

A message from the Executive Director, Tom Young

Good New Year to you! I hope the holiday season went well for you. Back to work, back to Math League practices, and looking forward to the final two regular season meets.

Meet three (which seems like ages ago!) went much better for most teams; event C was still hard. The scores across the state reflected that.

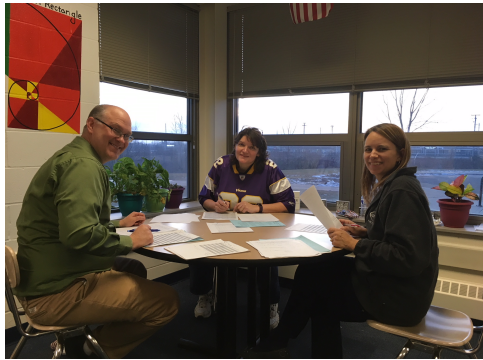
I thoroughly enjoyed visiting the Big Nine division for the third meet. The students (and coaches) were well fed, well-organized, and scored well, as well! See the pictures below. It was a delight to be treated to a surprise performance of the Rochester Century dance team before the meet. Century has a history of welcoming the other teams with diverse performances. I hear the Century Drum Line was featured one year. This makes for a fun meet; hats off to them!

Later in the newsletter, you'll find more information on the ideas of going to 3 classes. Please read this carefully and form opinions. Talk to your division coordinator at meet 4 regarding this idea. Also, some other new initiatives about weighted individual scoring and searchable database are detailed later in the newsletter.

Good luck to all on meet 4!

Meet Three photos from Big Nine Division

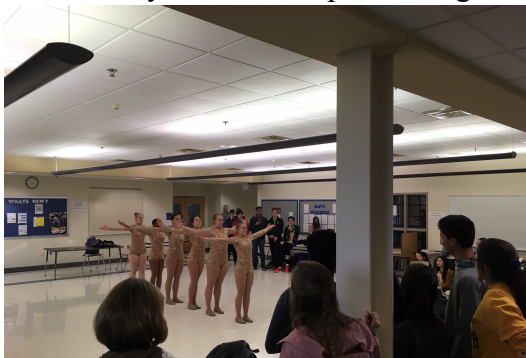
Century Teachers recruited to grade



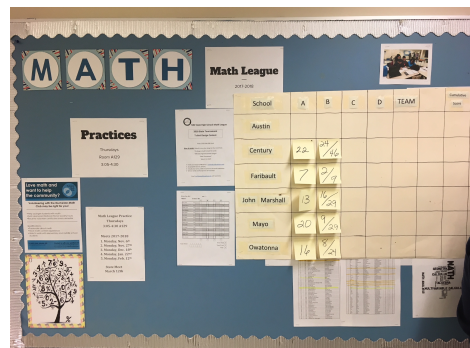
Big Nine students ready for Meet 3



Century Dance Line performing



The Math Wall



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

A Note From the Problem Writing Team

We seem to be improving! There were only six challenges in Meet 3.

Three of them were for problem C3. The question asked “What imaginary number, written in the form $0 + bi$, is on \overline{MN} in the complex plane?” Credit was given only if the student wrote “ $0 + \frac{3\sqrt{2}}{4}i$ ”. Originally the problem asked “What imaginary number is on \overline{MN} ?” but the proofreaders felt that in too many classrooms there is confusion with the use of the words “imaginary”, “complex”, and “non-real” numbers. By stating the particular format we were giving a hint to the student and reinforcing the fact that numbers in the complex plane are two-dimensional. **(Often problems ask a student to express an answer in a particular format and failure to follow that format should not receive credit. Oftentimes the the expression “Determine exactly” is used in stating a problem and this carries all sorts of ramifications regarding the format of the final answer.)**

There were two challenges for problem C4. The problem asked to find the coordinates of point C in rhombus $ABCD$. In both challenges students found the coordinates of point C in rhombus $ADBC$. In hindsight, I could have minimized students making this oversight if I had stated that “ $0 < \theta < \frac{\pi}{2}$ ”. In any case, radian measure was used in the statement of the problem, so radian measure must be used in the answer.

The final challenge was on T6 where one team used scientific notation for 1000 and 1/1000. Although the rules for “determine exactly” state that 3^4 is an unacceptable answer, we felt 10^3 and 10^{-3} were acceptable.

Meet 4 is fast approaching. When I coached I always felt that Meet 4 is the meet with the largest list of topics requiring review. Again be careful of questions whose answers must be in a particular format!

More Big Nine Pix

Food! Homemade cookies!



The Big Nine coaches



Moving to Three Tiers?

