Minnesota State High School Math League Newsletter

Issue #1 November 20, 2017

A message from the Executive Director, Tom Young

Good day to you. Welcome to the first of, I hope, many such newsletters. Feel free to contribute content as the year progresses!

Some thoughts regarding meet One: Several divisions were upset that they were asked to be very literal grading the tests. Many challenges were brought forth. That was good! It was disappointing that some divisions decided some cases on their own. The best way to insure uniformity across the state is for challenges to be adjudicated by a central body. So please, do not make decisions on your own – Challenge!

That being said, you'll note some latitude for grading in the Message from Tom Kilkelly (next page). **Divisions should mark answers as correct if the answer the student gives matches the League's answer using commutative and associative laws. Also, a decimal answer < 1 that omits a zero in the ones place (for instance, League says 0.5, student says .5) should be marked correct. And also, omitting the unit of measure is not cause for marking an answer wrong (as in Day 39 versus 39)**

OF PARTICULAR INTEREST *At the Fall Board meeting, Tom Kilkelly noted that astute students should study Absolute Value Inequalities for meet 2, Event A.*

Look later in the newsletter for information regarding the idea of moving to 3 tiers next year. We need your input. Also, please use the feedback page, on the scoring website, to give constructive criticism of each meet. Your suggestions help us improve.

I appreciate your passion for bringing great math problems to your students!

Meet One photos from Canterbury Division

Students taking test in Cafeteria

Coaches Grading Room

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

A Note from the Head of the Problem Writing Team

There were 68 challenges from the first meet, falling into four categories:

1) Problem Writer's Error

Event B Problem 4 - Due to my error of neglecting to state that the sides were all integers, the solution in the box was wrong. 42 challenges were made and we accepted 26 challenges with the following answers: $P > 26$, $26 < P < \infty$, $(26, \infty)$. We did not accept a finite set of values or just the symbol or word infinity.

2) Challenges Due to Stricter Grading Policy

Eight challenges occurred in Event B Problem 2 (where the answers listed were $\frac{5\sqrt{3}-5}{2}$, $\frac{5\left(\sqrt{3}-1\right)}{2}$, $2.5\left(\sqrt{3}-1\right)$, and $2.5\sqrt{3}-2.5$) and there were eight challenges in Event C Problem 2 (where the answer was $\frac{-10\sqrt{10}}{9}$). Obviously, due to the commutative and associative properties, there are several others ways to write these answers like $\frac{5\sqrt{3}}{2}-\frac{5}{2}$, $\frac{-5+5\sqrt{3}}{2}$, $-\frac{10}{9}\sqrt{10}$, $-10\sqrt{10}/9$, etc. **For the rest of the season we have decided to allow graders to accept answers that are variations due to the commutative and associative laws.**

3) Challenges That Should Have Been Determined at the Meet

There were four challenges to Event C Problem 1 (where the answer was $\frac{\sqrt{6}}{3}$). All of them wanted us to accept an answer of $-\frac{\sqrt{6}}{3}$ but in $\triangle ABC$, $m\angle A$ must be less than 180°, so the sin*A* must be positive.

4) Others – Only 6!

We accepted "$5 \div 2$" as "a quotient of two relatively prime integers." We accepted "$5\sqrt{2}\sin 15$" as numerically equivalent to $\frac{5\sqrt{3}-5}{2}$ even though we questioned whether trigonometric functions should be allowed in Meet 1 Event B. In Event B Problem 3, we accepted $\frac{5\sqrt{6}+5\sqrt{2}\tan 75}{2\tan 75}$ as numerically equivalent to $5\sqrt{6}-5\sqrt{2}$. Two other challenges to this problem were not accepted. Finally on the Team Event Problem 2, we accepted $\frac{\left(2-\sqrt{3}\right)\sqrt{12+6\sqrt{3}}}{6}$ as numerically equivalent to $\frac{3-\sqrt{3}}{6}$.

We have given the large number of challenges thoughtful consideration, proofread Meets 2 and 3 again, and hopefully there will be far fewer challenges in future meets.

Moving to Three Tiers?

Originally, the MN State HS Math League consisted of one tier, with all schools competing to advance to the State Tournament. Several years back, recognizing that larger schools have an advantage in sheer number of students, the Board decided to create two tiers.

Lately, several coaches have noted the difficulty of reaching the State Tournament for some of our smallest schools. Many coaches favor a move to three tiers. At our summer Math Coaches Conference, suggestions as to how to shape a 3-tiered system were discussed. Some of the ideas had divisions being realigned; some had divisions competing virtually; other plans had the scoring system changing.

