

EUROPEAN GIRLS'
MATHEMATICAL OLYMPIAD
EGMO 2017

FINAL REPORT

Organizer



Swiss Mathematical Olympiad

Platin Partner



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MATHEMATICAL OLYMPIAD
EGMO 2017**

FINAL REPORT

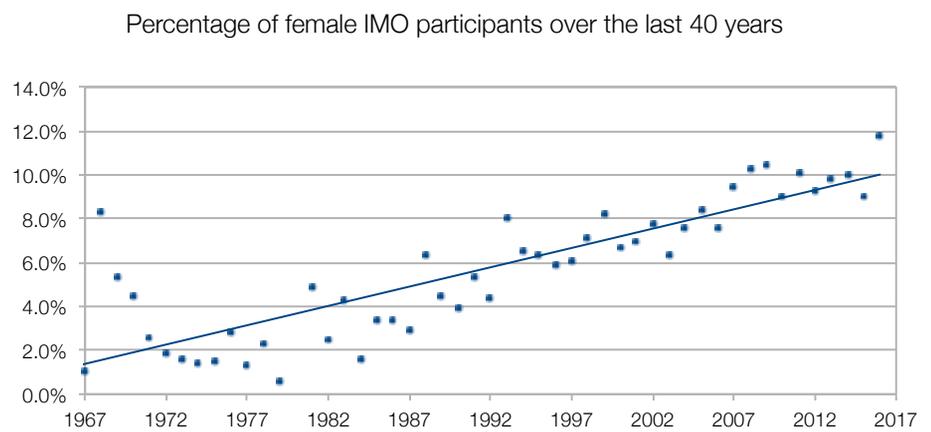


Winners of EGMO 2017: Qi Qi (USA) and Olha Shevchenko (Ukraine) , both with perfect score

EDITORIAL

The European Girls' Mathematical Olympiad (EGMO) is an international competition for female students (aged 14–19) whose interest in mathematics extends beyond the classroom. Its objective is to promote young female talent through challenging exams and appealing events. This helps to boost the number of young women participating in the national Olympiads, and ultimately in the teams at the International Mathematical Olympiad (IMO). The percentage of female contestants at the IMO has consistently grown over the past 40 years, but the pace of progress has been slow. The EGMO also encourages young women to study science subjects, helping to attract the next generation into STEM disciplines.

It all started in Cambridge, where the first EGMO took place in 2012. Since then, a new country has organized the EGMO each year, and the number of participating delegations has increased steadily. A national multi-stage selection and training process determines the four most promising girls in each participating country, who will then compete in the EGMO.



Switzerland was chosen to host EGMO 2017, which took place in Zurich. We were proud to welcome 168 contestants from 43 countries (33 European and 10 non-European) and a total of 271 guests, making EGMO 2017 the largest to date. The increase in the number of participating countries is very encouraging, as it shows the significance of the EGMO. At the same time, it also poses challenges, as funding becomes more complicated and the overall organization grows bigger and more complex.

Coordinating a competition such as the EGMO requires substantial funding, tremendous personnel resources (mainly on a volunteer basis), detailed planning and expertise in different areas such as event logistics, communication, fundraising, hospitality, IT, exam regulations and mathematics. This final report identifies some challenges and aims to provide guidelines for future EGMO events and other Scientific Olympiads to come.

On behalf of imosuisse, the association of the Swiss Mathematical Olympiad (SMO), we would like to thank all of our partners and all of our volunteers, without whom EGMO 2017 would not have been possible.



The organizing committee:

Jonas Kühne, Viviane Kehl, Jana Cslovjcek, Andreas Bärtschi

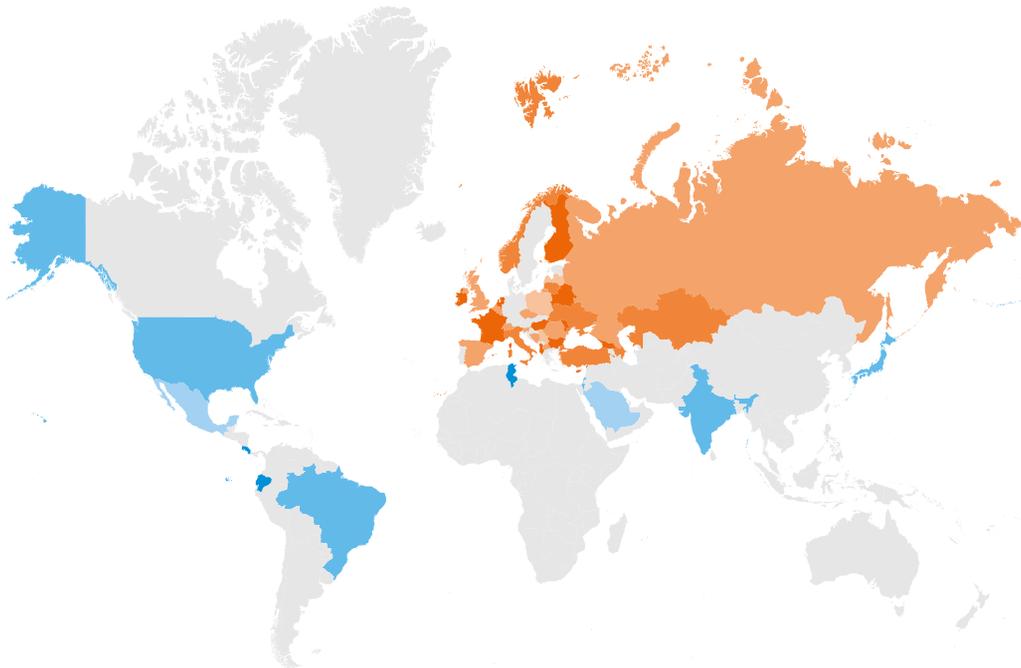
FACTS AND FIGURES

Where	Zurich, Switzerland
When	Arrival day: Thursday, 6 April 2017 Opening ceremony: Friday, 7 April 2017 Exams: Saturday and Sunday, 8 and 9 April 2017 Closing ceremony: Tuesday, 11 April 2017 Departure day: Wednesday, 12 June 2017
Organizer	imosuisse, the association of Swiss Mathematical Olympiads
Institutional Partners	University of Zurich ETH Zurich Association of Swiss Scientific Olympiads
Teams	44 (33 official European, 2 Swiss)
Contestants	168 (new EGMO record)
Leaders	44
Deputy Leaders	39
Observers	16
Total Number of Guests	267
Coordinators	28
Organizers, Volunteers	87
Awards	86 medals (16 gold, 27 silver and 43 bronze) 44 honourable mentions
Translated Languages	34
Nights of accommodation	1,900
Meals	7,300
Value of memories	Unlimited

EGMO DELEGATIONS

The following 43 countries sent delegations to EGMO 2017. Of these, 33 were official European entrants (labelled orange in the map below). Switzerland was represented by two delegations.

Albania	India	Norway
Azerbaijan	Ireland	Poland
Belgium	Israel	Romania
Bosnia and Herzegovina	Italy	Russia
Brazil	Japan	Saudi Arabia
Bulgaria	Kazakhstan	Serbia
Costa Rica	Latvia	Slovenia
Cyprus	Liechtenstein	Spain
Czech Republic	Lithuania	Switzerland
Ecuador	Luxembourg	Tunisia
Finland	Macedonia	Turkey
France	Mexico	Ukraine
Georgia	Moldova	United Kingdom
Germany	Netherlands	USA
Hungary		



GLOSSARY

The following terms are used:

Delegation: Each national delegation consists of at most four female contestants, one leader, one deputy leader and any number of observers.