That is the big question. A proposal, from a committee tasked with researching and recommending this, was made last fall at the board meeting. Here is the proposal:

We, the reformat committee, propose that the schools in the league be split into thirds, first by size then adjusted based on previous year's success. Adjustments would be made every two years using the previous two-year averages. Tier 2 and 3 teams who average in the top 15 (overall) in the previous two years would compete in Tier 1, regardless of their school's size. Tier 3 teams who average in the top 50 in the previous two years would compete in Tier 2. Teams that have been bumped up will be dropped down if the 2-year review dictates it. Any school will have the option "play up" to a higher Tier.

We envision each Tier being divided into 8 evenly distributed virtual sections from different geographic regions across the state. The highest scoring team from each section would be invited to the state tournament with an additional 2 wild card teams (highest scoring teams in the Tier that didn't win a section). Therefore, there would be 10 teams from each Tier receiving automatic bids with the rest of the field to be filled out by choosing the next 6 to 10 highest scoring teams from across the state regardless of Tier. The Hibbing Rule would be gone.

Teams would still compete in the regular season with their current divisions. However, to make it to state, a team would have to win its virtual division, be a wild card in their tier, or be in the top 6 to 10 high scoring teams not already picked.

Further, the committee proposed a possible virtual section lineup. Here is the recommendation for the large school tier (or as they proposed, Class 3A)

Class 3A Section 1

Century HS
John Marshall HS
Mayo HS
Lakeville Schools
Cotter HS
Rosemount HS
Apple Valley HS
Owatonna HS

Class 3A Section 3

Park HS
East Ridge HS
Eagan HS
Eastview HS
St Thomas - Visitation
Woodbury HS
Henry Sibley HS
Harding HS

Class 3A Section 5

Champlin Park HS
Park Center Senior HS
Armstrong HS
Maple Grove Senior
Osseo Senior HS
Rogers HS
Mounds View HS

Class 3A Section 7

Anoka HS
Blaine HS
Spring Lake Park HS
Coon Rapids HS
Andover HS
Elk River HS
Irondale HS

Class 3A Section 2

Shakopee Sr HS
Eden Prairie HS
Minnetonka Senior
Edina HS
Wayzata HS
The Blake School
St Louis Park HS

Class 3A Section 4

North St Paul HS
Central HS
Roseville Area HS
Stillwater Area HS
White Bear Lake HS
Tartan HS
Highland Park HS
St Paul Academy

Class 3A Section 6

Blmngtn Jefferson HS
Minneapolis South HS
Southwest HS
Washburn HS
Kennedy HS
Hopkins HS
Burnsville HS

Class 3A Section 8

Moorhead HS
St.Johns Prep
Duluth East HS
Cambridge-Isanti HS
St Michael-Albertville
Sauk Rapids-Rice HS
Tech HS
Buffalo HS

Using the last two years of data, here is who would have been invited to the state tournament:

Class 3A	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7	Section 8
2015-16	Century	Wayzata	Woodbury	St Paul Ac	Mnds Vw	Southwest	SprngLkPrk	St JohnPrp
2016-17	Century	Wayzata	Woodbury	St Paul Ac	Mnds Vw	Southwest	Irondale	St JohnPrp

The wild card teams for Class 3A would have been **Eden Prairie** and **Edina** for both years.

Using the committee proposal (to invite the top 6-10 scoring teams not already invited) the following teams would have made the tournament. (Overall place in league in parentheses)

2015-16: Minnetonka Senior HS (6), John Marshall HS (7), The Blake School (9), Cotter HS (11), East Ridge HS (12), Highland Park HS (14), Spring Lake Park HS (16), Tech HS (18), Eastview HS (19), Mankato West (20)

2016-17: John Marshall (6), Minnetonka (7), Cotter (8), Blake (9), Eastview (13), Highland Park (14), Eagan (16), Blaine (18), East Ridge (20), Lakeville (21)

Here is the recommendation for the middle-sized school tier (or as they proposed, Class 2A)

Class 2A Section 1

Austin HS
Faribault HS
Red Wing HS
Northfield HS
Osceola HS
Waseca HS
Stewartville HS
Shattuck St.M

Class 2A Section 3

Simley HS
South St Paul HS
Johnson HS
Hill Murray HS
Como Park HS
Washington Tech HS
Mahtomedi HS

Class 2A Section 5

Columbia Heights HS
Fridley HS
DeLaSalle HS
Patrick Henry HS
St. Anthony Village HS
Totino-Grace HS
Edison HS
Academy Holy Angels

Class 2A Section 7

Grand Rapids HS
Hibbing HS
Chisago Lakes HS
North Branch HS
Cloquet HS
Duluth Denfeld HS
Marshall School
Hermantown HS

