

A message from the Executive Director, Tom Young

Congratulations on another great regular season of Math League!

Thanks to all of you who worked hard to bring relevant mathematics to our students. Thanks to all of our students who toiled to solve difficult problems and grew in their understanding of mathematics!

The State tournament is just around the corner. Preparations are being made to make this another great event. Many thanks to Dana Koletar, Luke Olson, Tom Kilkelly, and Mike Reiners for all their work.

Looking beyond the state tournament, I personally invite you to set aside your calendar for the **Coaches Conference** this summer. It will be held on: **July 12-13 at Augsburg University**. The conference is a great way to meet with fellow coaches, help voice your concerns and ideas for improving the league, and have fun. One of the main reasons to go is to help shape the future of the league. **I hope to see you there this summer.**

The Summer Mathematics Institute for grades 7-12 will be held June 24-29 at Augsburg University. **Application due April 15th and is available on our website.** *If you are interested in teaching at SMI, shoot me an email.*

Thanks again for all your work in making this year great for the students. While it may have been a tougher year than usual, learning opportunities abounded!

PS: No team entered the video contest yet. It's extended; might there be one in the wings?

Meet Five photos from Suburban East Division

Happy team!



Happy Coaches!



A message from Tom Kilkelly, Head of the Problem Writing Team

Who would have thought the expression “how many times larger” could be the basis for a challenge, but when compared to the expression “how many times as large”, our English language can cause problems in mathematics. Do the statements “27 is twenty-six times larger than 1” and “27 is twenty-seven times as large as 1” contradict one another? This is an age-old problem in semantics. Even a question/answer math forum sponsored by NCTM, “Ask Dr.Math”, was asked about this almost twenty years ago. See <http://mathforum.org/library/drmath/view/52334.html>. One mathlete actually had listed the two expressions on his paper and then selected 26 for his answer. He made a successful challenge!

Now that the season is complete, I had a chance to look at the statistics that were generated by the scoring program. In comparing this year’s scores with the past two years, it appears this year’s problems were “a wee bit” harder than those from the last two years. The mean scores of this year’s individual events were 85% lower than 2015-15 and 70% lower than 2014-15. The mean scores of the team events were likewise also 70-80% lower. This year’s top score of 568 points was the lowest in these years (570 in 2015-16 and 591 in 2014-15). Four students, however, scored a perfect 70 for the season as compared with 4 in 2015-16 and 1 in 2014-15.

I hope you found this year’s questions fair but challenging and the solutions helpful and instructive.

More Suburban East Pix

Are they really only there for the donuts? I think not



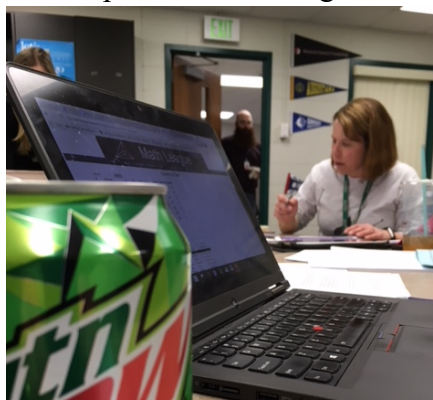
Another Happy Team!



This fine young man wanted to say thanks!



Our president working hard



A message from the All- State coaches Noah Franske, David McMayer, and Mikal Nelson

The Minnesota All State Math Team has been busy this year, sending various groups of students to three national competitions at colleges and universities.

In November, eight students traveled to Princeton, New Jersey to participate in [PUMaC](#).

William Cho, Jeffrey Huang, Richard Huang, Mark Pekala, Daniel Stein, Kevin Yang, David Zhang, and Alexander Zhu all participated. While our young team struggled to match the performances from the Minnesota teams in the previous two years, both coaches were encouraged by the general enthusiasm of the students. We agree that the experience will provide motivation to improve the team approach at upcoming competitions. Team results and an archive of problems and solutions are available at <https://jason-shi-f9dm.squarespace.com/archives/>.

In January, six students traveled to Pittsburgh, Pennsylvania to participate in [CMIMC](#).

William Cho, Richard Huang, Frank Lu, Mark Pekala, Nibir Sarma, and Ben Yan all participated. One thing that the students really appreciate is the introduction of computer science as a topic in this competition. In the future, we will continue to motivate our students to participate in this competition. We feel that CMIMC provides a unique competition experience...and we really like [Po Shen Loh](#). Team results and an archive of problems and solutions are available <http://www.cmimc.org/archive>.

In February, sixteen students traveled to Cambridge, Massachusetts to participate in **HMMT**.

Timothy Alexander, Stephen Chen, William Cho, Frank Han, Jeffrey Huang, Richard Huang, Frank Lu, Alex Pan, Mark Pekala, Matthew Qu, Matthew Schachter, Daniel Stein, Alexis Yi, Cindy Zhang, David Zhang, and Alexander Zhu all participated. HMMT is by biggest collegiate competition that we attend. Individually, Frank Han earned a top 40 finish out of over 700 participants. Frank Lu, Daniel Stein, Alexis Yi, and Alexander Zhu also finished within the top 200 participants overall. The two Minnesota Teams finished the tournament in 23rd place and 54th place overall out of a total of 91 teams. Team results and an archive of problems and solutions are available <http://www.hmmt.co/archive/problems/>.