Contestants/students: Contestants are selected through their country's national Mathematical Olympiad or equivalent selection programme. Contestants must not have formally enrolled at a university or any other equivalent post-secondary institution, and they must have been born less than twenty years before the day of the second Contest paper.

Leader and deputy leader: They are responsible for the conduct of their contestants, and that the students know and fully understand the contest regulations. Amongst others, leaders discuss and translate the exams in the jury sessions. Correction of the exam and the coordination of the solutions also belong to the tasks of leaders and their deputies.

Observer: In addition to leaders and deputy leaders, observers may be part of the delegations. They may accompany either contestants, leaders or deputy leaders.

ORGANISATION

Volunteers of the association imosuisse, the Swiss Mathematical Olympiad, organized the EGMO 2017. Usually, they are students or PhDs, mainly former participants of the Mathematical Olympiad. The Association of Swiss Scientific Olympiads supported the organizing committee (OC) in fundraising, communication and other areas. Further, both host universities, the ETH Zürich and the University of Zürich, contributed to the event with infrastructure, personnel and expertise.

imosuisse

Swiss Mathematical Olympiad SMO

EGMO 2017

Organizing committee (OC)

Andreas Bärtschi, Viviane Kehl, Jana Cslovjecsek, Jonas Kühne

ASSO

Association of Swiss
Scientific Olympiads

ETH Zürich

Department of
Mathematics

University of Zürich

Faculty of Science

ORGANIZATIONAL STRUCTURE

Chair OC
Andreas Bärtschi

- Budget**
Andreas Bärtschi
- Public Transport**
SBB, ZSG
- Layout & Design**
Cécile Baumann
- Ceremonies**
Sarina Hüppi
- Evening Programme**
Shaping the Future

Institutional Partners
Andreas Bärtschi

- ASSO**
Marco Gerber
Irène Steinegger
Mirjam Sager
- ETH Zürich**
D-MATH
Prof. Hungerbühler
- University of Zürich**
MNF
Prof. Kappeler

International Relations
Viviane Kehl

- EGMO AB**
Advisory Board Member
- Registration**
Invitations, Visa, ...
- Accommodation**
Hotel Leaders & Coordinators

Invigilation
Viviane Kehl

- Chief Invigilator**
Viviane Kehl
- Problem Selection**
Dimitri Wyss
- Coordination**
Dr. Lorenz Reichel
- Chair Jury**
Dr. Julian Kellerhals

Finances
Jana Cslovjecssek

- Treasurer**
Jana Cslovjecssek
- Accounting**
Jana Cslovjecssek
- Reimbursements**
Jonas Kühne

Chief Guide
Jana Cslovjecssek

- Deputy Chief Guides**
Ming Ming Khov
Corinna Stemmer
Rama Waber
Florence Zuffrey
- Guides**
Team Guides
Leader Guides
- Accommodation**
Youth Hostel
- Sports Programme**
Vanessa Piccolo
Jingyi Zhao
Angelika Markaj
Valeria Luce
Isabelle Calve

Volunteer Management
Jonas Kühne

- Recruiting**
Jonas Kühne
- Scheduling**
Jonas Kühne
- Logistics**
Mobility, Transport
- Exam Logistics**
Copying

Events
Jonas Kühne

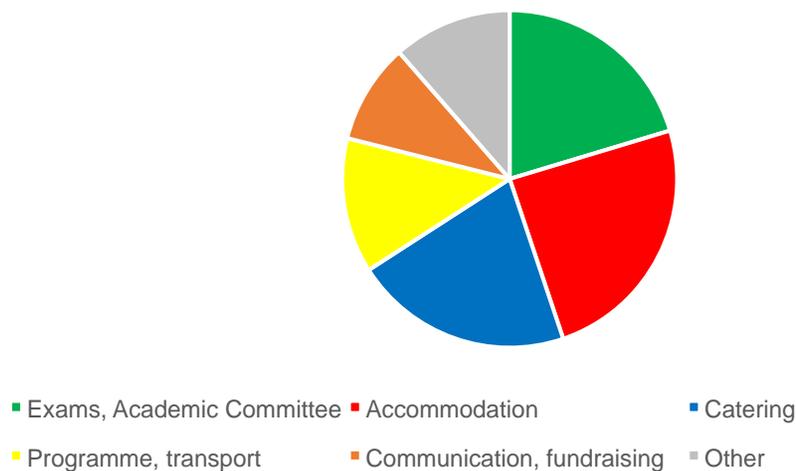
- Scavenger Hunt**
Daniel Graf
- Excursions in Zürich**
Jonas Kühne
- Excursion Rigi**
Jonas Kühne
- Transportation**
Eurobus

FINANCE AND PARTNERS

Expenditures

A total of CHF 540,000 was spent on EGMO 2017 (average exchange rates in April for CHF 1.00: EUR 0.94 and USD 1.00). However, this does not reflect the real efforts and costs of EGMO 2017. Almost all work carried out by the organizers and the volunteers was unpaid and does not appear in the above figure.

Costs EGMO 2017



Of the CHF 540,000 in expenditure, 24.4% was spent on accommodation (including breakfast) and 21.1% on all other catering. 20.4% was directly linked to the exams, jury session and other tasks of the academic committee (including infrastructure costs, staff, exam equipment, coordinators' expenses, etc.). 13.0% was spent on excursions, transport and other elements in the programme of supporting events. The remainder was spent on gifts, marketing and communication, fundraising, general expenses and other costs.

Revenue

Organizing such an event would be close to impossible without the tremendous amount of volunteer work. Not only was the main work of the entire organizing committee carried out by volunteers, but numerous guides, runners, invigilators and other eager helpers also contributed a huge number of unpaid hours during EGMO 2017 itself.

Besides this large amount of volunteer work, including pro bono services provided by the organizers, the budget was covered largely by fundraising and donations from partners (64.8% of overall income, from a total of 12 foundations, companies and institutions). In addition, the financial contributions by the organizers themselves accounted for 17.6%.

Finally, participation fees paid by non-European delegations and single room supplements contributed another 17.6% to overall income.

Partners

We are very thankful for all the support we have received from our partners. Organizing EGMO 2017 would not have been possible without them.

Platinum Partner State Secretariat for Education, Research and Innovation SERI

Gold Partner Metrohm Foundation

Silver Partners Ernst Göhner Stiftung
Swiss National Science Foundation SNF
F. Hofmann-La Roche Ltd
NCCR SwissMAP
Swisslos – Canton of Aargau

Bronze Partners SATW Swiss Academy of Engineering Sciences
Barbara and Roberto Conza Foundation
Canton and City of Zürich
University of Basel, Department of Mathematics and Computer Science

Institutional Partners University of Zurich
ETH Zurich
Association of Swiss Scientific Olympiads



PROGRAMME

		PARTICIPANTS	DEPUTY LEADERS
Thursday 6th	Whole Day	Arrival	
	13:00-14:30	Lunch Youth Hostel	
	18:30-20:30	Dinner Youth Hostel	
Friday 7th	08:00-10:00	Breakfast Youth Hostel	
	10:00-	Start Scavenger Hunt	
	10:15-11:30		Boat Trip Wollishofen-Bürkliplatz
	-12:00		Free Time
	12:00-13:00	Packed Lunch	Packed Lunch
	13:00-15:00	Scavenger Hunt	Free Time
	15:00-16:00	Transfer to ETH Zürich	Transfer to ETH Zürich
	16:00-17:15	Opening Ceremony	
	17:15-19:30	Apéro Riche	
	19:00-20:30	Transfer to Youth Hostel	
Saturday 8th	06:30-08:00	Breakfast Youth Hostel	
	08:00-08:45	Transfer to University of Zürich, Irchel Campus	
	09:15-13:45	Exam	10:00 Exam Handout
	14:00-15:00	Lunch Irchel	
	15:00-16:00	Transfer to Youth Hostel	
	16:00-19:00	Sports Programme	
	19:00-20:30	Dinner Youth Hostel	
Sunday 9th	06:30-08:00	Breakfast Youth Hostel	
	08:00-08:45	Transfer to University of Zürich, Irchel Campus	
	09:15-15:00	Exam and Lunch (see Saturday)	

