

Observations on EGMO 2019

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Introduction

The eighth European Girls' Mathematical Olympiad (EGMO) was held in Kyiv, Ukraine, between 7 and 13 April 2019.

I participated in this event in my usual role of IT, travelling with the UK team but not as part of the UK delegation. The UK team consisted of Naomi Bazlov, Sarah Gleghorn, Alice Luo and Yuka Machino, with the leader being Jenny Owladi and the deputy leader being Kasia Warburton. More about the EGMO 2019 experience from the perspectives of participating teams and leaders may be found in other reports, when available. These observations should be read as a supplement to those reports, in the spirit of Geoff Smith's Observations on IMO 2011 and IMO 2012.

Diary

2 April The EGMO team gather in Cambridge at the annual UK training and IMO selection camp. There are six girls at this camp, a record number (along with eighteen boys).

7 April The timing of EGMO means the team need to leave the Cambridge camp early, having sat the second Team Selection Test the previous day, and the timing of available flights to Kyiv dictates a very early start indeed. A sleep-deprived EGMO party catches a minibus at 04:30 for our flight from Stansted to Kyiv. The driver decides he needs to stop to refuel en route, then confuses us by only putting in a few litres of fuel. In Kyiv Naomi finds she has mislaid her phone, and there are long queues for passport control, after which we meet the UK guide Andrii. He takes us to a minibus with too few seats for a journey to another airport terminal, where photos are taken, and an attempt made to interview the team, before a larger minibus takes both us and the Greek team to the hotel (with a long time stuck in traffic on the way).

We have a late lunch, meet old friends from other countries, have further attempted interviews, and some people go on to explore the local area. By

dinner time, Naomi's phone has been found on the plane and returned to her, but Yuka's bed turns out to be broken. The selections of the UK squad of ten for the IMO (to be narrowed down to the final team of six next month in Leeds), and the UK team for the Balkan Mathematical Olympiad in Moldova, are announced at 21:00, the former including Sarah (Yuka will later be added to that squad as well following her outstanding performance at EGMO).

8 April The Jury meets to review and approve the proposed problems. A late change to Problem 2 by the Problem Selection Committee was incorrect and needs to be undone, while the original version of Problem 5 has an incorrect definition of integer part. The Jury approves a proposal from the EGMO AB for a sub-committee to handle unresolved disputes between leaders and coordinators, after last year's Jury had to sit past 02:00 to resolve disputes taken to the whole Jury.

The opening ceremony is in a mall attached to the hotel. Rather than teams parading across the stage, time is saved by having them stand up in place. This year, the order is that of the distance of each country's capital from Kyiv, starting with Australia and ending with the Ukrainian teams. Lunch follows the ceremony. The English Language Committee then edits the wording of the problems, including correcting the spelling of 'incentre' and a substantial rephrasing of Problem 6. The Jury follows with further changes to the wording, keeping in mind that the English version should be suitable not just for native speakers but for many other contestants taking it as a second language version.

Once the English version is done, leaders work on their translations into 34 other languages. Issues encountered in the course of translation include needing to say 'all' in some languages where English says 'the $N + 1$ yellow labels' (because of the lack of articles in languages such as Russian), and increasing difficulty devising a Spanish version suitable for all the Spanish-speaking countries at EGMO. Eventually all translations are done, and 369 pages of exams can be printed for contestants to sit tomorrow.

9 April Despite the care taken in wording the problems, various issues still confuse contestants and result in queries being sent to the Jury, especially whether the condition in Problem 2 applies to covered as well as uncovered cells. Once all queries are resolved, the mark schemes for the first day's problems are presented and approved with some changes. In the afternoon I print the papers for the second day. The organisers' estimate of the time scripts become available for leaders and coordinators, originally between 16:00 and 17:00, proves overly optimistic and gets steadily pushed back until scripts eventually become available after 19:00. Several alternative solutions to the problems are written up and distributed, including an Israeli proof

that the upper bound in Problem 2 is also a lower bound.

10 April Today, ‘pairwise different’ in Problem 5 causes much confusion among contestants, while some questions are asked about N in Problem 6 (a variable first mentioned in a reference to ‘ $N + 1$ yellow labels’). The discussion of the mark scheme for Problem 4 lasts more than an hour, resulting in the problem captain going away to rewrite the scheme along the lines voted on by the Jury. Providing time for leaders to study mark schemes and discuss them informally with the coordinators, before the presentations to the whole Jury, might help make the process of approving mark schemes smoother, but it is not clear how that could fit into the EGMO timetable.

Jenny, Kasia and I see the UK team after they finish the exam. Contestants then head out on excursions, while leaders and deputies continue work on their contestants’ scripts and await those from today’s exam. We all meet again at dinner, the team tired after their excursion.

When we travelled to EGMO, we observed that we were flying out of the EU without knowing whether our flight back on Saturday would take us back into the EU or not. The European Council meets this evening in Brussels and, late at night, agrees an extension of the Brexit process to 31 October. So on Saturday we will fly back into the EU rather than arriving at Stansted seventeen hours into no-deal Brexit.

11 April Coordination takes place today, with problems 1, 4 and 6 progressing fast (although with some delays in coordination tables submitting their forms for data entry). Problems 2 and 5 drag on late into the evening and the final Jury meeting has to be postponed. Originally planned for 20:00, it eventually starts at 22:10. It has clearly been a very good year for the UK, with a safe gold for Yuka, but whether all the other UK students will receive silver medals is unclear.

As no-one would pay attention after the approval of medal boundaries, we start with other business. After some reports, we have a presentation from Georgia about their proposal to host EGMO 2021, discussing the country, the Imereti region, the city of Kutaisi and the Akaki Tsereteli State University, and this proposal is accepted. Proceeding to elections to the EGMO Advisory Board, Slagjana Brsakoska from North Macedonia is elected after some confusion occasioned by a tie for second place in the first round of voting, then Viviane Kehl becomes the new Chair unopposed as neither other elected member of the AB wishes to stand.

Moving to approval of scores and medal boundaries, the Jury is feeling generous. Ideally there would be 71 medals given to contestants from official European countries and the Jury votes to give 80 rather than 69. This naturally leads to exactly 40 receiving silver or gold medals, of which 13 receive gold medals. The UK team have all received gold or silver medals, the first

time they have managed this at EGMO, despite being a young team with no previous EGMO experience (Naomi had previously represented the UK at the Romanian Master of Mathematics, while Yuka was the reserve for last year's EGMO). All of the team are available for EGMO 2020 and some for EGMO 2021.

12 April Today has an excursion for everyone, a sightseeing cruise along the river Dnieper. Geoff Smith dislikes olympiad boat trips and is not at this EGMO.

Our guide tells us to be downstairs at 09:45 for a 10:00 departure. Few people are present by then, and the departure is somewhat delayed. Eventually the coaches take us to the boats.

Warnings before the EGMO trip noted Ukraine might be colder than the UK, but sunny weather over the past few days has given us a false sense of security. The weather today is cold and grey. The upper level of the boat has better views, but is particularly cold. There is some tour guide commentary, but it is largely inaudible. The lower level (indoors) is warmer, but the promised tea does not materialise as someone forgot to bring the teabags. On returning to the hotel, our guide tells us to meet at 14:40 for the 16:30 closing ceremony. Seeing the huge crowds waiting for the lifts, the stairs seem a good idea to many people. They seem less of a good idea after reaching the 10th floor with tired legs and realising one is only half way up to one's room on the 19th floor.

The coach to the closing ceremony spends a long time stuck in traffic, so the 14:40 meeting time (or at least the 15:15 time the coach actually leaves) turns out to be reasonable after all. The Minister of Education and Science gives a good speech. Medals are awarded, followed by prizes for the team competition. The EGMO flag is handed over to the Netherlands, and many photos taken, before we return to the hotel for the closing dinner and party at the nearby mall. Tables are shared by two teams, with eleven seats, allowing both guides and a single deputy to be at the table; other adults are at separate tables where wine is eventually served. Contestants receive mugs with team photos on them.

At EGMO 2014 in Antalya, many excellent desserts were available, resulting in UK deputy Jo Harbour instituting a rule of no more than three desserts per meal. Jo has now retired as UK leader, and, having generally had no more than two desserts per meal earlier in this EGMO, I go for a second helping of desserts at this dinner.

Geoff Smith's IMO 2015 report notes the problems posed by large and heavy gifts given at olympiads. A mysterious entity, apparently not considering this issue, is attempting to recruit EGMO medallists to its cause by making a gift to every medallist of a four-volume hardback set of its movement's foundational text, *Harry Potter and the Methods of Rationality*. The

EGMO organisers have many boxes of books provided by this entity, and are going round the closing party, checking countries off on a list and giving $4n$ volumes to leaders with n medallists on their teams. This is less than entirely helpful to the leaders who then have large piles of books to pass on to their teams, and to those medallists who arrived at EGMO with their suitcases already using 19.9kg of a 20kg baggage allowance.

13 April The UK group slowly gathers at breakfast, and Jenny distributes the certificates. Books are passed on to students who had left the party before Kasia received the sixteen volumes from the organisers, and Naomi's mug, which she had left at the party, is successfully retrieved.

We are taken to the airport with the Latvian team, where it transpires we are at the wrong terminal and need to get a shuttle bus to the right one. There, everyone's luggage is within the weight limits, despite the books being carried by the team, but Naomi finds at security that she is carrying scissors. People get some food, and we fly back to Stansted, still located in the EU for now. Immigration for non-EU citizens is slow again, so people start to depart. I return to Cambridge with Kasia, while other destinations range as far as Macau.

Thanks

The Ukrainian organisers put on a magnificent event. Thanks to them and the EGMO AB for all their work in hosting EGMO in Kyiv. Thanks to Jenny, Kasia, Naomi, Sarah, Alice and Yuka for being an outstanding UK delegation and friendly travel companions. Thanks to the EGMO 2019 organisers and the UK Mathematics Trust for supporting my involvement in EGMO and arranging travel and Man Group for sponsoring the UK EGMO team. Thanks to Birgit and the rest of the Dutch olympiad people for taking on the task of hosting next year's EGMO in Egmond aan Zee and to Georgia for hosting EGMO 2021 so that EGMO can continue to go from strength to strength into the next decade.