Class 2A Section 2

Hutchinson HS
Delano
St. Peter HS
Dassel-Cokato HS
Mankato West HS
Mankato East HS
Marshall HS

Class 2A Section 4

Minnehaha Academy
Holy Family Catholic
Cretin-Derham Hall
Richfield HS
Roosevelt HS
Mound Westonka HS
Orono HS

Class 2A Section 6

Big Lake HS
Cooper HS
Foley HS
Monticello HS
Apollo HS
Int. Sch MN/Eg Ridge
Benilde-St Margaret's

Class 2A Section 8

Bemidji
Alexandria Area HS
Detroit Lakes HS
Fergus Falls HS
Thief River Falls HS
Sartell HS
Rocori
Sauk Rapids-Rice

Using the last two years of data, here is who would have been invited to the state tournament:

Class 2A	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7	Section 8
2015-16	ShttcKStMry	Mankato W	Mahtomedi	Minnehaha	HolyAngels	Benilde SM	Hermntwn	Sartell
2016-17	ShttcKStMry	Marshall	Mahtomedi	Minnehaha	HolyAngels	Benilde SM	Marshall	Sartell

The wild card teams for Class 2A would have been [Marshall and Delano](#) for 2015 – 16.

For 2016 – 17 the wild card teams would have been [Delano and Mankato East](#).

Here is the recommendation for the small-sized school tier (or as they proposed, Class 1A)

Class 1A Section 1

Lake City
Chatfield HS
Dover-Eyota HS
LaCrescent-Hokah HS
Lewiston-Altura HS
Plview-Elgin-Millville
St Charles HS
Wabasha/Kellogg HS

Class 1A Section 3

New London-Spicer
Adrian HS
Lakeview HS
Luverne Jr Sr HS
Montevideo HS
MACCRAY HS
BOLD HS

Class 1A Section 5

Lourdes HS
Zumbrota-Mazepa
Cannon Falls HS
Kenyon-Wanamingo
Triton HS
Pine Island HS
Goodhue HS

Class 1A Section 7

Barnum HS
Esko HS
Moose Lake HS
Willow River HS
Mora HS
Proctor HS
Carlton HS
East Cntral Secondary

Class 1A Section 2

Fulda HS
Fairmont HS
Blue Earth Area HS
Lke Crystl/Wlcm Mem
MN Valley Lutheran
Jackson County Central HS
Tri-City United HS

Class 1A Section 4

Providence Academy
Hope Academy
Parnassus Prep
Humboldt HS
Mounds Park Acad.
St Croix Lutheran
St. Paul Preparatory

Class 1A Section 6

Breckenridge HS
Pelican Rapids HS
Albany HS
Cathedral HS
Atwtr-Csms-Grve City
Park Rapids HS
Nevis HS

Class 1A Section 8

Badger HS
Grnbush-Middle River
Mesabi East HS
Mt. Iron-Buhl HS
International Falls HS
Eveleth-Gilbert HS
North Woods HS

Using the last two years of data, here is who would have been invited to the state tournament:

Class 2A	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7	Section 8
2015-16	LaCrescent	Fairmont	Luverne	Providence	Lourdes	Pelican Rp	Esko	Greenbush
2016-17	PlainviewEM	MNValleyL	NewLondon Montevideo (tie)	StCroix Lutheran	Lourdes	Pelican Rp	Esko	Int Falls

The wild card teams for Class 1A for both years would have been [Mounds Park Academy and St Paul Prep](#).

Impact the new proposal would have had on the 2016 – 2017 tournament

State Toumey Look					
3A	2A	1A	Next 10	Last year toumey teams that wouldn't have been invited	
Century(5)	Shattuck St. Mary's(73)	Plainville-Elgin-Millville(120)	John Marshall (8) 3A	East Ridge(20) 3A	
Wayzata(1)	Marshall High(24)	MN Valley Lutheran(80)x	Minnetonka (7) 3A	Lakeville(21) 3A	
Woodbury(10)	Mahtomedi(25)	Montevideo/New London Spicer(125)x	Cotter (8) 3A	Washburn(27) 3A	
St.Paul Academy(11)	Minnehaha Academy(19)	St. Croix Lutheran(46)x	Blake (9) 3A	Int Sch of MN/Eagle Ridge(35) 2A	
Mounds View(2)	Academy of Holy Angels (31)x	Lourdes(86)x	Eastview (13) 3A	Holy Family Catholic(41) 2A	
Southwest(17)	Benilde-St.Margaret's(38)	Pelican Rapids(86)x	Highland Park (14) 2A	Dassel Cokato(42) 3A	
Irondale(15)	Marshall School(23)	Esko(77)	Eagan(16) 3A	Elk River (43) 3A	
St.Johns Prep(12)	Sartell(33)x	International Falls(115)x	Blaine (18) 3A	Bemidji (45) 2A	
Eden Prairie(4)	Delano(32)x	Mounds Park Academy(50)x	East Ridge (20)	Cambridge Isanti(48) 3A	
Edina(3)	Mankato East(34)	St. Paul Preparatory(55)x	Lakeville (21)	Alexandria (54) 2A	
				Grand Rapids (58) 2A	
				St. Charles (133) A	
		Need to tiebreak Mont/New London by who won most meets?			
3A - 17 schools-	2A - 11 schools	1A - 10 schools			
score range: 385-570	score range: 200-382	score range: 114-274			
	(y) - place last season				
	x - new addition to field				