LEADERS	COORDINATORS		
Arrival		Whole Day	Thursday 6th
Lunch Youth Hostel		13:00-14:30	
Dinner Swissôtel		18:30-20:30	
Breakfast Swissôtel		06:30-08:00	Friday 7th
Transfer to University of Zürich, Irchel Campus		08:00-08:45	
First Jury Meeting		08:45-10:00	
Second Jury Meeting	Marking Scheme Preparation	10:00-11:30	
Lunch Irchel Campus		11:30-12:30	
Third Jury Meeting	Marking Scheme Preparation	12:30-14:45	
Coffee Break and Transfer to ETH Zürich		14:45-15:45	
Opening Ceremony		16:00-17:15	
Apéro Riche		17:15-19:30	Friday 7th
Fourth Jury Meeting	Marking Scheme Preparation	20:00-22:00	
Breakfast Swissôtel		06:30-08:00	Saturday 8th
Transfer to University of Zürich, Irchel Campus		08:00-08:45	
Q&A Session, Solution & Marking Scheme Discussion		09:15-12:45	
Lunch Irchel Campus		12:15-13:45	
Coffee Break		16:00-16:30	
Exam Marking		16:30-19:00	
Dinner Irchel Campus		19:00-20:30	
Breakfast Swissôtel		06:30-08:00	Sunday 9th
Transfer to University of Zürich, Irchel Campus		08:00-08:45	
Exam and Lunch (see Saturday)		09:15-13:45	

PROGRAMME

		PARTICIPANTS	DEPUTY LEADERS
Sunday 9th	15:00-19:00	Excursion to Uetliberg	
	19:00-20:30	Dinner Youth Hostel	
	21:00-23:00	Movie X+Y / Dance classes	
Monday 10th	06:30-08:30		Breakfast Youth Hostel
	09:00-13:00	Zürich Zoo (Groups 3+4) 09:24 Boat Trip (Group 1) 10:24 Boat Trip (Group 2)	
	13:00-14:00	Packed Lunch	
	14:00-19:00	Zürich Zoo (Groups 1+2) 16:40 Boat Trip (Group 3) 17:40 Boat Trip (Group 4)	
	18:30-20:00	Dinner Youth Hostel	
	20:30-22:00	Shaping the Future	
Tuesday 11th	06:30-08:00		Breakfast Youth Hostel
	08:30-09:40		Transfer to Arth Goldau (Groups 1+2) / Vitznau (Groups 3+4)
	09:40-10:30	Rack Railway to Rigi, Queen of the Mountains	
	10:40-12:00	Hike on Mountain Rigi	
	12:00-13:00	Traditional Swiss Lunch, Rigi Staffel	
	13:15-14:00	Rack Railway to Vitznau (Groups 1+2) / Arth Goldau (Groups 3+4)	
	14:15-15:15		Transfer to Youth Hostel
	16:30-17:15		Transfer to University of Zürich, Irchel Campus
	17:30-19:00	Closing Ceremony	
	19:00-23:30	Gala Dinner and Party	
23:30-00:30		Transfer to Youth Hostel	
Wednesday 12th	06:30-08:30		Breakfast Youth Hostel
	12:00-13:00		Lunch Youth Hostel
	Whole Day		Departure

LEADERS	COORDINATORS		
Exam Marking Dinner Irchel Campus Exam Marking		16:00-19:00 19:00-20:30 20:30-22:00	Sunday 9th
Coordination Lunch Irchel Campus Coordination Final Jury Meeting Dinner Irchel Campus	Breakfast Swissôtel	06:30-08:00 09:00-13:00 13:00-14:00 14:00-17:30 18:00-19:00 19:00-20:00	Monday 10th
Rack Railway to Rigi, Queen of the Mountains Hike on Mountain Rigi Traditional Swiss Lunch, Rigi Staffel Rack Railway to Vitznau (Groups 1+2) / Arth Goldau (Groups 3+4) Closing Ceremony Gala Dinner and Party	Breakfast Swissôtel Transfer to Arth Goldau (Groups 1+2) / Vitznau (Groups 3+4) Transfer to Swissôtel Transfer to University of Zürich, Irchel Campus Transfer to Swissôtel	06:30-08:00 08:15-09:40 09:40-10:30 10:40-12:00 12:00-13:00 13:15-14:00 14:15-15:15 16:30-17:15 17:30-19:00 19:00-23:30 23:30-24:00	Tuesday 11th
	Breakfast Swissôtel Lunch Youth Hostel Departure	06:30-08:30 12:00-13:00 Whole Day	12th Wednesday





INSIGHTS OF THE ORGANIZING COMMITTEE

ANDREAS BÄRTSCHI

Over the next few pages, the organizing committee of EGMO 2017 would like to give you some more insights into their work, sharing some challenges they encountered along the way and giving some recommendations to future organizers of EGMOs or any other International Scientific Olympiad.

As chair of the organizing committee of EGMO 2017, Andreas was responsible for the committee meetings, budget planning, corporate design, public transport and liaison with all institutional partners. The latter involved coordinating all academic events at the University of Zurich (UZH), negotiating the support of ETH Zurich and regularly communicating with the Association of Swiss Scientific Olympiads (ASSO).

Partnership with Universities

While in Switzerland, the Swiss Mathematical Olympiad association, had sole responsibility for the organization and financing of EGMO 2017, two universities generously supported the event from early on: the University of Zurich supplied the EGMO with rooms, infrastructure and services for the entire academic programme and the closing event. ETH Zurich offered infrastructure and financial support for the opening day as well as teaching assistantships to students heavily involved in the organization. Professors from the respective departments (ETH Department of Mathematics, UZH Faculty of Sciences) represented the host institutions in meetings and served as main contacts.

Challenges

- The biggest challenge was to get in touch with all responsible people within the universities' complex administrative structures. In the end, more than 20 staff were involved in decision-making processes. Middle management also needed to be kept up to date with an extensive written summary (14 pages, 9pt font).
- Room reservations had to be made via different channels, depending on the nature of the room (lecture hall, seminar room, canteen, ceremony locations).
- Room reservations had to be adjusted due to the expected size of EGMO 2017 (initial plans were for 37 teams instead of the final 44).
- Acquiring teaching assistantships for members of the organizing committee was very straightforward for Swiss bachelor and master students, but required more documents and/or a different setup for non-Swiss citizens, new graduates and people with shorter working hours per semester.
- Events taking place outside of office hours required the presence of security and medical staff, who were not originally budgeted for.

Recommendations

- Have academic staff present at meetings with middle management. Professors can provide valuable support and can point out the importance of the event.
- Find out about the chain of command. At ETH, there was always one specific contact for requests; at UZH, various different levels had to be informed.

- Check the room reservations one year and again one semester in advance. In one case, a booking was changed due to an internal university event. In addition, another large event was scheduled on the same weekend as the exams without our initial knowledge – luckily its organizing committee realized the date clashed with EGMO 2017, coordinated with us and was very helpful in providing a quiet exam environment.
- Keep in good contact with caretakers and other technical staff. Their help, both in advance and during the event, was invaluable.
- Given their busy agenda, sought-after must-have speakers – in our case ETH Rector Prof. Sarah Springman and UZH President Prof. Michael Hengartner – should be invited to the ceremonies roughly one year in advance.

