and the national coach of the United States' International Math Olympiad team. Under his coaching, the team won the competition in 2015, 2016, 2018, and 2019—their first victories since 1994. He previously won a silver medal for the US as a participant in 1999. Po-Shen Loh runs a popular course to train students for the **William Lowell Putnam Mathematical Competition** known as Putnam Seminar and is the founder of the educational website Expii. *All are welcome to attend!!*

5. **Announcing Documentary of Math Bowl and Math League in general**

    We have contracted with a local videographer to make a short documentary about the Math League featuring the Math Bowl. We will be asking for some student and coach interviews. Be aware that you may be on camera. If you haven't already, coaches should have students sign the Code of Conduct/Media Release form which includes an opt out for students who do not want to be photographed.

6. **Summer Math Institute Dates**

    See ad later in the newsletter

7. **Summer Coaches Conference**

    See ad later in the newsletter

8. **Request for volunteers to serve on committee to examine our practices and suggest changes.**

    Math league has been around for 43 years and has maintained a certain style of competition. Given the fact that some schools are having difficulty recruiting students, we want to explore possible changes to the league format. Volunteers will be asked to attend a summer retreat, brainstorm possible changes and help present those ideas to coaches at the Summer Coaches Conference

Legislation to create scholarships for Math League students!!

Four State Senators (Hoffman, Abeler, Kupec, and Gustafson) have introduced legislation to offer scholarships to Math League students.

The bill asks for sixty $5000 scholarships to be awarded in each of the next four years to students with 3 years of experience in the League and who attend a Minnesota college.

Senate File 2217 (SF2217) has currently been referred to the Higher Education committee.

Here was our rationale:

The Minnesota State High School Mathematics League is a nonprofit dedicated to challenging Minnesota students to deepen their problem-solving skills through extracurricular mathematics. The League looks to create sixty $5000 scholarships for a total of $300,000 each year for the next 4 years.

We feel a scholarship program would benefit students, high schools, Minnesota colleges, and the state of Minnesota in general.

The benefits for the students would be:
- 1. Access to financial support for their college education, reducing their financial burden.
- 2. Increased motivation to excel in mathematics, which could have a positive impact on their future careers.

The benefits for the Minnesota state high school mathematics league would be:

- 3. Increased reputation and recognition as a supportive organization of math education in the state.
- 4. Potential increase in participation in the league's programs, as students may be more incentivized to excel in mathematics.

The benefits for the colleges in the state of Minnesota would be:

- 5. Increased interest from high-achieving math students thereby attracting a stronger pool of applicants.
- 6. Potential increase in collaboration and partnerships with the league, leading to more resources and opportunities for students.

The benefits for Minnesota in general would be:

- 7. Increased support for education, which could have a positive impact on the state's future workforce.
- 8. Increase in the number of high-achieving math students staying in the state for college, contributing to the state's economy.

Allocating the scholarships

We would allocate the scholarships as follows: Each class of teams (A, AA, AAA) would be ranked by their team scores. The top twenty teams in each class would each receive a scholarship to be awarded to a senior attending a Minnesota college. If the school did not have an eligible senior, the scholarship would then fall to the next school in ranking.

Needs to be done

1. Letters (or emails) of support need to be written to your state legislator!!

Here is a sample letter:

I support legislation to create a scholarship fund for Minnesota State High School Mathematics League participants. I ask for your vote on Senate bill SF2217 and/or House bill _____-

My name is _____ _____ and I live at _____. You are my state senator/representative for District _____

The scholarship fund will help the league and the state in many ways. It helps the league recruit and retain participants. The financial burden for students would be eased.   It reinvests in the state college and university system, awarding money only to those students who attend a state university. Students would be more likely, I feel, to stay in the great state of Minnesota.

Please help us support excellence in mathematics in Minnesota!

With regards,

Signature _____

2. Progress of the bill can be found at:

Progress of Math Team Scholarship Bill

Summer Coaches Conference 2023
Topic: Giving Math League a Facelift
Dates: July 27 - 28

With the challenge of making Math Team more appealing to students, the topic of the conference will be how to give Math Team a facelift. Conversation items include: topic list, number of topics per meet, how a meet is run, getting more schools and students involved

Make plans to attend!!

