

# Reckoning with Randomness

by Victoria Xia



Math Prize for Girls, sponsored by the Advantage Testing Foundation, is a national competition for middle and high school girls. Each year, about 300 girls are invited to participate based on their scores on one of the American Mathematics Competitions (AMC) exams. With a grand prize of \$25,000 (and another \$23,000 to be distributed among the other top ten finishers), Math Prize offers the largest monetary prize of any high school math competition in the world. Girls may win a maximum of \$50,000 over multiple years of competition. Victoria Xia hit her maximum last year; here, she explains why she's still going back.

**A**s I write this, the fifth annual Math Prize for Girls is scheduled to take place in September at MIT, and I'll be returning to potentially continue my two-year winning streak. I've been asked a few times if I think I'll be able to pull it off. My answer: I wouldn't bet on it.

At any high school math competition there will be at least a handful of kids who could all easily take first place. Depending on who is lucky enough to have the test contain more problems of their favorite type, and also on how each contestant feels on that particular day, results can be shuffled around quite a bit. I consider myself to have gotten lucky twice in a row with Math Prize; had slightly different problems been chosen, I might not have a champion title to defend at all. Because each year's test has only 20 problems, one careless mistake or clever insight can bump a contestant many ranks.

At first glance, this randomness seems to imply a rather dark conclusion:

Regardless of the raw skill level I bring to a competition, I can't say with any confidence I'll take first place. However, there is also an inspiring flipside: Because many competitors likely have very similar raw skill levels, each additional practice problem I solve could give me an extra edge and gain me a few ranks. This competitive spirit helps me push myself to keep practicing and improving, but, ironically, I've learned that excessive competitiveness during the actual contest can harm more than it helps.

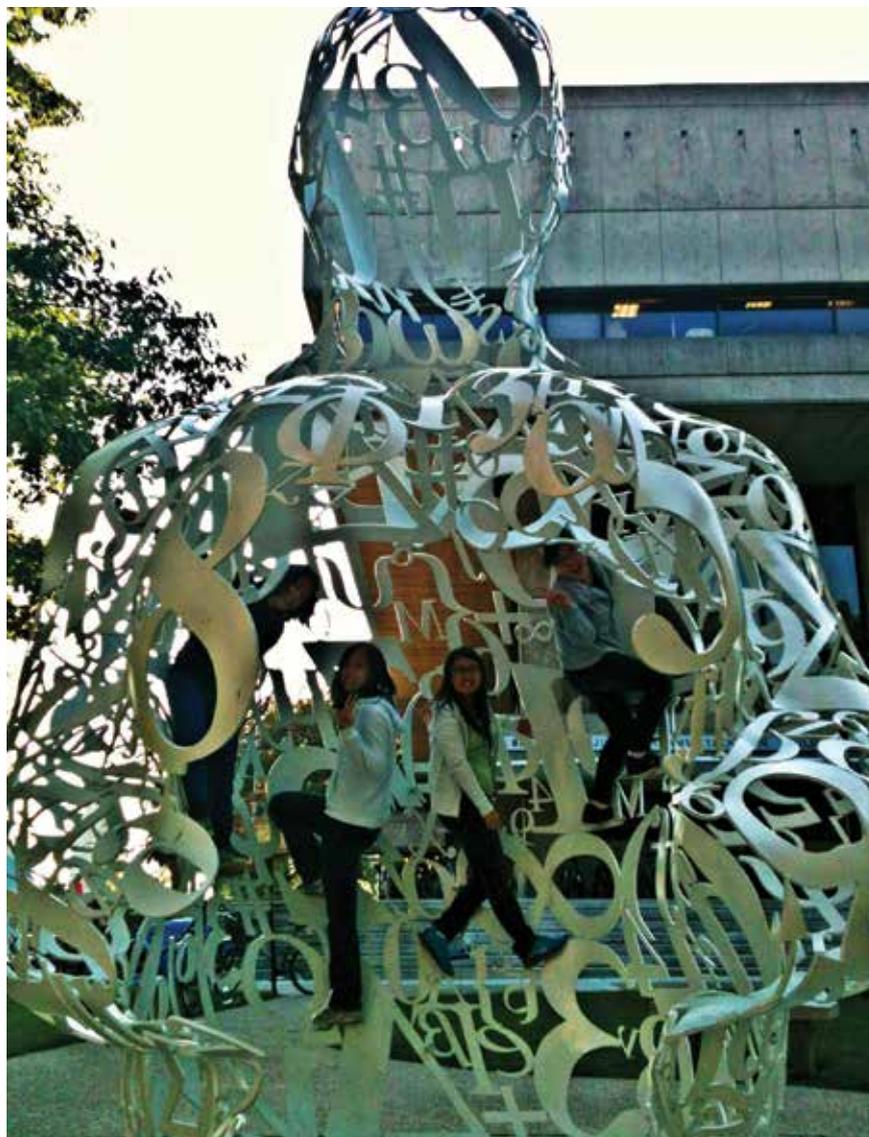
At the first ever Math Prize for Girls, in 2009, I was an eighth grader and also the only student below tenth grade to place among the top twelve girls. At the time, I was certain I'd return the next year and do even better. Seven of the girls who'd placed higher than I did were seniors. Surely, once they graduated, I would be in a position to win big.

The next November, as my dad and I were preparing to drive to New York for the 2010 Math Prize, my competitive nature started to kick in. My focus was on the prize.

### **A New Approach**

I liked math throughout middle school, but I only started loving it after entering Thomas Jefferson High School for Science and Technology (TJ) and practicing and traveling with TJ's math team. TJ's upperclassmen introduced me to Olympiad-style (proof-based) math, eventually leading me to qualify for the Mathematical Olympiad Summer Program (officially MOSP, but popularly MOP) at the end of freshman year. Each year between 50 and 60 students from around the nation are invited to MOP based on scores from the USA Math Olympiad and Junior Math Olympiad. MOP serves as the training ground not only for the U.S. International Math Olympiad team but also for the girls' teams that compete at the China Girls Math Olympiad (CGMO) and the European Girls Math Olympiad (EGMO). Since freshman year, I've been to MOP three times, CGMO twice, and EGMO once. Attending a three-week-long summer program where the schedule consists essentially of math, pure fun, and sleep is the best recipe for creating lasting friendships I've ever experienced.

Naturally, these ties were strengthened by spending another week with the same group of math-loving girls, this time halfway around the world. Imagine giving a



teenager a week to hang out with a handful of old friends in a new country. Surely you're imagining a lighthearted atmosphere with plenty of sightseeing, picture-taking, and joking around. Now add in an opening ceremony the day after the group arrives, math tests the next two mornings, and a closing ceremony toward the end of the week. On the same schedule are many other similarly sized groups of girls, representing various countries. Now you've got a decent idea of what CGMO and EGMO look like.

Who knew that exploring parks in Shenzhen, practicing haggling, and learning aerobic dance for the CGMO Dance Competition—let alone running scavenger hunts through downtown Cambridge, punting down the River

At Math Prize 2012, Victoria poses with friends from TJHSST on MIT's *Alchemist* statue.



**Left:** Punting down the River Cam with friends from EGMO **Right:** Lining up tiles for the domino competition at CGMO

Cam, and feasting on authentic fish and chips—could all be a consequence of doing math? The best part, though, is the lasting friendships— cliché, maybe, but utterly true.

### Lesson Learned

Catching up with these friends is top priority for me in Boston at Math Prize 2013. Also high on my list are exploring Boston with other girls from TJ and meeting some new faces, which should be easy to do at Games Night, held the Friday before the competition. Of course I also expect the math itself to be enjoyable, and then, somewhere much lower on the list of importance, are the results of the competition. I know I'll enjoy the trip and return home with fond memories. I've already won without even taking the test.

Compare this mindset to my prize-focused attitude in 2010. By focusing on winning, I set myself up to lose, regardless of how I placed. Even if I won the prize money, I would have missed out on interacting with other competitors, which I now know to be the most meaningful part of the experience. And if I didn't win the prize, I'd come back with nothing at all. The fear of leaving empty-handed created so much pressure that I was uncharacteristically nervous. Like many people, I don't perform well when I'm nervous. In 2009, I was one of five girls who tied for 8<sup>th</sup> place, but in 2010, I was one of eighteen tied for 18<sup>th</sup>.

By the time I competed in Math Prize 2011, I'd had my first MOP and CGMO experiences, and my competition mindset had shifted. I put much less emphasis on results. And I took home the grand prize in both 2011 and 2012.

### At the End of the Day

I can't say for sure why 2010 was the only year I didn't place in the top twelve. Maybe it was the false pressure I put on myself. Maybe I was unlucky that year; maybe I was lucky the other three. What I can say is that even had I placed the same in Math Prize 2010, 2011, and 2012, I still would've enjoyed the later two experiences astronomically more than the first.

To most on the outside, a math competition is just what it sounds like: a bunch of people get together and compete by doing math. But veteran mathletes know that the competition is just the stem that supports the flowers. Each competition also presents an opportunity to make new friends, catch up with old ones, and learn from the other creative minds gathered in the same place. Ten years from now, contest results won't matter much, but the friends I've connected with certainly will. **i**



**Victoria Xia** first became involved with math contests when she joined her school's MATHCOUNTS team in sixth grade. Since then she's qualified for MOP, earned gold medals at both CGMO and EGMO, won Math Prize, and traveled with TJ's math team to Princeton, Duke, Harvard, and MIT for their respective high school math

contests. As a senior she's serving her second term as captain of TJ's varsity math team, which allows her to give back to the math community and work with younger students. Aside from math, her interests include computer science, physics, chemistry, and tennis.

Editor's Note: Victoria Xia placed 2<sup>nd</sup> in the 2013 Math Prize for Girls competition.