Design, Gifts and Communication

The Association of Swiss Scientific Olympiads (ASSO), which took care of the fundraising, public relations and ordering of gifts, was a major source of assistance to the organizing committee. Its members offered advice and shared their connections from their experience in organizing IPhO 2016 and IBO 2013 in Switzerland.

Challenges

- The more people are involved in designing and ordering printed material and gifts, the slower the decision-making processes will become. Ordering through the ASSO proved helpful. However, the extra layer of communication between producing companies and decision-makers (organizing committee) made processes slower and more complicated, causing a large amount of email traffic.
- Identifying the correct quantities of participant T-shirts and medals was quite difficult, because the data from previous years either was not always reliable (T-shirts for volunteers) or fluctuated greatly (medals).
- Despite the fact that imosuisse (Swiss Mathematical Olympiad) was the organizer of EGMO 2017 and all press releases clearly stated this, media often instead named the well-known ETH or UZH as the main organizers of the EGMO.

Recommendations

- Start early on ordering gifts, clothes and medals, i.e. half a year in advance.
- Have a designer in charge of all graphic-related work, i.e. printing (booklets, advertisements) and branded gift items. Alternatively, develop a corporate design manual that people involved in the designing and ordering process can follow.
- Get anonymized participant data from previous EGMOs (available from egmo.org)
- Check the delivered items for correctness; this applies in particular to national flags!



Andreas Bärtschi at the Welcome Dinner

INSIGHTS OF THE ORGANIZING COMMITTEE

VIVIANE KEHL

Besides being President of the Swiss Mathematical Olympiad and a member of the EGMO Advisory Board, Viviane was involved in many different areas of the organization of EGMO 2017. Among others, she was responsible for the communication towards all delegations and took care of their registration and visa requests. As chief invigilator, it was also her responsibility to ensure that the exams proceeded smoothly.

Registration and International Contacts

Challenges

- Not all leaders are aware of the deadlines or stick to them. Getting all the information needed can be time-consuming.
- Visa letters create a considerable amount of work (February/March). Embassies (at least the Swiss ones) tend to have different requirements for different countries.
- Some countries select their teams less than one month before the EGMO. Names and other personal details are therefore available rather late in some cases.
- The information in the food requirements and allergies section of the registration form was not always completed properly.

Recommendations

- The registration system available from Joseph Myers is extremely useful! If additional data is collected (e.g. passport numbers), consider stating why you are collecting it (e.g. needed for hotel pre-registration).
- Joseph Myers is also a great help during the EGMO for collecting the translations of the exams.
- Decide beforehand how to remind participants of deadlines; either by reminder emails to everyone before the deadline passes or by specifically contacting those who missed a deadline immediately afterwards.
- If emails are never answered (e.g. due to spam blockers or outdated contact details) you could consider using Facebook or similar communication channels.
- Some delegations need to have payment confirmations, for example, printed and signed in the original. Make sure to ask everyone in time and have a suitable stamp at hand.



Organizing Committee

Recommendations

- The organizing committee (OC) should be large enough that some people know what is supposed to happen where and when. In our case, four people on the OC were sufficient as – during the EGMO itself – we could rely on others to manage jury meetings, coordinators and the coordination entirely by themselves (i.e. jury and problem selection committee chairs, chief coordinator). Equally, trained personnel took care of media relations and all other communications (website, social media, pictures, videos).
- Have some additional staff available to help in unexpected situations.
- Any OC member should be reachable by phone at any time.
- Make sure the OC members know Geoff Smith's phone number for difficult situations where sensible advice is needed.

Chief Invigilator

Challenges

- Some contestants are quite ill-informed on some important aspects of the exams, or just forget during the exam that, for example, no marks are deducted for incorrect draft answers.
- Invigilators who are not experienced in the Mathematical Olympiad themselves may not advise contestants properly as to how to submit their work, even if briefed carefully, as they might also forget.
- Some language barriers may also prove difficult.



Recommendations

- The chief invigilator should ideally be a former contestant and former leader of an international Olympiad, so as to be able to handle clarifications from the jury and similar problems efficiently.
- During the exam, most invigilators are busy escorting contestants to toilets. If only women should do this job, have mainly female invigilators.
- For entrance checks, it would be helpful to put up posters at the exam venue of items that are allowed/not allowed.
- Seating plans are very helpful in handing over answers from the jury efficiently.
- Contestants love getting extra food in the middle of the exam!

INSIGHTS OF THE ORGANIZING COMMITTEE

JANA CSLOVJECSEK

Jana, a member of the organizing committee, was involved in a variety of tasks in the planning and organizing phase for EGMO 2017, including in finance. During the EGMO itself, Jana acted as chief guide, at the top level of the guide hierarchy.

Guides

Challenges

- The main challenge of the role as chief guide was to bring all necessary information to the contestants. Each team had an appointed guide as first point of contact who was also responsible for ensuring that all contestants were fully informed. My task was to provide the guides with sufficient information, without overloading them. Communication went from chief guide to four deputy chief guides, each of whom was responsible for about ten team guides.
- This hierarchy helped to manage the amount of people to deal with, but it also brought some problems that we did not think of in advance. Since every item of information went through the whole communication chain, many important details were lost in the process. Furthermore, it was much slower than first envisaged. This was mainly because it was difficult to find convenient time slots for the briefings, but also because the briefings were longer than initially planned.
- The problem with time management was that information could not be given too early, to prevent mix-ups with current programme items. However, it also should not be given late, for obvious reasons.

Recommendations

- It ultimately transpired that the best approach was to brief the deputy chief guides at least a day in advance. They then briefed the guides about half a day in advance. For example, I would do the briefing of the deputy chief guides for Tuesday on Monday morning or Sunday evening. This left enough time for everyone to find a convenient time slot to brief the team guides, ensuring that the teams got the information for the coming day around dinnertime. It also minimized confusion regarding the programme.
- I tried to minimize the loss of information from both ends. Firstly, I made a list of the most important information for the coming day. It was put on a whiteboard, visible to everyone. The list was normally updated around dinner, so that everyone could have a look at it before going to bed.
- Secondly, I wanted there to be as much information as possible available to the guides. I therefore started to write a summary for each day, containing all the salient points for the guides and teams. This summary was handed out to the deputy chief guides during their briefing. It structured and clarified the information, and I got a positive response from the deputy chief guides. The briefings also became much shorter and easier to lead. In retrospect, I would hand this summary not only to the deputy chief guides, but also to each team guide.

- As a final point, I would like to add that the deputy chief guides were a great help. They did a lot of coordination between the guides and were able to help in many planning steps. These included tasks such as finding additional guides and helping with the invigilation, but also figuring out a way to get all the teams to the airport at the right time. I definitely recommend this structure, and it was useful that the deputy chief guides did not have a team of their own to take care of. This made it possible to cover for sick guides or to split teams with different interests.
- For these important positions, it is highly recommended to pick capable people who can take the responsibility that comes with the job and are able to lead a group of people. We chose them based on their age, but now I think we would have done better to have also considered experience of leadership and of planning such events.



Jana Cslovjecssek on the Rigi excursion



INSIGHTS OF THE ORGANIZING COMMITTEE

JONAS KÜHNE

As a member of the organizing committee, Jonas was involved in the overall planning of EGMO 2017. His focus was on recruiting the volunteers and planning the events. During the EGMO he mainly worked in the background, managing a small volunteer group known as “runners” and volunteers who were helping on single days and at specific events.