Our competition season this year will culminate with the [ARML](#) practices and competition.

Minnesota has had recent success, finishing in fifth place and eighth place overall in the nation during the last two competitions. Last year, Michael Tang finished sixth overall in the nation out of over 3000 participants. He had the fastest solution in the nation to the following tiebreaker question:

Problem 1. Compute the least positive N such that there exists a quadratic polynomial $f(x)$ with integer coefficients satisfying

$$f(f(1)) = f(f(5)) = f(f(7)) = f(f(11)) = N.$$

The coaches will be gathering data from the MN Math League regular season, the MN Math League State Tournament, and the American Mathematics Competition. The coaches will also take into account past performance at national competitions (ARML, PUMaC, CMIMC, and HMMT). We plan to invite over 150 students to participate in the practices. We will select 60 individuals from the list to join us on the trip to the University of Iowa for ARML 2018 on June 1-2.

Coaches can nominate students for consideration, particularly those who are younger and less identifiable by an examination of available data.

Coaches with nominations should contact David McMayer at david.mcmayer@gmail.com. Interested students and parents should work with the coaches from their school to submit a nomination.

Noah Franske, David McMayer, and Mikal Nelson all serve as coaches and advisors for the students during these competitions. We are grateful for their tireless efforts.

Don't Forget to enter this Contest!

Video Contest! EXTENDED!

There's money to be made! Calling all schools to produce a 90 second video explaining why you like to be involved in the Math League. Student interviews, teacher endorsements, sample problems, or video of practices/meets are all possible components of such a video. Videos are due to the League Office (mathleague@augsborg.edu) by March 5th, 2018. Videos must be sent by, and approved by, the school math team coach. A committee will decide the winners and the winning videos will be shown at the State Tournament.

First prize: \$200 to the math team at winning school

Second Prize: \$150 to the math team at 2nd place school

Third Prize: \$100 to the math team at 3rd place school

Embrace your inner Steven Spielberg!

notice there are no cartoons in this newsletter; they've been problematic in the past ;)

initiatives and a possible change for 2018 – 2019

#1 WEIGHTING INDIVIDUAL SCORES

Talking to coaches over the past couple of summers and at the state tournament, it has been suggested that we weight individual scores, based on some comparative criteria. A student, for instance, would receive more credit for solving a difficult problem (that fewer students across the state solved) than a student that solved a problem that almost everyone solved. Various criteria for weighting student performance have been implemented on our scoring database on a trial basis. Coaches should have access to this. *We are not weighting performance this year*, but the Board will be deciding at the Fall 2018 meeting as to whether to implement weighted performance in 2018-19 (and beyond) and, if so, which method to use.

Explore the scoring database and form an opinion as to a

- a: whether you like this idea
- b: if you do, find a preference as to the weighting method
- c: also, formulate an answer to this question - would you use the weighting system to break ties based on our current system or would only the weighted scores be used to rank individual students?

Express your opinion to your division coordinator. Look for a survey later this year.

#2 PROBLEM DATABASE ON THE SCORING WEBSITE

Another wish list item for several years has been this: can we have a searchable database that we can use to pull up previous years' problems on a certain topic? Guess what? We have a searchable database on the horizon! Our web guru, Gary Kannel, has implemented the database and we are in testing phase. Look for this in the future! Hats off to Gary!

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Mathematics League" @MNSHSML and
Twitter @MNHSMathLeague

Problem Corner

an effort to spur conversation

If you'd like to contribute a problem
or send in a solution, email
tyoung@district16.org

Student solutions
encouraged!

A solution to a word problem from Newsletter 4

Mrs. O'Connor has 30 students and 30 desks in her first hour PreCalculus class, all in 6 tidy rows of five desks each. Her students were tired of where they were sitting, so she tried to mix it up a little by making a new seating chart. She used her computer attendance program to generate a random arrangement of the students. Confident that this would assuage their malaise, she asked the students to move to their new desks. After they had moved, a student spoke up. "Mrs. O'Connor, I'm still sitting in the same desk!" Mrs. O'Connor was surprised that someone was still in the same spot. Or should she be? What is the probability that at least one student will be in the same spot after this rearrangement?

SOLUTION: This is the complementary problem to "When will no student be in the same desk?" It is another version of the age-old probability problem "If 8 people check their coat, and the ditzy coat attendant randomly gives the coats back at the end of the night, what is the probability that no one gets their own coat?" This "no one gets their own coat" problem is known as a derangement problem, and the limit (as the number of items approaches infinity) of the answer can be shown to be $1/e$. Therefore, the answer to the problem posed is $1 - 1/e$. So, Mrs. O'Connor should expect at least one student in the same desk approximately 63.2% of the time!

New Problem

How many 4 digit numbers are there such that the thousands digit is equal to the sum of the other 3 digits?