

Report on the 48th International Mathematical Olympiad in Hanoi, Vietnam (July 19-31, 2007)

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The 48th International Mathematical Olympiad (IMO), held in Hanoi, Vietnam from July 19 to 31, 2007, was an inspiring and memorable event. This competition united 520 students with strong mathematical interests from 93 countries around the world, setting a record in terms of both students and teams participating in the IMO. It was truly an honour for me to take part in this prestigious event, which broadened my horizons in both math and elsewhere.

The IMO is one of several annual international Olympiads for high-school students in basic academic disciplines, the others being chemistry, physics, biology, informatics, astronomy, and linguistics. Each country participating in the IMO sends a team of at most 6 contestants, under the age of 20 years. The actual competition consists of two 4.5 hour sessions on two days, each session consisting of three painstakingly-selected mathematical problems. IMO problems usually do not require anything strictly beyond high-school curriculum; however, these problems do require creative and ingenious approaches and solutions must be written up rigorously as if in a textbook or research paper.

To prepare and select students for this event, the Canadian Mathematical Society holds a variety of training camps and competitions. Several camps that have helped me and my fellow team members prepare have included Regional and National math camps, and the mathematics seminar held at Waterloo in June. Other, more intensive sessions are the IMO Winter and Summer Training Camps - the former held at York University every January and hosting 15 students, the latter held after team selection. The most important mathematical Olympiads in this context are the Canadian Mathematical Olympiad (CMO), the Asian Pacific Mathematical Olympiad (APMO) and the USA Mathematical Olympiad (USAMO). Strong results on one or all of these contests are used by the team selection committee to select the six Canadian team members for each year's IMO.

This year, our IMO training consisted of two parts, with the first taking place at the University of Calgary. Here, we were joined by several local students with high mathematics potential, who were invited to experience the mathematical guidance that our team underwent. Our preparation consisted of mostly lectures on various problem-solving strategies, and also some problem-solving sessions, with student presentations of solutions in the evening. During our stay, we also paid a visit to the ongoing Calgary Stampede, a day of fun to counterbalance the intensive problem-solving which we underwent.

After several days in Calgary, we proceeded to the Banff International Research Station (BIRS) to continue our training, which resumed in a similar format as before. However, we also wrote numerous mock IMOs, which emulated the conditions of the actual examination, and helped us apply the techniques we learned and judge our progress. Our coaching was conducted by not only our leader (Dr. Bill Sands) and our deputy leader (Adrian Tang), but also several past Olympiad participants and professors familiar with the IMO. While we spent much of our time in Banff working on math problems, we also visited several of the natural sites, including Sulphur Mountain, the Hot Springs and the Columbia Ice Fields, and were awed by the magnificent scenery. As well, at BIRS we were provided with comfortable accommodation and great food, which helped us stay in good physical condition.

Partly through our stay in Banff, we were joined by the Mexican team, whose Deputy Leader also gave us an informative lecture. Along with training with the Mexicans, we also socialized with them and played soccer and badminton together. We even went as far as to bet on the IMO, pitting our team's total score against theirs: if we scored higher, then each Canadian team member would get a Mexican sombrero; otherwise, they would take the Canadian team mascot, a stuffed moose known as Canmoo. Now, Canmoo has symbolically represented the Canadian IMO team since his inception in 2005; however, owing to a series of unfortunate events, his actual body has already been replaced twice. In the end, the Canadians did score higher, allowing the team not only to take the oversized hats but also to keep their mascot for the next IMO.

Finally, upon completion of training, we flew over to Hanoi, the capital city of Vietnam. We had nearly two full days before the exam to rid ourselves of jet lag caused by the nearly 20-hour flight. This was accomplished through numerous activities that the Vietnamese organizers made available, such as chess, badminton, volleyball, and water polo, and through socializing and interacting with other teams as they arrived. While some participants may have been a little nervous or stressed about the upcoming competition, we found that everyone was generally very friendly and we got along very well.

The Opening Ceremony on July 24, marking the official start of the IMO, featured speeches from both the organizers of the IMO and high-ranking officials, the latter including the Prime Minister of Vietnam. In addition to various displays of Vietnamese culture, each country's team was given a few seconds on the stage to introduce themselves. The two days of the competitions followed this warm gathering, and the problems which appeared were difficult enough to tax even the brightest of mathematical minds. Once the exam was over, it was up to the team leaders, deputy leaders, and observers to work through their students' solutions and drafts and determine what marks they would deserve. For those interested, the problems of the 2007 IMO can be found on the official website: <http://imo2007.edu.vn/>, along with various news updates and photos of the event.

On the other hand, once the examinations were over, we, the contestants, were able to relax and experience Vietnam, through a series of excursions to several cultural and heritage sites. As well, we explored the city of Hanoi, and with the help of our local guide, we obtained some great bargains on souvenirs and other useful items. In our free time, we not only (inevitably) discussed our solutions, but also played sports and chatted with other teams. In short, we had a lot of fun, and made many friendships.

Of course, we did not lose sight of the competition itself, and many students anxiously awaited news from their team leader on how they performed, whether their solutions were actually correct or if part marks could be obtained. As the coordination sessions of the problems were completed (the leaders spent two days coordinating), results trickled in, mostly posted in the Art of Problem Solving / Mathlinks forum, at <http://www.artofproblemsolving.com/> or <http://www.mathlinks.ro/>. Even when all the scores had been compiled, it was still difficult to predict exactly where the medal cut-offs would occur. As a rule, IMO medals are distributed such that the top half of students receives medals, with the gold-silver-bronze ratio being 1:2:3; students who do not make the bronze cut-off but attain a perfect score on at least one question receive an honourable mention. Hence, the stress did not fully dissipate until the day before the closing ceremony, when everybody's final placement had been decided.

The Closing Ceremony on July 30 proceeded in a similar format to the opening ceremony, and several important speeches and cultural presentations were made before the medals were handed out. This year, the Canadian team achieved one silver medal, three bronze medals and an honourable mention. In the unofficial country rankings based on the sum of the scores, Canada placed 27th out of 93 countries. In general, we were satisfied about our performance on this very difficult examination (in which, indeed, no one achieved a perfect score). Furthermore, this year's team necessarily consisted of all new members (since the previous team members had all graduated), which meant that next year the team would have more experience.

All in all, the 2007 IMO was an eye-opening and memorable encounter in many ways. It was sad to say goodbye to the numerous new friends that we made, and especially poignant for me as this was my last year in high school, but it was also highly gratifying to know such bright and supportive people with both similar and diverse interests. We would not have had the privilege of attending such an event if not for the generous support of the Canadian Mathematical Society and its sponsors such as the Samuel Beatty Fund, and if not for the help and dedication from our parents, teachers, leaders, coaches, and fellow students. My heartfelt thanks goes out to all who have enabled us to go to the IMO and benefit from this remarkable experience.

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