Volunteer Recruitment

EGMO 2017 had four major groups of volunteers. The first were the guides, who were responsible for looking after the delegations. There were team guides, who were assigned to one or two countries and were responsible for caring for the contestants of these delegations. As an additional level of hierarchy, we had four deputy chief guides, each responsible for a quarter of the team guides. Since the leaders of the delegations stayed in a different hotel to the rest of their delegations, we had additional leader guides responsible for the leaders and the academic staff. A second group of volunteers were the runners (logistics) assigned to different tasks on an on-demand basis. The team of runners were also responsible for handling any transport needs. The third group were volunteers who helped at specific events that required additional resources, e.g. exam invigilation and the opening and closing ceremonies. The last group were the academic staff recruited by Andreas Bärtschi and Viviane Kehl.

Challenges

- For the guides, we wanted female students or doctoral candidates. However, it turned out to be hard to find enough volunteers willing to invest a whole week, especially during the lecture time.
- To recruit, we tried sending emails to all kinds of mailing lists at universities, but the success rate was low. Most volunteers were recruited from International Scientific Olympiads held previously in Switzerland such as the IBO and IPhO, and from (student) associations that themselves rely on volunteers. The most promising way to find volunteers is to talk to potential volunteers in person.
- Many volunteers have absences; it is hard to decide how many absences are acceptable. If the programme for the week is fixed, it is most efficient to decide on a case-by-case basis.

Recommendations

- Start recruitment early, but not too early. Nine months before the event is a good time to start.
- In the early phase, it is useful to ask interested volunteers if they can spread the word or know of additional channels for finding volunteers.



Events

The planning of many of the events was outsourced to volunteers (e.g. scavenger hunt, sports programme), to professional event managers (opening and closing ceremonies) and to the companies involved (e.g. zoo and Mount Rigi). Therefore, the main task of the organizing committee was to perform the overall time planning and to ensure that the transport of people and material ran smoothly.

Challenges

- It is hard to satisfy every guest's wishes and needs, especially with such a diverse group. Some participants prefer a densely packed programme; others want as much free time as possible.
- It is difficult to plan the right amount of spare time. There is a need for flexibility in case a programme item is delayed; on the other hand, it can be boring for participants if they need to wait too long for the next item in the programme.

Recommendations

- It is a good trade-off to have a programme with mandatory and optional items.
- It is necessary to inform the guides and teams when they can vary the programme themselves. We got the feedback that many teams wanted to go souvenir shopping, which was possible during the zoo and Uetliberg excursions. However, the teams and guides often followed the printed programme too strictly.

Volunteer Management during the EGMO

Challenges

- It is hard to estimate the right number of volunteers before the actual event. However, having too many is obviously better than not having enough.

Recommendations

- It makes sense to inform the volunteers that they might have some free time and should bring some work or a book along with them.
- To be flexible in every situation it is helpful to have some spare volunteers who can handle spontaneous tasks. At EGMO 2017, we had a team of six people (runners) who were not assigned to a specific task and were used to resolve some unforeseeable problems.
- The runners had also two cars to accommodate transport needs.
- The day of the closing ceremony is usually the longest. It therefore makes sense to have two shifts of volunteers: one for the preparation of the ceremony, and one for the dismantling, which in our case went on until 3.30 a.m. If you can leave the closing ceremony dismantling until the next day, you gain some flexibility.

Catering

Challenges

- It is hard to make a menu plan that satisfies everyone. Although we had meals that were considered international cuisine, many participants requested food that was more “international” (a term unfortunately lacking a precise definition).
- The contestants need at least one warm meal per day, especially on exam days and the day before. On the day before the exam, we had packed lunch bags during the scavenger hunt and mainly cold dishes during the buffet that followed the opening ceremony, which turned out to be less than ideal.
- The vegetarian and vegan food needs to contain enough protein. The youth hostel, which served some of the meals at the EGMO, often served the same meals for the vegetarians as for the carnivores, just without meat.

Recommendations

- The leaders need to be asked repeatedly to enter the dietary requirements on the registration forms. At the start of the event, guides should again check with contestants directly if the information is complete and correct.
- Always plan for some additional vegetarian, vegan, lactose-free and gluten-free meals. From our experience, the information in the registration forms is always incomplete.





INSIGHTS ON ACADEMIC WORK

DIMITRI WYSS

Dimitri and Lorenz, who were responsible for the academic work behind ensuring challenging exams, were also asked to write about their tasks. Their recommendations will give some more insights and some advice for future EGMO organizers.

Dimitri, former president of the Swiss Mathematical Olympiad, was the chair of the problem selection committee (PSC) at EGMO 2017. The PSC's task was to choose six exam questions from suggested problems sent to the committee by the participating delegations.

Problem Selection

Challenges

The problem selection went quite smoothly for us, as in the end we had more than 40 problems to choose from. We originally received almost no combinatorics problems, but the early deadline allowed us to ask for another round of problems in good time. Luckily, many leaders managed to send in more suggestions after that. The PSC consisted of eight people, and I believe that should be the minimum, as the workload is considerable if you want to have three to four people solving each problem.

Recommendations

We finalised the exam a little less than a week before the EGMO, which was perhaps on the late side. I think the PSC should ideally decide on the exam proposal at least 10 days before the start of the EGMO to have time for the following:

- Check carefully once and for all if any exercises are already known.
- Find good suggestions for the formulations. The better they are, the less time the jury meeting should (with luck) take.
- Write down all the solutions that the PSC has found. As many of us were also coordinators, there was not much time during the EGMO for this.
- In the first meeting, the jury had one hour to look at the problems and see if they already knew any of the questions from previous events or their national Olympiads. None mentioned any such problems in that hour; however, after we put up the solutions, some leaders recognized elements of the solutions that were also part of known problems. In the end, this did not influence the exam. To avoid this sort of problem it might be a good idea to hand out the solutions together with the exam right at the beginning.

Jury Session

During the jury sessions, leaders discussed and translated the problems for the next day's exams.

Recommendations

- Make sure the room in which the jury session is held is equipped with a decent audio setup. The EGMO has reached a size where presentations and discussions without microphone support can be hard for everyone to understand.
- Have an idea when you want to do what in the jury session (e.g. resolve problems, etc.)



Ukraine, awarded as best European delegation, with Dimitri Wyss, Lorenz Reichel and Viviane Kehl

INSIGHTS ON ACADEMIC WORK

LORENZ REICHEL

Lorenz was a founding member and the first chair of the Swiss Mathematical Olympiad. His main task as chief coordinator at EGMO 2017 was to ensure the smooth correction of the problems. All solutions by the EGMO contestants were corrected by the leaders of the delegations (usually supported by deputies and occasionally observers), but also by the organizers themselves. Coordinators, who work on the marking schemes and the actual correction, support the organizers in this duty. Additionally, the coordinators play an important role in the coordination process, where the delegations and the organizers compare their corrections and settle on the final marks.

Coordination

Good marking schemes and coordinators who are very familiar with their problems are key to a good coordination process. In our view, the following support these aspects:

- Assign coordinators to the problems focusing on experience, rather than preference for a specific category. We noted that all coordinators, including those who coordinated a category they did not choose, liked their problem in the end. By devoting that much focus to a single problem, you start to see the subtleties and interesting points, whatever the category.
- Coordinators who participated in the problem selection are particularly valuable. They have already thought about most problems in detail.
- Investing the time in investigating the problems and creating the marking schemes is essential for a good coordination process. We had coordinators who joined after the marking schemes had been created. When it came to coordination, they were at a strong disadvantage by not having explored the problem thoroughly enough.
- We observed that a coordinator with very strong knowledge of the problem could coordinate many exams without having seen the papers beforehand.
- Knowing a problem well also includes understanding many approaches that do not work and why they do not work. Having a good knowledge of what does not work can shorten coordination of non-solutions drastically.
- Consistency in marking schemes across problems is a very difficult matter. Some problems need more detailed precision than others. One way of increasing consistency is via the number or range of “easy” points (probably something between 1 and 3) that do not need super-rigorous argumentation.

