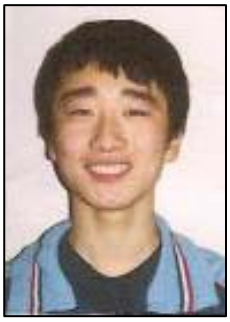
REPORT ON THE 50th INTERNATION MATH OLYMPIAD

Chen Sun (A.B. Lucas Secondary School) - 2009 Samuel Beatty Contestant



The International Mathematical Olympiad (IMO) is the most prestigious high school mathematics competition in the world. Held annually in a different location each year, each country sends a team of at most 6 secondary students to write a contest over two days. Each day of the contest, the contestants are presented with three essay-style problems to be solved in 4.5 hrs, for a total of 9 hrs. These problems are frequently in the style of "mini" mathematics research problems, requiring clever and novel arguments and ideas. This year the 50th IMO, held in the port city of Bremen, Germany, was also the largest IMO to date, with a over hundred countries participating and 600 contestants.

Each country decides who they are going to send to the IMO. The Canadian team is traditionally chosen in mid-May based on the results of three other Olympiads similar to the IMO: the Asian-Pacific Mathematical Olympiad (APMO), the United States of America Mathematical Olympiad (USAMO), and our own Canadian Mathematical Olympiad (CMO). Our team was exceptionally talented, with four out of the six of us having previously attended IMO 2008 in Madrid, Spain.

Before we headed to the IMO site in Spain, we spent two weeks at the Banff International Research Station (BIRS) in the Rockies. In that gorgeous environment, we trained very hard for the upcoming IMO. Through the course of our training, previous Canadian IMO medalists and university professors gave us plenty of lectures, problems and mock contests for practice.

Officially, eight hours per day at the training camp are spent doing math, with a mock Olympiad or lecture in the morning, another lecture in the afternoon, and a problem session in the evening. However, in actual fact, most of our team spent a large portion of our free time working on problems too, with several members working through recreational time, excursions, and even meals!

Our accommodations at Banff were excellent. The campus allowed us internet access and even free access to the gym. (While taking breaks from math, members of our team often went to play basketball). The meals were also fantastic—we ate almost every day at a classy buffet-style establishment in view of the mountains. We also had several excursions, including ones to the Banff Canada Day Parade, to Lake Louise, and the natural "inkpot" basins.

After the second week, we finally headed to the IMO site in Germany. We arrived two days before the actual competition date to adjust to jetlag.

The day before the contest, the IMO officially started with the Opening Ceremony. Angela Merkel, the Chancellor of Germany, delivered a speech. Because it was the 50th anniversary of the IMO, the Germans decided to nostalgically show us when each of the 100 international countries started participating, by a Countries' Parade in order by year. Romania and 4 other Eastern European Teams were the first participating countries in 1959. After the Opening Ceremony, we had a nice lunch outside, where we went around and met the other teams. We spent the rest of the day relaxing, in anticipation of the contest the next day. The Germans, in the evening announced something—that in honor of the 50th anniversary, all the medals this year would be made of the actual substances—the gold medals would be made of actual gold, the silver, silver, and the bronze, bronze. This was both

exciting and unnerving for us as participants!

The next morning, we woke up early and ate (or tried to eat) a good breakfast, nervous about the upcoming contest. We forgot about our anxiety, though, when we received the problems and started devoting all our energy towards solving them. Problem 1 was a fairly easy number theory problem, meant to get contestants comfortable with the paper. Problem 2 was a nice problem from Euclidean Geometry. Nearly the entire Canadian team was able to solve the problem, and nearly every single one of us produced *different* solutions! Problem 3, the hardest problem of the contest that day, was to prove a certain number theoretic sequential result. The solution was deceptively short, but only one member of our team found it.

The same process repeated the next day. Problem 4 was a problem in Euclidean Geometry again, but this year, it was actually rather tricky for a first problem! Although the Canadian team did fairly well on it, while asking our friends from other countries, some of them were not so successful. Problem 5 was an interesting functional equations problem. Again, our Team, solid from the two week training period in Banff, was able to do very well on it. Finally, Problem 6 was the last problem of the day and the hardest problem of the entire contest, a very hard combinatorics problem. In total, only 3 out of some 600 contestants were able to solve it, making it one of the hardest problems in IMO history. None of the Canadian team were able to make significant progress on it. (For those interested, the contest in 52 different languages, information about the city of Bremen, and greetings are available at **www.imo-official.org/year_info.aspx?year=2009**, the official IMO 2009 website.)

After the contest was over, we could finally relax. Over the next few days, while our Team Leader and Deputy Leader would be discussing and arguing for our solutions with the problem coordinators, the organizers showed us the sights of Bremen. Among other places, we visited the Bremen City, and got to know the legend of the “Musicians of Bremen” very well. We also went to the beautiful island of Wangerooge and the Wadden Sea World Heritage Site where we had a scavenger hunt across the island and the beach. There were also lots of fun events organized, including a rock concert, a soccer tournament, and several banquets. There was also a special session where past IMO participants who had become famous mathematicians came to talk with us. A lot of Canadians were very excited when Terence Tao, the Fields Medal winner, also came! We also spent much time with the other teams, especially the Americans and the Australians and the Indians.

Eventually all the scores were decided on and we got to see our medal standings. In the IMO, half the contestants get medals, and the numbers of gold, silver, and bronze medals are roughly in the proportion 1:2:3. Our team received gold, 3 silvers and two bronzes; making it the 4th time in history everyone on Team Canada received a medal. Moreover, we placed 18th in the unofficial country rankings, one of the best performances in Canadian history! We were all very happy with our performance. We received our medals at the Closing Ceremony that evening and were treated to a farewell barbeque afterwards. We flew back to Canada the next day.

Despite being a lot of work, being a member of the Canadian IMO team has been one of the most enjoyable experiences of my high-school career. This would not be possible without the support of the Canadian Mathematical Society and sponsors like the Samuel Beatty Fund. Also, thanks go to the leaders, coaches, and teachers who helped us succeed to the extent which we did.