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### **Challenge Yourself!**

1. **MS A** Three grasshoppers play leapfrog along a line. At each turn, one grasshopper leaps over another, but not over two others. Can the grasshoppers return to their initial position after 1991 leaps?

2. **MS B** What is the area of the orange portion of this figure? The figure is formed by first inscribing a circle of radius r in a square. Then that square is inscribed in a circle, which is inscribed in a square. Finally, the resulting square is inscribed in a circle that is inscribed in a square.



3. **MS C** Farmer Jon has 100 goats, each worth \$121, and farmer Becky has 100 pigs, each worth \$105. Jon owes Becky \$1. To settle the debt, he gives her some goats and she gives him some pigs. How many goats and pigs were exchanged?

4. **HS A** How many different ways are there to roll a total of 12 with three standard six-sided dice?

5. **HS B** Prove that there are no equilateral triangles (in the coordinate plane) such that every vertex has integer coordinates.

# **Director's Report**



Kovan Pillai

Welcome to New York Math Circle's first newsletter! 2015–2016 has been a year of growth and change for New York Math Circle. Dr. Japheth Wood had an addition to his family and stepped down as Executive Director, although he remains actively involved in NYMC through the Board and has received an award from the MAA (MetroNY section) for his work with math circles. Dr. Kovan Pillai, who had been an NYMC instructor for a year, took over from Dr. Wood in June 2015, and has prioritized the expansion of the program to offer Sunday classes at NYU and increased course offerings for HS students at Queens College.

### **NYMC Enrollment**

Circle	Fall 2014	Spring 2015	Fall 2015	Spring 2016
MS	146	196	197	240
HS	111	122	144	147
Total	257	318	341	387

Under Dr. Pillai, our faculty has also grown. Since September, we have welcomed Thomas Redis, Barry Weng, Maggie Feurtado and Tim Evans to our faculty, all of whom have both strong problem-solving math backgrounds and extensive classroom experience. We are also proud to announce that in Fall 2015, Fred Galli received the Sloan Math Teaching Award. It is our goal to continue to increase our offerings both on Saturdays and Sundays.







Maggie Feurtado

Barry Weng

Thomas Redis

Tim Evans

# Support Us!

It would be remiss of me not to mention some obstacles we face in our expansion. We keep costs low, without sacrificing quality, to make our classes affordable. However, we have recently lost free use of **Queens College** space and are now incurring significant charges, forcing us to review our rental options.We are grateful to the Center for Mathematical Talent for arranging space at NYU. We are also grateful to the many donors whose support has been a vital part of our success. Please become a supporter!



Now challenge yourself and see how many problems you can solve!

# **Challenge Yourself!**

#### Alumni News

6. **HS B** A penguin takes a random walk on a long ladder, starting at the intersection of one of the rungs and one of the sides. Every second she moves, with equal probability, either to the other side of the ladder (on the same rung) or up or down one rung (on the same side). However, she only moves up on one side of the ladder, and she only moves down on the other side. Find the probability that, after one minute, the penguin is back where she started.



7. HS C In  $\triangle ABC$ , the points *E* and *F* lie in the interiors of sides  $\overline{AC}$  and  $\overline{BC}$ , respectively, so that AE = BF. Furthermore, the circle through *A*, *C* and *F* and the circle through *B*, *C* and *E* intersect in a point  $D \neq C$ . Prove that the line *CD* is the bisector of  $\angle ACB$ .

8. HS D Solve in the naturals:

$$55(x^3y^3 + x^2 + y^2) = 229(xy^3 + 1)$$

9. Extra Challenge 1 A square piece of paper, eight inches on a side, is folded so that one corner meets the midpoint of the opposite side, as shown. The paper is then unfolded. What is the length of the crease?



10. Extra Challenge 2 Show that, given any positive integer k, there exists a Fibonacci number ending in at least k zeros.

Solutions to appear on our website at the end of summer.



Calvin Lee with USA Team in Romania

NYMC would like to congratulate an amazing mathlete and former NYMC student, **Calvin Lee**, on winning an individual silver medal, and the U.S. team on winning the gold medal at the 8th Romanian Master of Mathematics (RMM). Calvin was honored to represent the United States at RMM, stating "I enjoyed wrestling with the problems, exploring Bucharest with my teammates, and meeting math-loving people from around the world."

While Calvin studied at Stuyvesant HS, he did not complete his senior year of high school. Calvin was admitted to MIT in his junior year. He was also a student at NYMC from 2011 to 2013. "NYMC was among my earliest experiences in the world of mathematical problem solving. I learned not only a beautiful selection of mathematics, but also a way of approaching challenging problems which has served me well to this day. I am also grateful for all the continued support and encouragement from the faculty and staff."

RMM took place from February 24–29 in Bucharest, and is one of the toughest math contests in the world. There were 17 different teams from 16 different countries participating in this challenging math contest. Each contestant worked through six problems over the course of two days. It was an extremely close contest as the U.S. scored 73 points, beating U.K. with 72 points, for the gold medal. Two U.S. team members won individual gold medals, three won individual silver medals including Calvin Lee, while one member won individual honorable mention.