It might make sense to be more generous on problem 1.

Organizational Matters

- A handful of coordinations take a very long time. Once such a “candidate” is identified, it helps to log the time spent in coordination. If no agreement has been reached after long discussions (e.g. after one hour in all), it is quite probable that no agreement will be arrived at.
- In one case, we let another pair of coordinators look at the papers. They independently came to the same conclusion as the first pair. This convinced the leaders that they had been treated fairly and accepted the proposed points. A fresh pair of coordinators of this kind can help.
- If leaders are “stubborn”, in the sense that the coordinators see the case as being clear but the leaders want to continue arguing, the head coordinator should be involved and coordination ended. Politely suggest to the leaders that the issue be referred to the jury. Both times that we applied this approach the leaders later came back to sign off the proposed points.
- Leaders are right to defend their students’ work. Some leaders, however, think they need to get the maximum possible points (even if not merited) by being exceedingly tough.

The above points not only make coordination more effective, but also protect students whose leaders are more cooperative.





EGMO
2017
Zürich

Language: English

Day: 1

Saturday, April 8, 2017

Problem 1. Let $ABCD$ be a convex quadrilateral with $\angle DAB = \angle BCD = 90^\circ$ and $\angle ABC > \angle CDA$. Let Q and R be points on segments BC and CD , respectively, such that line QR intersects lines AB and AD at points P and S , respectively. It is given that $PQ = RS$. Let the midpoint of BD be M and the midpoint of QR be N . Prove that the points M, N, A and C lie on a circle.

Problem 2. Find the smallest positive integer k for which there exist a colouring of the positive integers $\mathbb{Z}_{>0}$ with k colours and a function $f : \mathbb{Z}_{>0} \rightarrow \mathbb{Z}_{>0}$ with the following two properties:

- (i) For all positive integers m, n of the same colour, $f(m + n) = f(m) + f(n)$.
- (ii) There are positive integers m, n such that $f(m + n) \neq f(m) + f(n)$.

In a colouring of $\mathbb{Z}_{>0}$ with k colours, every integer is coloured in exactly one of the k colours. In both (i) and (ii) the positive integers m, n are not necessarily different.

Problem 3. There are 2017 lines in the plane such that no three of them go through the same point. Turbo the snail sits on a point on exactly one of the lines and starts sliding along the lines in the following fashion: she moves on a given line until she reaches an intersection of two lines. At the intersection, she follows her journey on the other line turning left or right, alternating her choice at each intersection point she reaches. She can only change direction at an intersection point. Can there exist a line segment through which she passes in both directions during her journey?



Sunday, April 9, 2017

Problem 4. Let $n \geq 1$ be an integer and let $t_1 < t_2 < \dots < t_n$ be positive integers. In a group of $t_n + 1$ people, some games of chess are played. Two people can play each other at most once. Prove that it is possible for the following two conditions to hold at the same time:

- (i) The number of games played by each person is one of t_1, t_2, \dots, t_n .
- (ii) For every i with $1 \leq i \leq n$, there is someone who has played exactly t_i games of chess.

Problem 5. Let $n \geq 2$ be an integer. An n -tuple (a_1, a_2, \dots, a_n) of not necessarily different positive integers is *expensive* if there exists a positive integer k such that

$$(a_1 + a_2)(a_2 + a_3) \cdots (a_{n-1} + a_n)(a_n + a_1) = 2^{2k-1}.$$

- a) Find all integers $n \geq 2$ for which there exists an expensive n -tuple.
- b) Prove that for every odd positive integer m there exists an integer $n \geq 2$ such that m belongs to an expensive n -tuple.

There are exactly n factors in the product on the left hand side.

Problem 6. Let ABC be an acute-angled triangle in which no two sides have the same length. The reflections of the centroid G and the circumcentre O of ABC in its sides BC, CA, AB are denoted by G_1, G_2, G_3 , and O_1, O_2, O_3 , respectively. Show that the circumcircles of the triangles $G_1G_2C, G_1G_3B, G_2G_3A, O_1O_2C, O_1O_3B, O_2O_3A$ and ABC have a common point.

The centroid of a triangle is the intersection point of the three medians. A median is a line connecting a vertex of the triangle to the midpoint of the opposite side.





INSIGHTS ON COMMUNICATION

The communication surrounding the EGMO had one main goal: to create a positive image of the European Girls' Mathematical Olympiad 2017 in Zurich. We wanted to highlight the event as an important initiative encouraging girls from 43 countries – our future mathematicians and scientists.

The challenge was to address two different target groups:

- The EGMO community (participants, volunteers, leaders, organizers, and their friends and families)
- The general public

We tried to reach the first group by publishing continuous, relevant content before, during and after the event. We opted for a blog on the EGMO 2017 website, www.egmo2017.ch/news, and a Facebook page www.facebook.com/EGMO2017/.

Media relations helped us to reach the general public. The response to the topics of mathematics and girls was positive. By focusing on talented and passionate girls in mathematics, we wanted to undercut the stereotype that “maths is just for boys”. This stereotype still leads to gendered socialization, which is one reason why there are still fewer girls than boys studying STEM subjects.

Blog and Facebook

One month before the competition, we started to build up our EGMO 2017 community on our Facebook page, www.facebook.com/EGMO2017. Our goal was to fill our followers with excitement. In addition, of course, we wanted to introduce them to the organizers and the volunteers, the host universities and the programme, as well as to show them all the kinds of preparatory work being done.

During the event, the blog www.egmo2017.ch/news was our content hub. We gathered the latest news every day and shared this on Facebook. We focused on:

- Events: what happened today, what will happen tomorrow?
 - People: interviews about the programme, mathematics and the importance of encouraging young women in mathematics
 - Behind the scenes: who is working behind the scenes to make this Olympiad a success?
- In addition, we introduced an interactive element on Facebook for the teams: a photo competition.

Photos and Video

Two professional photographers covered the key events of the week. A selection of photos were uploaded every day to our Flickr account, www.flickr.com/photos/egmo2017. This platform allowed us to embed photos on our blog and to share them on Facebook. The same professionals also produced the EGMO week movie, which was one of the highlights of the closing ceremony.

To vary the formats of our blog and to capture the feeling of an EGMO, we produced three videos on iPhones, published them on YouTube www.youtube.com/channel/UCkxGvx4udPfBiDXl80wohJA and shared them on Facebook. In total, these videos were watched 2,167 times.

Recommendations

- Editorial planning is important. Think about the crucial moments and people. Write about them, show them, let them talk. Explain why they do what they do.
- Write clearly and simply. Always remember that the general public, and not just insiders, should understand what you are saying.
- Introduce leaders, volunteers and organizers and not just participants. They are all part of the EGMO and do a great job. Value their work.
- Use different formats: interviews, pictures, videos, articles.
- Share your blog content on social media; engage your host universities to share the content in order to reach more people.
- Provide professional photos, make sure your audience can download these and share them on social media.
- Get additional photographers for the closing ceremony (delegation and winner photos).
- Organize good technical equipment, ready to be moved (smartphone including microphone and stand, laptop, USB sticks, etc.).
- Build your Facebook community early; one month before the event is late.



Media Relations

Media relations professionals from our partners ETH, UZH and the Association of Swiss Scientific Olympiads (ASSO) took care of all press-related work. We started to introduce the EGMO to the media in summer 2016, via press releases about Swiss students participating in other International Scientific Olympiads. Two months before the event, we began to contact some key media via email and phone.

