2022 European Girls' Mathematical Olympiad

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Introduction:

The European Girls' Mathematical Olympiad (EGMO) is an international competition in mathematics for girls around the world. The EGMO is held every year in Europe, and many countries around the world participate in it. The EGMO contest is written in two consecutive days, each day consisting of 3 problems to be solved in 4.5 hours. This year, the EGMO was hosted in Hungary with 57 participating teams and 222 contestants.

Experience:

Starting in February, the team has had weekly training sessions up until the actual contest in April. Each weekend our team leaders organized wonderful guest lectures on various different topics in math, covering various topics in number theory, algebra, geometry and combinatorics, including homothety, inversion, collinearity, inequalities, tiling, and linear algebra. After each lecture, we were given some topic-related problems to practice on and enhance our understanding of the lecture. I have learned a lot during these training sessions and they opened my eyes to problem solving techniques I didn't know before.

Due to the ongoing effects of Covid-19, our team wrote the EGMO in a hotel in Toronto instead of traveling to Hungary. Our four participants, including me, Emma Tang, Kathryn Dou, Miranda Zhao, and our team leaders Mariya Sardarli, Elnaz Hessami Pilehrood lived in the hotel and used the hotel's meeting room as our testing center. This year, EGMO took place on April 8th and 9th from 6:30 am to 11:00am EST each day.

On the morning of April 8th, our team wrote the contest while proctored by our team leaders Mariya (in person) and Dorette (over Zoom). Problem one was a geometry problem. The question was relatively simple as it only required cyclic quadrilaterals and angle chasing to solve. All of my teammates got 7s on this problem except for me, as I failed to recognize the cyclic quadrilateral in the problem. Problem two was a functional equation problem. Everyone in our team managed to find solutions to the functional equation but failed to justify our solutions fully, resulting in partial marks for everyone. Problem three was a number theory problem, and it was the most difficult problem of the day. I solved the question by identifying the non-increasing property of the sequence, resulting in a 7. The rest of my teammates did not have enough time to think through the problem (as they spent more time on problem one), resulting in zeros or partial marks.

On the afternoon of April 8th, our team visited the University of Toronto where we met many female mathematicians over a Zoom panel. The speakers of this panel gave us lectures and shared their experiences as women in STEM. The lectures on interesting math topics further strengthen my passion for math and determination to pursue a career in math. The personal experiences shared also exposed me to the challenges women face in the area of math, and the implicit and explicit discrimination in such a male-dominated field. At the end of the panel, I was deeply inspired by these amazing female mathematicians.

On the morning of April 9th, our team wrote the exam while proctored in person by our team leaders Mariya and Elnaz. Problem four was a number theory recursive relation problem. This problem was fairly easy, our entire team solved it resulting in three 7s for my teammates and a 6 for me as I made a minor error in my solution. Problem five was a combinatorics problem on tiling. I solved this problem using reflections and symmetry, resulting in a 7. My fellow teammates each found insights of the problem but didn't piece together an entire solution, resulting in partials for everyone else. Problem six was an extremely hard geometry problem. No one in our team solved the question fully but we each got 1 point for the work we put down.

This year, Team Canada has received three silver medals and one bronze medal. Team Canada ranked 11th amongst all 57 participating countries, the highest we've ever been in history! Great job, 2022 team Canada!

Reflection:

As a female mathematician, I have noticed the gender imbalance in the field of math. When I took invitational contests such as the AIME or the CMO, I noticed that the vast majority of the participants were male. When I took the HMMT this year, I was the only girl in the team of eight. Interestingly, I rarely saw the lack of girls in school math courses such as Advanced functions, Calculus and Vectors, as well as other STEM subjects such as Physics, Chemistry, and Computer science. The girls in these courses often do just as well as boys, but rarely extend their interest in STEM beyond the school curriculum. I believe this is because girls are often discouraged to study math deeply due to the ongoing stereotypes that girls are not good at math. Although my parents have greatly supported my interest in math, I have met other girls who had their interest extinguished at a young age because of social expectations. Oftentimes, girls are discouraged to study math beyond the school curriculum because girls don't "need" to be too good at math, and doing well in school is "good enough" for them.

I often found it hard to connect with other girls who have similar interests in math. In fact, out of all girls I knew to be interested in math, I've met most of them through the EGMO TST last year and the EGMO this year. Participating in the EGMO was a marvelous experience for me. It pushed me further as a mathematician and gave me the

rare opportunity to meet other female mathematicians. I am incredibly grateful for having this opportunity to be in such a supportive and inspiring community.

Acknowledgement: