

Minnesota State High School Mathematics League

Over thirty years of challenging Minnesota math students.

Sponsored by Augsburg College

MN State High School Math
League
Augsburg College Campus Box
#190
2211 Riverside Avenue
Minneapolis, MN 55454

The MN All-State Math Team finished 8th in the nation at the American Regions Math League Competition on June 3, 2017.

The American Regions Mathematics League's annual competition brings together the nation's finest students. They meet, compete against, and socialize with one another, forming friendships and sharpening their mathematical skills. Since its inception in 1976, ARML has snowballed, burgeoned, and mushroomed into a national program, involving [well over] 2000 students and teachers from almost every state. Simply put, ARML is the World Series of mathematics competitions. The contest is written for high school students, although some exceptional junior high students attend each year. The competition consists of several events, which include a team round, a power question (in which a team solves proof-oriented questions), an individual round, two relay rounds (in which a contestant solves a problem and passes his/her answer to another team member, who uses this answer to solve another problem), and a super relay. [In all, 134] teams will participate [this year]. A team consists of 15 students, high school age or lower. The competition takes place the weekend immediately following Memorial Day. Most teams arrive on campus Friday afternoon, stay in University dorms, and leave the day after the competition. The competition begins early Saturday morning at Penn State, the University of Georgia, and the University of Iowa, and in the early evening on Friday at UNLV. (pulled from [this linked website](#) and modified)

http://www.arml2.com/arml_2017/page/index.php?page_type=public&page=home

The Minnesota Teams are coached by a group of ten teachers and ARML alumni. Over the course of four practices in May, they work to narrow a group of 150 hopeful students to a set of four teams of 15 students each. The sixty students on these teams this year represent 25 different schools across the state.

Our top team of 15 students from Minnesota scored 214 out of 300 possible points and finished 8th in the nation. Results can be found [here](#).

(http://www.arml2.com/arml_scoring_permanent/score2017/page_structure/page/index.php?page=public_scores&site=IOWA&div=ADIV)

The score earned by the teams that finished in 6th and 7th place were 216 points and 215 points respectively. It was a VERY close finish. For reference, last year, Minnesota finished 5th in the nation, narrowly beating a few teams that finished just below us.

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Three of the top students from Minnesota correctly answered 9 of the 10 individual questions and subsequently placed within the top 35 students in the nation (out of over 2300 talented math students at the competition). For reference, only five students nationwide earned perfect scores of 10 out of 10 individual questions and a *really* good student at the competition is able to correctly answer 5 out of 10 questions.

All ties after the individual questions are decided by set of three tie-breaker questions, presented in succession. The score of each student is the total time to correctly answer a question given a 600 second time limit on each question. An incorrect answer earns a score of 600 on that question. The first question is the hardest of the three and the last question is the easiest.

The following was the first tie-breaker question:

Compute the least positive N such that there exists a quadratic polynomial $f(x)$ with integer coefficients satisfying $f(f(1)) = f(f(5)) = f(f(7)) = f(f(11)) = N$.

Frank Lu, a sophomore from Minnetonka High School, correctly answered this question within 356 seconds. Frank finished in 18th place in the nation and earned a significant financial prize.

Michael Tang, a senior from Edina High School, correctly answered this question in a blistering 98 seconds, the fastest time in the nation. Michael finished in 6th in the nation and also earned a significant financial prize.

Frank Han, a sophomore from Eden Prairie, missed this question, but stormed back to correctly answer the second question in a blazing 47 seconds. Although Frank did not rank within the top 20 students this time, we are looking forward to all that he will accomplish over the next two years.

The second tie-breaker question was the following.

Cube $ARMLKHJC$, with opposite faces $ARML$ and $HJCK$, is inscribed in a cone, such that A is the vertex of the cone and edges AR , AL , AH lie on the surface of the cone, and vertex C , diagonally opposite A , is on the base of the cone. Given that $AR = 6$, compute the radius of the base of the cone.

For reference, the third tie-breaker question was the following:

Given that $\log_{b^3} a^2 + \log_{b^9} a^4 + \log_{b^{27}} a^8 + \dots = 1$, compute $\log_b a$.

As a group of coaches, we are extremely proud of what all of these students on the teams have accomplished this year. We look forward to another set of successes next year!

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