One week before the opening ceremony, we published the first EGMO-specific press release. To reach the national and international media, press releases were written in German, French and English. A second press release was sent the day after the closing ceremony, presenting the final rankings. Both press releases were distributed on the EGMO and ASSO websites and on three online science news platforms.

We invited journalists to the opening ceremony and offered them a general time slot to meet participants right after the second exam. In addition, we arranged some further opportunities for interviews with participants and organizers.

Media Coverage

Our monitoring tools Argus and Meltwater identified about 180 newspaper articles and radio reports on EGMO 2017.

We are especially proud of the quality of the coverage in Switzerland. Two major national newspapers (Neue Zürcher Zeitung and Tagesanzeiger) and Echo der Zeit, a prestigious radio programme, produced substantial profiles of and a report on the Swiss team and the event. In addition, two Swiss participants were invited to a broadcast by Sven Epiney, a very well-known Swiss radio host.

Recommendations

- Work with people who have experience of media relations. Connect with professionals at your host universities.
- Limit the main contacts for journalists to a few responsible people.
- Define time slots for journalists to meet participants.
- Provide professional photos for the press.
- Respect students' need for privacy and time to rest.
- Use a monitoring tool to track your national and international media coverage.

Junge Frauen und Mathe, das passt

Eine starke Zürcher Delegation überzeugt an der Mathematik-Olympiade

168 Gymnasiastinnen aus 43 Ländern stellten in Zürich ihr mathematisches Wissen und ihre Kreativität unter Beweis. Zwei Zürcherinnen holten eine Bronzemedaille, eine weitere wurde mit einer «Honorable Mention» ausgezeichnet.

NATALIE AVANZINO

Dass Mathematik etwas mit Schönheit zu tun hat, würden wohl nicht alle ehemaligen Gymnasiasten und Gymnasiastinnen behaupten. Ganz anders die vier jungen Zürcherinnen Kanella Minakaki, Yuxi Zheng sowie die beiden Schwestern Ivana und Viera Klasovita: Sie vertreten die Schweiz am vergangenen Wochenende an der sogenannten European Girls' Mathematical Olympiad, einem internationalen Wettbewerb für Mint-Fächer (siehe Kasten). «Mathematik ist für mich wunderschön», sagt die 18-jährige Ivana Klasovita mit strahlenden Augen. «Wenn eine Aufgabe überrascht und man dem Rätsel nicht nur mit logischem Vorgehen, sondern auch mit kreativen Ideen auf die Spur kommt, fasziniert mich dies.» An der zweitägigen Mathematik-Olympiade hatte die junge Frau die Chance, sechs solche «mathematischen Schönheiten» zu lösen.

Die junge Frau aus Aeugst am Albis besucht wie ihre Zwillingsschwester Viera das Realgymnasium Rämibühl in der Stadt Zürich und möchte nach der im Sommer bevorstehenden Matur Informatik an der ETH studieren. «Das Studium kombiniert meine beiden Lieblingsfächer Mathematik und Programmieren», sagt die begabte Gymnasiastin. Auch Viera ist wie ihre Schwester fasziniert von den Mint-Fächern und startet im Herbst ihr Mathematikstudium. «Mathe macht uns einfach richtig Spass», kichern die beiden gehörigen Slowakinnen, die als Dreijährige in die Schweiz kamen, weil ihre Eltern eine Anstellung als Elektroingenieure suchten.

Trotz ihrem ambitionierten Auftreten hat man mitnichten das Gefühl, die beiden Mädchen verpassten ihre Jugend. Jahrelang betrieben die beiden Leichtathletik. Unterdessen ist Viera eine passionierte Stepppflanzlerin – ein Hobby, worüber Ivana grinsend die Augen verdreht und ihrer Schwester in die Seite kneift. Für diese Olympiade hätten sie sich aber «schon seriös vorbereiten müssen», führen die jungen Frauen aus. Schliesslich sei nicht klassisches Mittelschulwissen abgefragt worden, es seien eher knifflige Rätsel gewesen.

«Wenn das Interesse da ist . . .»

Natürlich durften aber auch kurz vor der Olympiade andere Vergnügen nicht zu kurz kommen. Wie immer chatteten die jungen Frauen und bespielen mit Smartphones ihre Social-Media-Kanäle. Wenige Tage vor der grossen Mathema-



Yuxi Zheng, Ivana und Viera Klasovita und Kanella Minakaki haben die Zürcher Gymnasien an der Mathematik-Olympiade vertreten.

SEBASTIAN HÄBERLENDI / NZZ

tikprüfung hat Kanella Minakaki, die dritte Zürcherin in der Schweizer Delegation, ihren 16. Geburtstag gefeiert. Trotz intensivem Vorbereitungsprogramm ist sie mit ihren Freunden ins Kino gegangen. Die Bachenbülacherin ist erst vor vier Jahren mit ihren Eltern aus Griechenland in die Schweiz gezogen – nur sechs Monate vor dem

Übertritt ans Gymnasium. «Das war kein Problem für mich», resümiert die selbstbewusste junge Frau, die die Kantonsschule Zürcher Unterland in Bülach besucht. «Wenn das Interesse da ist, lernt man alles und wird gut darin», sagt sie in tadellosem Zürcher Dialekt. Gerne würde sie später Medizin studieren, aber bis zur Matur seien es ja noch

Nachwuchs für Mint-Fächer

Die European Girls' Mathematical Olympiad (EGMO) ist ein internationaler Wettbewerb, der den weiblichen Fachkräftenachwuchs in Mint-Fächern (Mathematik, Informatik, Naturwissenschaften und Technik) fördern möchte. Er richtet sich an begabte Mittelschülerinnen im Alter von 14 bis 19 Jahren. Die erste EGMO fand 2012 in Cambridge statt und wird seither jedes Jahr in einem anderen Land durch-

geführt. Der diesjährige Organisator, der Verein Imosuisse, wurde dabei vom Verband Schweizer Wissenschafts-Olympiaden, der Universität Zürich und der ETH unterstützt. Die Teilnehmerinnen hatten neben den mathematischen Tests auch Gelegenheit, etwas von der Schweiz zu sehen: So waren die jungen Frauen am Montag auf der Rigi und wurden mit einer Schnitzeljagd durch Zürich gelotst.

zwei Jahre. Genug Zeit, um ihrem Hobby Basketball zu frönen, «The Simpsons» zu lesen und, so oft es das Budget erlaubt, ins Kino zu gehen.

Die sechs anspruchsvollen Prüfungsaufgaben, die die Zürcherinnen und 164 andere junge Frauen aus 43 Ländern vorgelegt bekamen, wurden aus verschiedenen Teilgebieten der Mathematik – wie etwa Algebra, Kombinatorik, Zahlentheorie oder Geometrie – zusammengestellt. Bereits für die korrekte Beantwortung einer der sechs Fragen erfolgte eine «Honorable Mention» der Jury. Neben Kanella Minakaki, Ivana und Viera Klasovita aus dem Kanton Zürich sind weitere drei Frauen aus der Schweiz angetreten.

«... ist Mathematik so einfach»

Die siebte Teilnehmerin der Schweizer Delegation ist Yuxi Zheng. Die Chinesin bestreitet seit letztem Sommer ein Austauschjahr in der Schweiz und besucht die Kantonsschule Limmattal. Dies scheint der jungen Frau aus Hangzhou keine grosse Anpassungsschwierigkeiten zu bereiten: Alles sei angenehm hier und die Schule total entspannt. «Mathematik ist so einfach. Ich habe fast nie Hausaufgaben», sagt die junge Frau. «In China ginge das nicht, der Unterricht ist deutlich strenger.» Dort sei Fleiss die wichtigste Eigenschaft eines Schülers. Yuxi verrät: Häufig würden Kinder in ihrem Heimatland bereits vor der Einschulung in Förderkurse geschickt. Ihre Eltern hätten das jedoch nicht gemacht. Dies sei der Grund, weshalb sie zu Beginn der Primarschule nicht sehr gut in Mathematik gewesen sei. Als sie aber begonnen habe, mit ihrem Vater täglich fünf Seiten Mathe-Aufgaben zu lösen, habe sich das schnell geändert, ergänzt sie mit einem schelmischen Lächeln.

