

2023 Samuel Beatty Report
12th European Girls' Mathematical Olympiad (EGMO)
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Introduction

The European Girls' Mathematical Olympiad (EGMO) is an international competition for female-identifying students from all over the world. The competition is written over two consecutive days, with each day consisting of 3 problems to be solved in 4.5 hours. This year was the first fully in-person competition since 2019; it was held in Portoroz, Slovenia with 55 participating teams (38 official European teams) and 213 contestants.

Preparation

This year, the Canadian Mathematical Society organized two training opportunities for the Canadian EGMO Team. The first was a four-day camp, and the second was an online training session.

Our in-person camp was held in downtown Toronto over four days. Days at our camp consisted of problem-solving sessions and lectures taught by Anna Kelley, our team leader. Our lectures covered several Olympiad topics and techniques, including p -adic values, monovariants/invariants, and geometry fundamentals. On the third day of the camp, we wrote a 4.5-hour practice test to simulate the EGMO competition conditions.

The camp experience was unforgettable. I especially loved meeting my teammates! We bonded not only as we explored difficult math problems, but also as we wandered around the streets of downtown Toronto, tried (and, for me, failed) skating in Nathan Phillips Square, and giggled over warm ramen bowls and refreshing ice cream. (There was no better way to spend my eighteenth birthday: new friends and math!)

After our camp, the CMS organized a 2-hour lecture and problem-solving session led by Mike Pawliuk on the subject of the Pigeonhole Principle.

Arrival

After many years of virtual EGMOs, our team members were ecstatic about the opportunity to attend the competition in Europe! Team Canada arrived during the afternoon of April 13, eager to meet fellow female mathematicians and settle in after a long day of travel. Even though the weather was rather moody that evening, we were thrilled about the breathtaking views of the sea at the port. That night, our Slovenia guide, Brina, greeted us at our hotel doors with delicious Slovenian candy and snacks.

The second day opened with a Treasure Hunt to allow contestants to explore the beautiful town of Portoroz and its neighbouring towns Piran and Lucija. Several engaging riddles and games were scattered throughout the area; some of Team Canada's favourites included the five-legged obstacle course, the "spot the teddy bear" challenge, and the cup pong race. Cordelia was brave enough to step into the cold seawater; the rest of us were not so courageous, unfortunately!

The highlight of this day was the opening ceremony, which marked the official beginning of the Olympiad, where we showed off our funny Canadian flag headbands! We snapped our annual picture with the American EGMO team, who asked us to borrow our headbands.

The Competition: Day 1

The first day of the competition began at 8:30 am the next morning. Although a little jet lagged, we were excited, nervous, and ready to tackle the contest.

The first problem asked the contestants to prove a statement about an algebraic sequence. While the problem initially seemed complex, the solution quickly unravelled using a simple trick of focusing on the maximum and minimum terms.

An interesting geometry problem followed, which involved proving the collinearity of three points in a construction of circles and their tangent lines. My teammates each solved the problem after realizing a special property relating the three points. I failed to notice this property, resulting in no progress toward the solution.

The final problem of the day asked contestants to find the upper bound of a particular aspect of a combinatorial setup. Similarly to the first problem, a clean, clever trick revealed the solution. Our team agreed that this was a relatively simple problem three when compared to previous years!

Following the competition hours, all contestants had the option to attend a plethora of engaging and relaxing events including dance, bracelet making, and badminton. In our free time, we walked around the port to try delicious ice cream and pizza. That night, the sky cleared up, and the sunset was simply gorgeous. The broad streaks of bright pink, yellow, and blue calmed our nerves—in preparation for day two!

The Competition: Day 2

After an afternoon of relaxation and a night's sleep, the second day of competition began.

Problem four asked contestants to find and prove an upper bound on a given process, in which a bug was crawling around a circle. Our team found this problem particularly interesting and fun; it was one of our favourite problems on the contest.

The fifth problem involved proving a statement about an interesting idea (titled a ‘twist’) involving an infinite sequence of whole numbers. We all found this problem relatively straightforward—but also tedious, for it was a repeated application of modular arithmetic. For me, some small errors resulted in the loss of one point.

The last problem was another geometry question involving lines and their tangent circles. Though no one in our team solved this problem, we were awarded partial marks for our significant progress toward the solution.

After an exciting 9 hours of competition, the EGMO was finished! However, there was much more in store for us. Similarly to the first day, team members attended more fun workshops, including a memorable salsa workshop outdoors.

Post-Contest Fun

The fourth day was packed with fun activities. We took a 1.5-hour bus ride to the capital of Slovenia, Ljubljana, where we split into groups led by local tour guides. We learned the story of the Ljubljana dragon, enjoyed the stunning views from the castle, and rode a boat along the Ljubljanica River.

After touring the unique city and purchasing some cute souvenirs, we travelled to the WOOP! Trampoline Park, a centre of activities such as escape rooms or bowling alleys. We explored Virtual Reality for the first time, playing exciting rhythm and team fighting games, and enjoyed a few exhilarating games of laser tag (Emma wanted to play a zombie VR game, but the rest of us were too afraid...). While I had some troubles adjusting to Slovenian rules of laser tag, Yingshan quickly adapted and won the title of best player!

After the bus ride back to the hotel, our team celebrated the results of our hard work: we won two Silver and two Bronze medals! Our combined scores won Team Canada eleventh place, tying our highest-ever standing from 2022.

The following morning, we made one last trip to the Postojna Cave Park, which was a highlight of the trip for me. The views from inside the cave were absolutely mesmerizing—a perfect end to a wonderful time in Slovenia. When we returned, we received our medals at the closing ceremony, enjoyed one last dinner at the Grand Bernardin Hotel, and danced to fun music with our fellow contestants.

That night, we stayed up until 2:30 AM—hoping to make the most of our last moments in Slovenia—and finally departed for the airport to return to Canada.

Acknowledgements

Attending EGMO has always been a dream of mine. As a young girl, I always doubted that I could become a mathematician, but the opportunity to participate in EGMO has inspired me to not only reach for the skies but also work to create a more equitable, welcoming community for all mathematicians of diverse identities. I'm grateful beyond words for the wonderful memories I've created and the special friendships I've forged.

I'd like to make a few thank-yous, for none of our achievements would be possible without the kindness and dedication of many...

First, I'd like to thank my brilliant teammates—Yingshan, Cordelia and Emma. You all inspire me beyond words.

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I'd like to thank our coaches, lecturers, and teachers for helping us reach our greatest potential.

I'd like to thank the EGMO and CMS organizations for bringing the competition together. Speaking from experience—your dedication to your mission truly changes the lives of countless young minds.

Finally, I'd like to thank the University of Waterloo and Samuel Beatty Fund sponsors. Without your generous support, our successes would not have been possible. Your ongoing funding has allowed us to grow as mathematicians, friends, and people!



Thank you for your support!