Introduction

This year, I had the immense pleasure to represent Canada at the European Girls' Mathematical Olympiad (EGMO). Having participated in EGMO in 2019, my spectacular experience only made me more excited to be on the team again in 2020 with three other girls—Amelie, Anna, and Jennifer—under the guidance of our Leader Dorette Pronk and Deputy Leader Diana Castaneda Santos.

EGMO was unlike any other math experience. EGMO has challenged me, supported me, and pushed me beyond what I could ever achieve alone. Through EGMO, I broadened my mathematical knowledge as I immerse myself in the joy of problem solving and found belonging among a supportive international community of girls who are passionate about mathematics like me.

The Many Unexpected Turns

Different from previous years, EGMO 2020 took place in our homes due to the COVID-19 pandemic. According to plan, the contest was supposed to take place in Egmond aan Zee in the Netherlands. The committee promptly cancelled the in-person competition at the outbreak of COVID-19 and announced later that it would be replaced by a virtual competition conducted at our home countries.

The team received multiples stages of training in the months preceding the competition. The four team members as well as two substitutes (Rachel and Laura) were invited to a 4-day training camp at The Fields Institute. I found this experience extremely beneficial, as I expanded my skill set in lectures and developed my problem-solving abilities as I collaborated with my peers. A typical day at training starts with us gathering at the lobby of the hotel and eating breakfast together as the leaders brief us on the day's timetable. Our training came in different formats, including lectures, which typically happen in the mornings and afternoons, problem-solving sessions during the evening, and mock Olympiads from time to time. After a long and demanding day of math, the team, leaders, and lecturers would bond during heartfelt discussions about women's challenges in mathematics, or a light-hearted Escape Room outing—all of which helped me connect with my teammates and coaches on a deeper level. Topics we worked on during the training camp include invariance, functional equations, homothety, and number theory with coaches and previous EGMO members. We ended the training camp with a mock Olympiad as an opportunity to reflect on our learnings and test-taking strategies.

While we were all disappointed when the EGMO cancellation was announced in late-March, we were nevertheless grateful for the opportunity to participate remotely. Upon discussion with our team leaders, we agreed on Thursday and Friday mornings as our contest window.

Writing the contest at home provided us an additional layer of comfort but posed multifaceted challenges to each of us. It eases the stress and distraction due to travelling, time difference, and being in the same room with more than 200 other contestants, but also takes away the excitement and the community feeling.

Despite not being able to enjoy EGMO's rich social offerings in the Netherlands, the host provided us abundant opportunities to connect with each other and celebrate our achievements. The Opening Ceremony was streamed on YouTube, where all countries' photos were shown. I was especially excited when Canada's team photo was shown. I was so incredibility proud of and thankful for how much I have achieved as the result of the support from my peers on the team and sense of community that we have forged during our training camp at the Fields Institute and throughout the past three months of training.

EGMO is a demanding competition. It requires extreme focus during a prolonged period of time. Team meetings with our leaders and teammates on days preceding the contest helped to alleviate my anxiety, zoom out to look at the bigger picture, and refocus on the pure joy of problem solving.

Upon the conclusion of the competition, I was excited to join the discussion about contest problems on the EGMO's online forum and social media. Although we speak different languages, live in different countries and time zones, and attend different schooling systems, when we solve a problem, our lines of logic and road bumps resemble each other to great extents. I find this truly remarkable.

Various social activities were held in days after the contest. Many girls took part in an online Bingo contest. I chatted with a few girls from Costa Rica, the Netherlands, and Ukraine. Team Canada viewed the Closing Ceremony together over Zoom.

Difficult times have demonstrated that we're all incredibly interdependent.

EGMO is a competition, but more a celebration

EGMO is no doubt a demanding competition, but it is more a celebration of our hard work and achievements, a quick pause to look back at our paths and reflect upon how far we've gone and friendships we've formed along the way. Team Canada was proud to take home 1 Silver Medal, 1 Bronze Medal, and 1 Honourable Mention. Canada ranked the 30th among all 53 participating countries.

This year's competition has one combinatorics problems, two geometry problems, two algebra problems, and one number theory problem. However, most problems require techniques from multiple disciplines. For me, I found the overall difficulty of the problems had significantly increased from previous years. Topics like tiling and invariance that have frequently occurred in EGMO did not appear on this year's contest. The grading scheme was also stricter. For example, the first problem requires two proofs, for the forward and backward direction. I completed the backward direction but did not receive partial marks.

Last words

As a female mathematician, I had grown used to the gender imbalance in math teams, math camps, and advanced math classes. When I started the Math Club at my school, I was the only girl in a club of 20. The societal and cultural expectation for girls to not be good at math have been ingrained in minds of many, even girl mathletes like me.

Many call the gender-imbalance phenomena "meritocracy." There is a tendency that we explain the lack of girls with a "survival of the fittest" argument—the lack of girls is a mere coincidence.

However, this is not the case. And EGMO is here to change people's perception about it. It brings out girls' mathematical talents that went under-noticed; it calls upon countries to take a proactive stance in training aspiring girls. For me, EGMO was the first time where I did math among so many ambitious, intelligent, and confident girls. Despite the absence of male competitors, the atmosphere was no less empowering and inspiring than at any other competition. In a male-dominant field, providing girls with additional opportunities has crucial value in promoting equal gender representation. Due to many social and cultural reasons, girls—often considered less "talented" and not "suitable" to study math—are exposed to less resources and opportunities to develop an interest. EGMO, with its primary goal of forging a supportive and inspiring community, makes up for this shortage of opportunities. A number of the EGMO problems are more approachable—first steps and initial observations are usually attainable for almost all participants. While complete solutions require the same kind of ingenuity and creativity as the solutions to IMO problems, they lack the hyper-competitiveness of the International Mathematical Olympiad or Romanian Master of Mathematics. This is especially encouraging—it presents girls an accessible path that they can pursue and gives them a sense of achievement.

Participating in the EGMO, I expanded my mathematical skillset, developed mathematical intuition, and immersed myself in the pure joy of problem-solving. I became acquainted with a community of supportive and enthusiastic female mathematicians and gained confidence to continue pursuing mathematics. I've also acquired friendships that have and will last longer than the span of the competition. I was extremely lucky to have these opportunities and can only wish that more girls will have the chance to participate and become similarly inspired.

Acknowledgement

There are many people that I'd like to thank. I could not have achieved what I have achieved without the support from my family, friends, and coaches.

I'd like to thank my leaders, Dorette and Diana, who helped us, challenged us, and took care of us during Winter camp and the EGMO training camp. They have meticulously scheduled our days so that our lectures cover a variety of topics and always remembered to sprinkle in some fun after a long day of problem solving. Thank you for grading our problems, putting together mock tests, and providing constructive and comprehensive feedback for our work.

I'd like to thank my lecturers—Jacob, Dani, Mike, Elnaz, and many more—who have taken time out of their busy schedule to support us.

I'd like to thank my teammates—Amelie, Anna, and Jennifer—for supporting each other. They are people who I comfortably laugh with and laugh at. Thank you for making our times together always enjoyable.

I'd like to thank CMS and the organizers of EGMO 2020. The competition this year has taken many unexpected turns. It was their tireless work that made EGMO possible. They have just done as much behind the scenes, especially in this time of uncertainty. Thank you for supporting the cause of dispelling the gender disparities in mathematics and thank you for supporting us.

I'd like to thank our sponsors— The Samuel Beatty Fund, University of Waterloo, the Actuarial Foundation of Canada, NSERC, University of Regina, and the RBC Foundation—for funding our training. We have learned and grown so much as aspiring mathematicians due to your generosity.