

# Success by Numbers: Math Competitions Help Prepare Students for Challenges Ahead

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Math is often misunderstood and maligned, especially by students. Math is dull and boring. Math is way too hard. Math is anything but cool. At the same time, math can be fun and rewarding. Math can be beautiful and creative. And, perhaps most important, math can nurture strong analytical and problem-solving skills—key ingredients for career success. One tool for bridging the gap between general perceptions and critical reality is the math competition.

Since 1969, the Canadian Mathematical Society (CMS) has been staging national math competitions to encourage students to explore, discover, and learn more about mathematics and problem solving. Along the way, thousands of students have become more comfortable with math and more confident about what they can achieve. The most popular of the CMS national competitions is the Sun Life Financial Canadian Open Mathematics Challenge, which is held in November each year.

## Why Math Competitions?

Math competitions are a primary extracurricular activity that can both stimulate and cultivate student interests. Like sports, whether for recreation or competition, math competitions require basic knowledge and understanding. Coupled with discipline and practice, exercising math skills will lead to improved self-confidence, enjoyment and success. And math competitions are much more than just an intellectual pursuit for gifted students. A good math competition provides opportunities for “Hey, I can do that!” and nurtures the attitude of “Now maybe I can try that!”

Teachers play a critical role in math education, and competitions represent much more than another opportunity to organize. Most math competitions provide a plethora of supplementary resource materials, including sample and past problem sets, weekly or monthly problems, and other resources. In the case of the CMS, the resources are quite diverse. There is the book *The Alberta High School Math Competitions*

*1957–2006: A Canadian Problem Book*, edited by Andy Liu (Mathematical Association of America/Canadian Mathematical Society, 2009). For shorter treatments, there is the book series *A Taste of Mathematics* (ATOM) and the international problem-solving journal *CruX*. There is also the Problem of the Week (<http://cms.math.ca/Competitions/COMC/2014/potw.html>). And then there are the CMS math camps (for example, the Alberta/CMS Math Camp held in August for Grades 7–10 participants). These resources are valuable and rich tools in their own right, and they can be tailored to classroom or student interests.

Teachers can choose from many math competitions. Some are offered by a university, such as the Centre for Education in Mathematics and Computing (CEMC) contests at the University of Waterloo. Others are designed for regional or provincial participants, such as the Edmonton Junior High Math Contest. The CMS national math competitions are built on partnerships with universities across Canada; in Alberta, the CMS partners with the University of Calgary.

## The Competitions

### Sun Life Financial COMC

The Sun Life Financial Canadian Open Mathematics Challenge (COMC) is a flagship national competition open to any student in any location at any grade level. It attracts thousands of participants from across Canada and internationally each year. Although the competition is targeted at upper-level high school students, performance awards are available for multiple grade levels. Furthermore, every student in Canada who participates is equally eligible for prizes. Top-performing students receive plaques and certificates, and their school receives a plaque as well. Graduating students who perform well may be considered for scholarships, and other students are eligible

for an invitation to a CMS regional, specialty or national math camp.

The two-and-a-half-hour competition is usually held at participants' schools in early November. Although the competition is nationally focused, performance is recognized at both the national and the provincial levels (including specific grade levels).

In addition to receiving awards, plaques, certificates and prizes, top-performing students are invited to participate in the advanced CMS competition. For students with advanced interests, this is the only competition that can lead to a student's being chosen by the CMS for Math Team Canada and participation at the International Mathematical Olympiad.

### **Sun Life Financial Repêchage**

Students who come close to qualifying for an invitation to the advanced CMS competition are invited to participate in the take-home Repêchage competition in early February. About 75 students are given one week to complete eight questions. The best performing students will be invited to the advanced competition, and each student receives a book from the ATOM series.

### **Sun Life Financial CMO**

The Sun Life Financial Canadian Mathematical Olympiad (CMO) is a three-hour advanced competition that is usually written in school in late March and typically consists of five challenging math problems. Approximately 80 students are invited to participate. The top-scoring students receive awards and prizes, and the student with the best score is awarded the Sun Life Financial Cup. All students receive a one-year online subscription to the journal *Crux*. Top-performing students may also be invited to a national math camp or to be members of Math Team Canada.

### **Math Team Canada and the IMO**

Canadian students have consistently performed very well on the world stage at the International Mathematical Olympiad (IMO). The IMO is an intense world-class competition that takes place over three days. Each day students have four and a half hours to solve three questions. CMS selects six students to be on Canada's team and, as with any sport, CMS assembles training and coaching staff to provide an intense preparation program. Training takes place at the Banff International Research Station, and then the team flies off to the IMO venue. At the July 2014 IMO, in South Africa, the team took two gold

medals, one silver medal and three bronze medals and ranked ninth out of 101 countries (with 560 participants).

### **Other Competitions**

In addition to staging national competitions, the CMS is also the supporting organization for Canada's participation in the Asian Pacific Mathematics Olympiad (APMO). Domestically, the CMS also supports provincial and regional math competitions across Canada. For example, the top three students from the Alberta High School Mathematics Competition are invited to participate in the CMO. Students can explore these competitions as they work toward the CMS math competitions and Math Team Canada.

### **Teacher Appreciation**

None of these math competitions could be staged without the support and efforts of the teachers who organize events at their schools. The CMS is especially grateful to those teachers who support the CMS competitions, and it has a teacher appreciation program, including the distribution of sponsored educational materials, as a small token of appreciation for making a big difference.

### **Success by Numbers**

If web stats are to be believed, the websites associated with the CMS national math competitions attract an awful lot of students and teachers, who seem to enjoy the breadth of materials available. Meanwhile, direct participation in the CMS competitions grows each year as more and more students and teachers become aware of the opportunities.

While it is always reassuring to note success by numbers, perhaps the more rewarding aspect of the CMS math competitions is the knowledge that each student can participate and compete at his or her own level. The collateral benefit is students who are better prepared for career competitions ahead, where success with numbers can really mean success by numbers.

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*Johan Rudnick is the executive director of the Canadian Mathematical Society. Information on the CMS math competitions and other competitions can be found on the CMS website at <http://cms.math.ca/Competitions/>. Readers are welcome to contact Johan directly at [director@cms.math.ca](mailto:director@cms.math.ca).*