Schools that would have been invited to the tournament but weren't: Holy Angels, Sartell, Delano, MN Valley Lutheran, New London Spicer/Montevideo, St Croix Lutheran, Lourdes, Pelican Rapids, International Falls, Mounds Park Academy, St Paul Prep

Schools that were invited but wouldn't have been: Washburn, International School of MN/Eagle Ridge, Holy Family Catholic, Dassel Cokato, Elk River, Bemidji, Cambridge Isanti, Alexandria, Grand Rapids, St Charles

The League Board will be making a final decision as to whether to implement the 3-tier system and in what manner at the Fall 2018 Board meeting.

Speaking of the State tournament, just a heads up...

The tournament will still be held at South St. Paul Senior High on Monday, March 12th, but some changes are being made to the timetable, due to the fact that SSPHS has spring break that week and the whole school is available to us. At the Board executive committee meeting on January 6th, the decision was made to move the timetable of the state tournament up about an hour. Instead of providing dinner, we will be providing lunch from 11:30 to 12:30. The invitational will start at 10:30 and will be given at SSPHS instead of the hotel. We anticipate the Math Bowl will start at 1pm and the tournament will start around 2, finishing around 4:30. Awards will follow and it is our goal to be all wrapped up by 5:15. Look for a more specific timetable in the tournament packet.

Don't Forget to enter these Contests!

Video Contest!

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 February 15th, 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!

State Meet T – shirt Design Contest returning!

Each year, the league provides t-shirts for sale to the tournament participants. Do you want to design the t-shirt for the 2018 State Tournament? If so, the one-color design should include these words: "MN State High School Math League", "State Tournament", and "March 12, 2018". Your one-color design should be emailed to mathleague@augsborg.edu in pdf file format by February 5th, 2018. Include name, grade, and school in your email submission. Winner will be notified by February 16th, 2018. The prize? A \$50 VISA gift card!

And don't forget you can take the AMC 10 or AMC 12 at Augsburg through the Math League

Math League now offering AMC 10 and 12 Competitions!

The MN State HS Math League will be offering the AMC 10 and AMC 12 (both versions A and B) to students whose school does not offer the test. The AMC 10/12 A is Wednesday, February 7th and the AMC 10/12 B is Thursday, February 15th. Students will be charged \$5.00 per person. Tests will be given at Augsburg University, from 4 pm to 5 pm. Look for the registration form on the League website.

If you want to take either test, please contact us by January 18th.

On each date, the number of students is limited to 30 for the AMC10 and also 30 for the AMC 12. For more information about the AMC tests, see <https://www.maa.org/math-competitions/amc-1012>

Two other 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!

Other Math Competitions open to Minnesota teams

Wisconsin State Universities that host a math competition during the year.

University of Wisconsin Eau Claire Math Department February 17th, 2018
<http://www.uwec.edu/academics/college-arts-sciences/departments-programs/mathematics/about/math-meet.cfm>

A good resource for problems from national and world competitions

The Art of Problem Solving
https://artofproblemsolving.com/community/c13_contest_collections

follow us on Facebook "Minnesota State High School
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 couple of word problems

#1

Noelle lives in Minnesota, but once had the pleasure of traveling to Germany during Oktoberfest. After getting tired of the festivities, she visited the neighborhood bookstore looking for a good read. While she perused the books, she noticed the locals (some decked out in their lederhosen and tyroleans) also checking out titles. She was struck by the way they held their head as they did this, reflecting that it was different than how she and others held their heads in bookstores back home. What was the explanation for this unusual "tip of the hat?"

#2

A Word Ladder from a Sporcle Calendar

Fill in the missing 4-letter word in each space. Each new answer will only change one letter from the previous answer

1993 Spielberg film: Jurassic _____

Bacon or ham: _____

Second largest Irish city _____

Prepare food with heat _____

1991 Spielberg film _____

Owl noise _____

Manager of a party _____

1981 Spielberg film: Raiders of the _____ Ark

1993 Spielberg film: Schindler's _____