The following alumni responded to our **online survey** - if you want to be included in our next newsletter, please contact us.

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**Max Fishelson**, former NYMC student during the period 2010–2015, is a senior at Stuyvesant H.S. and will be attending MIT in September 2016. He participated in multiple math competitions including ARML, NYSML, USAMO, USAJMO, AIME, Local MATHCOUNTS, Chapter MATHCOUNTS, State MATHCOUNTS, NYCIML, NYML, HMMT and PUMAC. Some of Max's recent achievements include being qualified for USAMO in 2015 and 2016, co-captain of NYC and Stuyvesant's math teams from 2014–2016, and co-captain of the nationwide ARML math team, winning 7th place in 2015.

**Zachary Marcone**, a current student at Columbia University, participated in NYMC's HS Summer Program in 2013. He participated in AMC, the Suffolk County Math Contest, and the Suffolk County Math Tournament. Congratulations to Zachary on receiving the Rabi Scholar at Columbia University, the most prestigious math/science undergraduate recognition in the institution.

#### Alumni News (cont.)

Adam Granger, a student at NYMC from 2013–2016, was accepted to Manhattan College. His summer plans include attending NYMC HS Summer Program - Level C. Some of his notable achievements include the National Honor Society, Lasalle Honor Society, and Presidential Merit Scholarship at Manhattan College.

Congratulations to **Alisher Khodjaniyazov**, a student at Brooklyn Studio Secondary School, for winning 2nd place in the Tashkent District Math Olympiad. He was enrolled at NYMC during 2014–2015, stating NYMC HS Summer Program was "one of the best math experiences I had in my life. You are surrounded by people who love math every day for more than 5 hours." Best of luck in Stony Brook University!

A current student at MIT and alumni of NYMC (2011-2012), **Justine Jang**, participated in in ARML, AIME, Local MATH-COUNTS, Chapter MATHCOUNTS, and State MATHCOUNTS.

Previously a student at NYMC in 2011, **Edward Fan** is graduating from Trinity H.S. and will attend MIT in the Fall of 2016. Edward participated in AIME, Local MATHCOUNTS, Chapter MATHCOUNTS, and State MATHCOUNTS competitions.

Best wishes to **Dessie DiMino** for her acceptance to CalTech in the Fall of 2016. She was a NYMC student in 2011–2012, and participated in the Local MATHCOUNTS competition. Dessie plans to major in computer science at CalTech. She was involved in the Garcia MRSEC summer research program, an Intel Semifinalist (Tissue Engineering) and attended the Girls Who Code Summer Immersion Program.

Congratulations to **Joseph Mogrovejo**, alumni of NYMC in 2011, for his acceptance to CUNY Hunter College!

#### **Current Students News**

**Congratulations to our NYMC mathletes!** Based on responses to a recent online survey, the following NYMC students excelled in local, regional and national math competitions:

Math Kangaroo: Paul Gutkovich, Arun Rau, Eric Tang

**MOEMS:** Paul Gutkovich, Adi Vidur Jasuja, Lennie Ma, Jansen Wong

**MathCounts Chapter:** Tyson Boynton, Rishabh Das, Rachel Joh, Adi Vidur Jasuja, Lennie Ma, Benjamin Wang, Mario Tutuncu-Macias, Jonathan Zhang

MathCounts NY State: Rachel Joh, Adi Vidur Jasuja, Lennie Ma, Mario Tutuncu-Macias, Jonathan Zhang

**AMC8**: Paul Gutkovich, Adi Vidur Jasuja, Eliana Liriano, Christopher Lo, Lennie Ma, Mario Tutuncu-Macias, Arun Rau, Jansen Wong, Jonathan Zhang

**AMC10**: Adi Vidur Jasuja, Christopher Lo, Lennie Ma, Bill Ni, Mario Tutuncu-Macias, Jansen Wong, Jonathan Zhang

NYCIML: Michelle He, Wilson Zhao

AIME: Chelsea Chen, Michelle He, Jonathan Zhang

**USAMO or USAJMO**: Kailas Amin, Serina Hu, Brian Huang, Vaughan McDonald

**Keep up the good work!**. We know there are many more accomplished students out there - if you wish to be included in the next newsletter, please respond to our next online survey.

#### **Summer Plans**

Registration for the **2016 MS Summer Program** is now open! You can register here:

REGISTER NOW

The **2016 HS Summer Program T-shirt design competition** Every year, each participant of the NYMC High School Summer Program receives a NYMC T-shirt. We are looking for a new great design for the 2016 T-shirt and are inviting our current students and alumni to come up with one! The top design will get one of this year's T-shirts. For details,



Due to last minute cancellations, a few spots are available in the **2016 HS Summer Program**. Please email info@nymathcircle.org if you are interested. More information is available at

https://nymathcircle.org/summer