Dass sie für die Schweiz an der Mathematik-Olympiade starten durfte, mache sie sehr stolz. In China hatte es mit der Qualifikation für die Olympiade nicht geklappt. Für ihr Austauschjahr habe sie sich ganz bewusst für die Schweiz – und klar gegen Deutschland oder Österreich – entschieden, weil es hier so wunderschön sei, schwärmt Yuxi. Fast schon berichtigt ist die Chinesin unter den anderen Teilnehmerinnen für ihre Schokoladenobsession: Am Prüfungswochenende sei sie denn auch vor allem damit beschäftigt gewesen, genug Proviant für die über vierstündigen Tests zu organisieren. «Ohne Schokolade und Guetsli geht gar nichts bei mir», betont die Sechzehnjährige.

Und ganz offensichtlich ist die Schweizer Schokolade nicht nur exquisit, sondern auch gut für die Nerven: Yuxi Zheng hat – wie auch Ivana Klasovita – für ihr ausgezeichnetes Testergebnis am Dienstagabend an der Schlusszeremonie auf dem Campus Irchel der Universität Zürich eine Bronzemedaille erhalten. Viera Klasovita wurde mit einer «Honorable Mention» für ihre hervorragende Leistung ausgezeichnet.



“SHAPING YOUR FUTURE” EVENT

The EGMO aims to encourage young women by giving them intellectual challenges, but also the chance to meet like-minded people who share their passion for mathematics.

During the EGMO, we also wanted to connect the girls with successful female mathematicians. Like most young people, EGMO participants are grappling with questions such as “What should I study?” or “What do I want to do with my life?”. During a discussion panel, the girls had the pleasure of listening and talking to four women working for Google, Roche, ETH Zurich and Munich Re. The discussion centred on the fascination of maths and how it is helping to shape our future. However, it also included personal recommendations to the girls regarding their future. Here, we seek to highlight some of the advice given:

Talent: Sandrine Micaleff (Roche) pointed out the importance of using the talent that participants have: “Do what you love and you will be good at it. After your studies, you will find a way to apply your ability to think about hard problems in your professional career.” Bea Wollenmann (Munich Re, founder of the Swiss Mathematical Olympiads) adds that it is also important to gain new skills: “Learn a lot about communication and how to work with other people with different ideas.”

Self-confidence: Özlem Imamoglu (ETH Zurich) underlined that good self-confidence is required. “Think about yourself: Are you satisfied? That is enough, you do not have to be twice as good as your male colleagues, but you have to believe in your skills. People notice this and will treat you differently, and it also helps you to get a thick skin.” This thickness is necessary, she thinks, because there are still some people with sexist views.

Open-mindedness and flexibility: It is not possible to plan a career in great detail. “Take the chances you get, stay open to new possibilities”, is the advice of Bea Wollenmann. Mirjam Wattenhofer comments that at the beginning of her career she did not study what she loved most. Rather, she chose a subject that offered her new possibilities: she studied computer science because she wanted to move to Finland working for her uncle’s company.

Family and work: Combining work and family is possible, the panellists agreed. It requires a great deal of discussion with one’s partner about roles and duties; sometimes it may also mean postponing a child because of a new job offer or a new home. It also entails a huge amount of organization: childcare, housework, etc.

We would like to thank our panellists for their interesting contributions and for their commitment to motivating young women to study mathematics.

Recommendation:

- The participants will find a variety of opportunities to meet and get to know each other during the week-long programme or subsequently on social media. However, think about additional possibilities such as workshops or discussions where girls can exchange information and opinions and learn more about mathematics and their potential careers. This motivates them and helps them on their way to future job decisions.

SURVEYS

To evaluate the event and assist the organizers of future International Scientific Olympiads, we asked participants (contestants, leaders, deputies, etc.), guides and coordinators to fill in a survey at the end of EGMO 2017. The questions covered general aspects, organizational matters (mainly food and accommodation), activities, exams and other academic areas, and communication.

General

Most participants really liked the event, giving it a rating of 5 to 7 points out of 7 (from 1=horrible to 7=fantastic). The highlights for the contestants and guides were the different activities of the programme of supporting events, especially the chance to get to know new people from all over the world. They enjoyed staying in the city of Zurich, and also the exams themselves. The highlights for the academic team (leaders and coordinators) were sightseeing in Zurich and their stay at the Irchel Campus. Many also named the competition and the academic work as a highlight. The delegation leaders and deputies were happy with the organization and the programme on offer.

The participants received a bag with some useful goodies at the beginning of the EGMO. The clear favourites were the Swiss army knife and the Sigg bottle, followed by the EGMO branded towel and T-shirt.

Many of the participants would have liked more free time, especially to go shopping. We required the contestants to be in the company of an adult, either a guide or deputy leader, at all times. In response, some contestants stated they would like to be allowed to go to the city on their own.

We asked for suggestions as to how future Olympiads could be improved. Many of the participants wanted the exam location to be closer to the accommodation. The contestants also asked for more activities with the leaders. Most of the people involved in the EGMO would prefer it if everyone stayed at the same hotel. The deputy leaders would like to have a few more programme options on offer.

Hospitality

The leaders and coordinators were happy with their stay at the Swissôtel. The contestants, deputy leaders and guides staying in the youth hostel told us that the rooms were too small, especially the wardrobes. Many of the contestants would have liked a bathroom per room and not a shared one per floor. Apart from that, they appreciated the spacious communal rooms of the youth hostel.

We received very mixed feedback on the food. Most were happy with the meals provided. Some would have liked a wider choice. The vegetarian and vegan meals in particular were criticized for being just meatless versions of the meat option, rather than a decent meal with protein replacements. Many of the contestants asked for more fast food.

As everyone in the youth hostel wanted to eat breakfast at the same time, we had long queues. Our solution of letting only one member per team collect the breakfasts for the whole team made the situation a bit better.

Activities

Ratings for all activities were mainly positive. The clear favourites of the contestants were the scavenger hunt, the excursions to Uetliberg and the zoo, and the boat trip. Our guests much appreciated the trip to Mount Rigi – the only excursion that everyone involved in the EGMO could take part in – although the weather did not play along.

Exams

The contestants were happy with the exam situation, except for some problems caused by glare from the sun, which disturbed some of the contestants. The academic committee was happy with the difficulty level of the problems, but some would have liked the chance to look at the problems earlier, preferably on the arrival day.

The contestants liked the first problem best. The leaders preferred the second one, and the deputy leaders had very wide-ranging opinions when asked for their favourite problem.

Guides

The teams were happy with how well the guides cared for them and how well informed the guides were. Some teams even stated that the guides cared for them almost too much. The leader guides, who were responsible for the academic committee, also got positive feedback; they were particularly helpful when the leaders had questions about the public transport system, the contest or the city.



OUTLOOK

We are looking forward to all future EGMOs. May they be filled with passion, friendship and unique experiences for all participants and organizers!

7th European Girls' Mathematical Olympiad, EGMO 2018 in Florence, Italy

8th European Girls' Mathematical Olympiad, EGMO 2019 in Kiev, Ukraine

9th European Girls' Mathematical Olympiad, EGMO 2020 in the Netherlands

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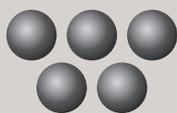
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