Minnesota State High School Mathematics League

Newsletter

Issue #9 December 11, 2018

A message from the Executive Director, Tom Young

Hello!

Meet two is almost a distant memory… seems that so much happens at this time of year. The second meet went much more smoothly than the first; the website worked beautifully.

We really appreciate the divisions (Canterbury, Iron Range, Classic Suburban, and Minneapolis) that provided feedback on the meet. It helped us gauge how well the meet went and helps us shape succeeding meets. If you haven't given feedback before, send us your thoughts in upcoming meets. Click on Meet Op > Meet Feedback.

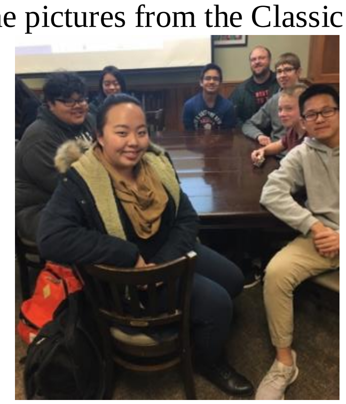
Also, **read about the Roberts Scholarship later** in this newsletter. Scholarships are offered to help offset the costs for students interested in attending an out-of-state math opportunity. They are offered once each year. A set amount of funds will be available each year, and multiple awards are possible. We want students to use these funds!

Another item to look for: We give the AMC 10 and AMC 12 to students whose school does not. See article for registration information.

Go Math League!

Meet Two: some pictures from the Classic Suburban Division

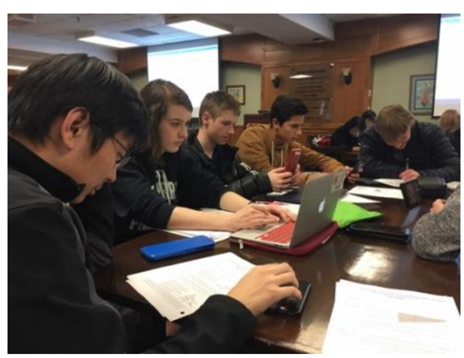
Dedicated Coaches



North St. Paul Polar Proud!

St. Thomas/Visitation dressed for success

Tartan rocking the Acute Nerd Hoodies



Hill Murray hard at work

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

The problem writing team was pleased with the caliber of the problems for meet two. We processed a total of 7 challenges on problems A2, C4, D1, and D2. The challenges on A2 and C4 were rejected. The PWT felt that the definition of a section was sufficiently clear and that the form of the question on C4 stated the necessity of "a.m." or "p.m." The challenges on D1 and D2 were granted as the students had equivalent forms.

One of the responses on the Meet feedback was that "Ceva's Theorem is not standard high school material, and should not be a 1 point problem." I disagree. The problem stated was a straight-forward application of Ceva's theorem and could be done quickly enough to be a 1 point problem. It is the job of the student and coach to study all topics listed in the topic list and to be prepared for such a problem.

Looking back to problem D1. The students that challenged were given credit because they had –.727 instead of –8/11. It was ruled that they followed the instructions which said "***Calculate*** the slope of the line 8x + 11y – 13 = 0." I am worried that some divisions gave credit for the answer:

$$y = -8/11\ x + 13/11$$

While no instance of this was reported, it is tempting to say that "the student knew how to do the problem." Do not be tempted to mark an answer correct, unless it is equivalent by associativity and commutativity. Please honor the challenge process to ensure fairness.

Good luck on Meet Three!

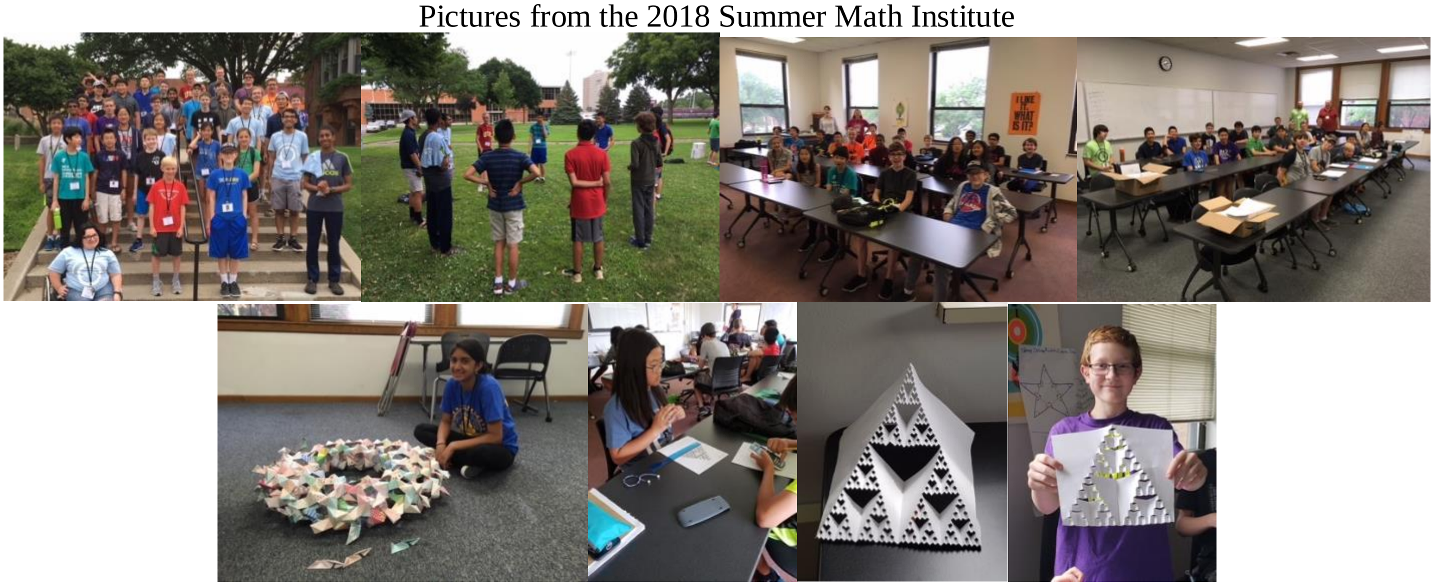
2019 Summer Math Institute

Look for more information in subsequent newsletters about the 2019 sessions. Tentatively they are:

7 – 9 Mathematics and Art

10 – 12 Theory of Equations

Pictures from the 2018 Summer Math Institute



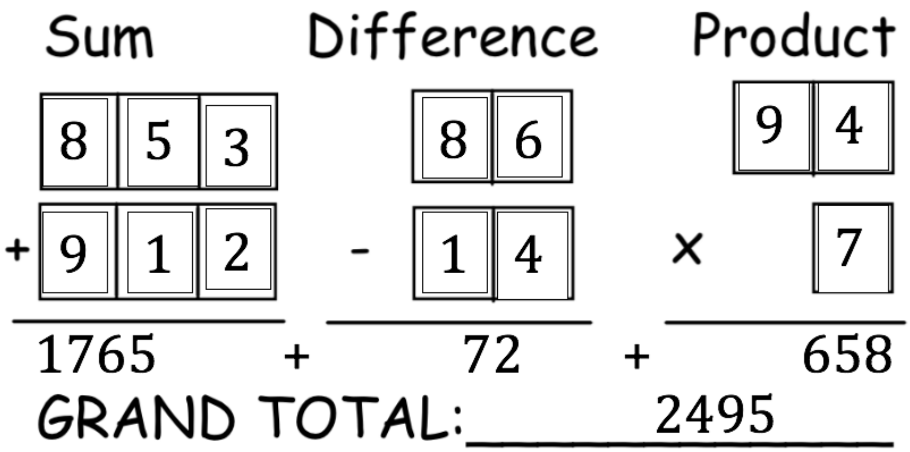
More Teacher Tidbits

(submitted by Mike Hilst, coach Spring Lake Park)

The Grandest Total ……. A great warm up for math team practice!

This is something that is simple to do and has a high level of engagement for the math teamers. Credit goes out to the "cyberworld", as I believe this was found on Pinterest.

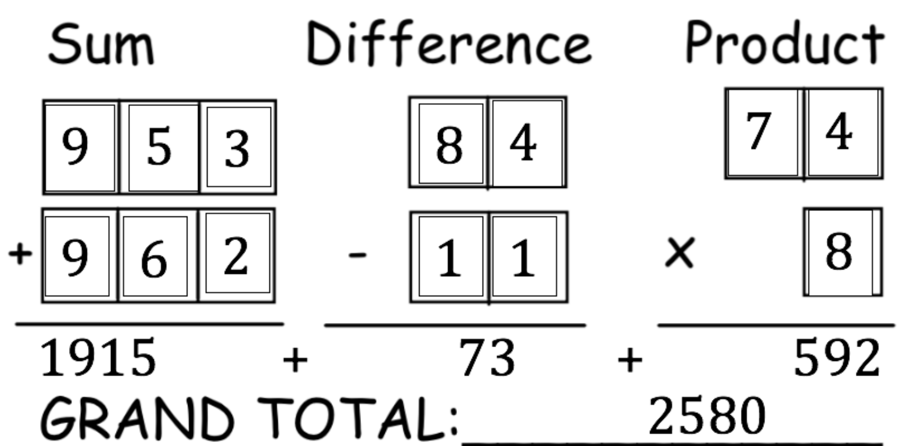
Students are given a gameboard, either on paper or electronically. One at a time, random integers from 1-9 are generated and students place the numbers in one of the boxes on the gameboard, hoping to create the "Grandest Total" by the end of the random number draw. A typical gameboard might look as follows:



While this result will likely NOT be the Grandest Total possible, most math teamers will have devised a strategy by which they place larger numbers in the spots where you see larger numbers in the example.

Where the fun really begins is when you start swapping numbers to improve your result. I usually start by copying the work of the student with the highest total on the whiteboard so all students can view it. Then, as a group, students suggest changes to create the true "Grandest Total". In the example above, for instance, the student could have had a higher total (by 9 points) if the one and the two in the sum were switched.

After making a few more moves, a "Grander Total" would have looked like this:

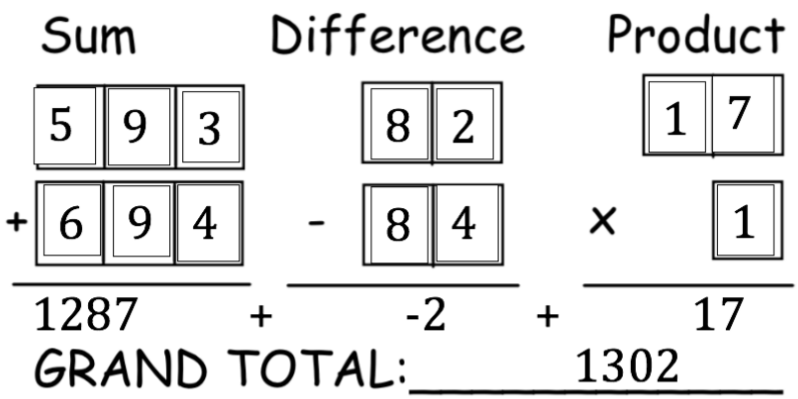


Is this the Grandest Total, or is there something even better that could have been done? (by the way, the answer is "yes," there is a Grander total.

After playing a round or two with the students, they typically get the hang of the strategies, which is when it would be time to switch things up. My favorite modification is this: Choose a number somewhere between 1000 and 1500 and see which student can get the closest to this number. This requires a whole different level of thinking, for as the numbers are drawn, strategy might need to change.

While the closest student may get within 20 points of your target number, it is amazing how often their gameboard can be refined to get even closer.