A committee met this summer and forwarded a specific plan to go to three tiers. It was presented at the fall Board meeting and was tabled. The Board asked for more input, from coaches, regarding the idea.

Instead of presenting that specific plan just yet, or variations thereof, the League would like all coaches to discuss the merits of going to a 3-tiered system at Meet Two. Further, we'd like you to fill out two Google Form surveys regarding the idea.

Survey number one, asks you to weigh in on going to a 3-tiered system. It can be found at:

https://goo.gl/forms/7cCIKm4SFm0ZT0Op2

Responses should be viewable to all.

Survey number two asks you to weigh in on the structure of the time and day of the state tournament. It can be found at:

https://goo.gl/forms/ve0yGlcCyE1IIoos2

Responses should be viewable to all.

Please complete both surveys. A large response helps guide decision – making.

Look for continued information in upcoming newsletters.

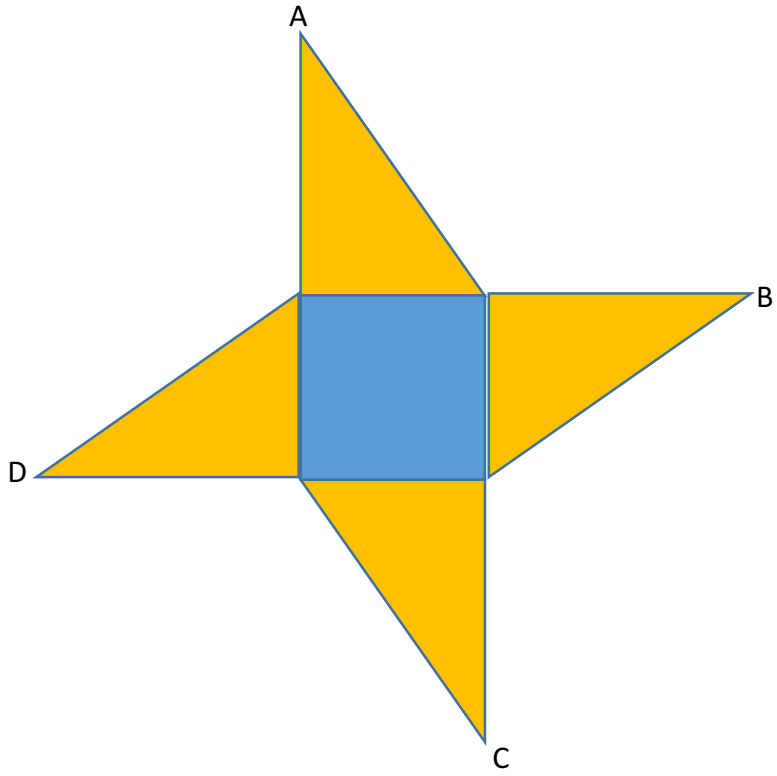
Problem Corner

an effort to spur conversation

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

An Trinh, a math team junior at Spring Lake Park HS, posed this problem:

In how many unique ways can four exterior 30° – 60° – 90° triangles be attached to the sides of a unit square? Specifically, one triangle is attached per side and the short leg of the 30° – 60° – 90° triangle will share its side with the side of the square. One such way is shown below:



Extension: Find the area of the quadrilateral created by joining the 4 outermost vertices. In the picture above, the quadrilateral would be ABCD.

Extension: Do a similar analysis with a regular hexagon and 6 exterior 30° – 60° – 90° triangles.

Other Math Competitions open to Minnesota teams

State Universities that host a math competition during the year.

Bemidji State University
http://www.bemidjistate.edu/news/2017/10/12/bemidji-state-hosting-900-high-school-students-for-45th-annual-math-contest/

University of Wisconsin Eau Claire
http://www.uwec.edu/academics/college-arts-sciences/departments-programs/mathematics/about/math-meet.cfm

St. Cloud State University
https://www.stcloudstate.edu/mathstat/math-contest/

Mankato State University
http://cset.mnsu.edu/mathstat/mathcontestflyer.html

National Competitions

Math Madness
http://aretelabs.com/math_madness/about

Purple Comet
http://purplecomet.org

Many more can be found linked at:
https://en.wikipedia.org/wiki/List_of_mathematics_competitions#National_high_school_competitions_.28grade_9-12.29_AND_lower

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

Speaking of competitions!

The MN State HS Math League sponsored 8 Students from Minnesota to compete in the Princeton Math Competition (PUMAC) at Princeton University, in New Jersey, on Saturday November 18th. They were William Cho, Jeffrey Huang, Richard Huang, Mark Pekala, Daniel Stein, Kevin Yang, David Zhang, and Alexander Zhu.

Coaches were David McMayer and Mikal Nelson

Results soon!