Thursday night social is dinner and a ball game at the St. Paul Saints stadium!

2023 Summer Math Institute
June 25 – June 30 Residential Camp for 10th – 12th graders
June 25 – June 30 Residential Camp for 7th – 9th graders

The League plans to offer two one-week concurrent residential programs of the Summer Mathematics Institute in 2023.   It's full speed ahead!!

The first is for students entering grades 7-9 in fall of 2023.
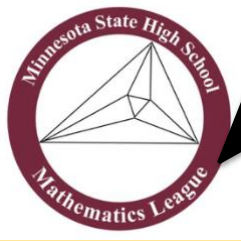**Instructors:**
Deb Fagan and Meg Bierwirth.
Topic: From Archimedes to Katherine Johnson to Po-Shen Loh to YOU!

The second is for students entering grades 10-12 in fall of 2023.
Instructors:
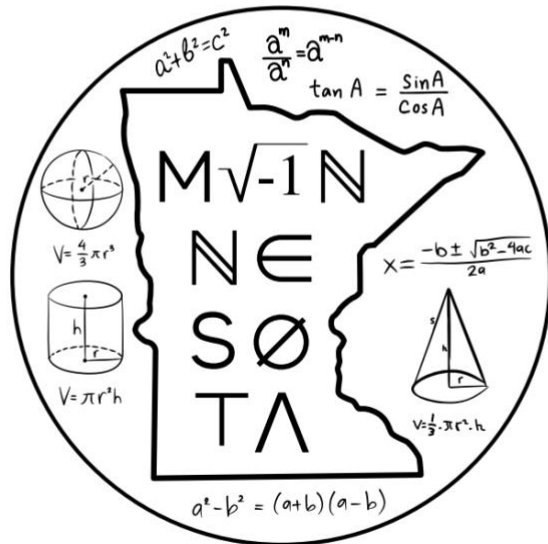**Dr. Ken Suman and Mike Hilst**
Topic: Geometry in the MSHSML

MN State High School Math League

2023 State Tournament
T-shirt Design Contest

Prize: **$50 VISA Gift Card and a Free T-shirt**

We have a winner!

MN State High School Math League

STATE
TOURNAMENT

$$a^2 + b^2 = c^2 \qquad \frac{a^m}{a^n} = a^{m-n}$$

$$\tan A = \frac{\sin A}{\cos A}$$

$$V = \frac{4}{3}\pi r^3$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$V = \pi r^2 h$$

$$V = \frac{1}{3}\pi r^2 \cdot h$$

$$a^2 - b^2 = (a+b)(a-b)$$

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NESØTA

- March 13, 2023 -

MN State High School Math League Math Team Video Contest

1st place: $200 to school's math team
2nd place: $150 to school's math team
3rd place: $100 to school's math team
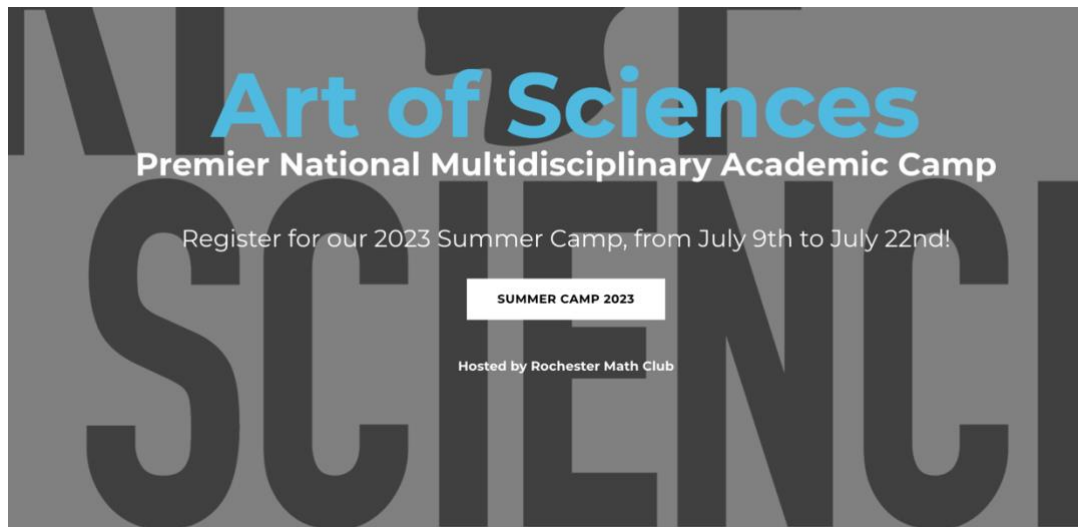
Video Guidelines:

Produce a 90 second video explaining why you like to be involved in the Math League. Videos might include: student interviews, teacher endorsements, sample problems, or video of practices/meets. Be Creative!!!!!!!!!!!

Video Entry Submission:

**Videos are due to the Math League Office
(mathleague@augsburg.edu)
by *March 1st, 2023*.**

- **Videos contest entries must be sent and approved by the school math team coach.**
- **Winning schools will be notified by March 7, 2023.**
- **Winning video will be shown at the State Tournament on March 14, 2023, uploaded to the Math League Facebook page, and may be used for other promotional purposes.**

Questions? Email mathleague@augsburg.edu

Get ready to explore the Art of Sciences like never before!

Join us for an unforgettable multidisciplinary academic experience at the fifth annual Art of Sciences Summer camp, held from July 9-22, 2023 on the beautiful St. Olaf campus.
Designed for curious minds in grades 6 to 12, this academic camp is not your ordinary summer program.

Discover the wonders of mathematics, economics, photography, physics, biology, machine learning and AI, creative sound design, Python programming, business for youth, baking, and reading. With so much to explore, you're sure to find something that excites you.

But the learning doesn't stop there! The classes are followed by fun social activities in the evening, carefully planned and supervised by our friendly camp counselors. Indulge in sweet treats at the ice cream social, bond with new friends over s'mores, show off your skills at poker night, or unwind at movie night. Get active and enjoy the sunshine with ultimate frisbee, sand volleyball, swim, or frisbee golf.

This camp is open to students from all over the country, so you'll have the opportunity to make lifelong friends and experience a taste of Minnesota. Get all the information you need on our website, including details on our curriculum, instructors, schedule, and reviews from past years.

Don't miss your chance to join us for an amazing adventure into the Art of Sciences! Sign up now at https://www.rmc-academy.org/.

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, 2023

Applications can be found on our web site at: http://mnmathleague.org/?page_id=1033

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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 #36 https://artofproblemsolving.com/wiki/index.php/ 1984_USAMO_Problems/Problem_1

In the polynomial $x^4 - 18x^3 + kx^2 + 200x - 1984 = 0$ the product of two of its roots is -32. Find k.

Solution by coach Mike Gingerich

I used the Rational Root Theorem to find the only possibilities to be 1, -32, -1, 32; 2, -16; -2, 16; 4, -8; -4, 8. I then used synthetic division to get a linear equation in terms of k. That equation could be set equal to 0, because a root gives a remainder of 0 in synthetic division. I then used that value of k to check the other root. The roots were -4, 8. After solving it this way, I realized that I could have also used the Remainder Theorem and saved a little bit of time.

Puzzler #37   OEIS A047838

Define the organization number of a sequence of integers as follows: Start with the lowest number, and count the number of "steps" to reach the next larger number. Repeat until you reach the highest number, always keeping a running total. The sum of the steps is the organization number of the sequence.

For instance in the sequence 1, 2, 3, 4, 5 start with 1. It takes one step to go to 2, one step to go from 2 to 3, one step to go from 3 to 4, and finally one step to go from 4 to 5. A total of 4. Very organized!

Consider 3, 1, 5, 2, 4 start with 1. It takes two steps to go to 2, three steps to go from 2 to 3, four steps to go from 3 to 4, and finally two steps to go from 4 to 5. A total of 11. Very disorganized! There are other ways to be just as disorganized.

What is an example of a most disorganized row from a Sudoku puzzle? 1,2,3,4,5,6,7,8,9 is very organized