Using the same numbers from above, here is an attempt to get close to 1300:



Again, the question is asked "Can I get even closer?" (And once again, the answer is "yes")

This activity is one that gives all students a chance to be successful; to contribute to a larger group goal, and to even consider a little probability as the numbers are drawn. You can even modify the game to fit the needs of other groups. I chose to create a version intended for my AP Calculus class:

When $f(x) = \square\, x^2 - \square\, x$ find the Grandest Total of

Limit multiplied by Derivative minus Integral

$$\lim_{x \to \square} \frac{\square x^2 + \square x + \square}{\square x^2 + \square x + \square} \bullet f'(\square) - \int_{\square}^{\square} \left(\frac{\square}{\square}\, x - \square\right) dx$$

I suggest using the numbers 1 through 6 for the random number draw

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More Pictures from the Classic Suburban Division at Meet Two

Mahtomedi Men

Packers from South St. Paul

Smiling and Serious Sibley

Smiling and momentarily not-as-serious Simley

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, 2019

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

You can take the AMC 10/12 tests 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 A and B and AMC 12 B to students whose school does not offer the test. The AMC 10 A is Thursday, February 7th and the AMC 10/12 B is Wednesday, February 13th. Tests will be $10.00 per person. Tests will be given at Augsburg University in Minneapolis from 4:00-5:30 PM. Maximum number of students per test is 10. Email mathleague@augsburg.edu for a registration form.

More information on the AMC tests

Don't Forget to enter this 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@augsburg.edu) by March 1st, 2019. 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.

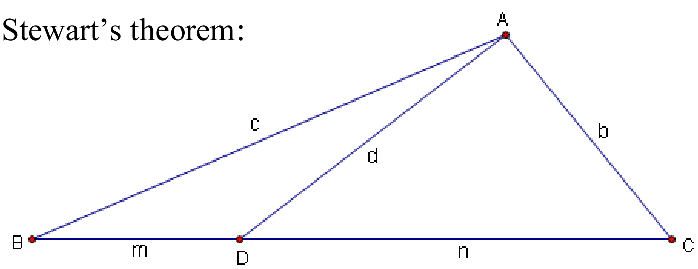
First prize: $200 to the math team at winning school
Second Prize: $150 to the math team at 2nd place school
Third Prize: $100 to the math team at 3rd place school

More Teacher Tidbits, this time from students!

(submitted by the mathletes from Spring Lake Park)

ARML students are often given the following mnemonic for Stewart's theorem:
(https://artofproblemsolving.com/wiki/index.php?title=Stewart%27s_Theorem)

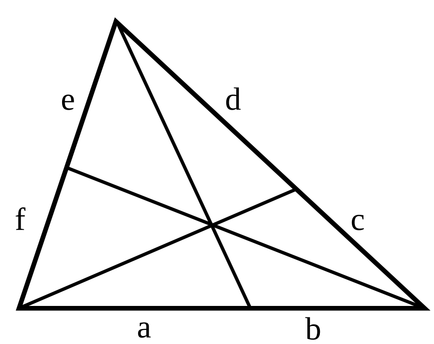
Given a triangle ΔABC with sides of length a, b, c as shown. If cevian AD is drawn so that BD = m, DC = n and AD = d, we have that $b^2m + c^2n = man + d^2a$. (This is also often written man + dad = bmb + cnc, a form which invites mnemonic memorization, i.e. "A man and his dad put a bomb in the sink.")



SLP students studied for Ceva's theorem in a similar way:

Given a triangle with concurrent cevians drawn as shown we have ace = bdf, a form which invites the mnemonic memorization

"A carp es a big darn fish." Where 'es' is Spanish for 'is'



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!

No solution to the problem from Newsletter 8 was submitted. Can you solve the problem?

(possible answer : 2,037,171)

NEW PROBLEM

https://college.lclark.edu/live/files/25503-sp18-pow-1

Lewis & Clark College

Department of Mathematical Sciences

Problem of the Week #1 (Spring 2018)

Let $x_1, x_2, \ldots, x_{2018}$ be positive integers. Find the smallest possible value for the quantity

$$(x_1 + x_2 + \cdots + x_{2018}) \cdot \left(\frac{1}{x_1} + \frac{1}{x_2} + \cdots \frac{1}{x_{2018}}\right).$$

Please justify your answer.