CMS Math Camps Report

Rapport des Camps mathématiques de la SMC

CMS
SMC

2016

About the CMS Math Camps

22 CMS MATH CAMPS

17 REGIONAL CAMPS

3 NATIONAL CAMPS

2 SPECIALTY CAMPS

MORE THAN **80%** OF STUDENTS REPORTED INCREASED INTEREST IN STEM PROFESSIONS

The CMS Math Camps are a major enrichment activity in the field of mathematics for young Canadian students from coast to coast.

Every year, the CMS collaborates with universities and colleges to organize and host math camps in all Canadian provinces.

In 2016, a total of 22 camps were held across the country with 1000 students and volunteers participating. For the first time, a few CMS math camps had more girls than boys attending, showing that our efforts to end the gender gap are beginning to work.

Camps ranged from day camps to weeklong overnight camps and included specialty camps, such as, the math camp for Quest Girls and the math camp for Black students at Dalhousie.

Math camps engage students and provide them the chance to sharpen their mathematical skills and explore new horizons not accessible in a classical classroom setting.

Hands-on enrichment activities, presentations and group interactions, games, puzzles and contests help students learn more about math theories and how to apply them in real life.

In a typical CMS math camp, students learn about the crucial role played by mathematics in the advancement of science, technology, engineering, and how various areas of mathematics interact with one another (STEM).

The CMS wishes to thank all sponsors, universities, teachers, camp organizers, volunteers, parents and students who contributed to make the 2016 CMS math camps a success!

"It was an awesome experience for me and ensured my interest and future career in STEM."

– Student

À propos des Camps mathématiques de la SMC

22 CAMPS MATHÉMATIQUES DE LA SMC

17 CAMPS RÉGIONAUX

3 CAMPS NATIONAUX

2 CAMPS SPÉCIALISÉS

PLUS QUE **80%** DES PARTICIPANTS ONT INDIQUÉ UNE AUGMENTATION D'INTÉRÊT POUR DES CARRIÈRES EN STIM

Les camps mathématiques de la SMC constituent une activité d'enrichissement majeure dans le domaine des mathématiques pour les jeunes étudiants canadiens d'un bout à l'autre du pays.

Chaque année, en collaboration avec les universités et les collèges, la SMC organise les camps mathématiques dans toutes les provinces canadiennes.

En 2016, un total de 22 camps ont été organisés à travers le pays avec la participation de 1000 étudiants et bénévoles. Pour la première fois, quelques camps mathématiques de la SMC ont accueilli plus de filles que de garçons, ce qui montre que nos efforts pour mettre fin à l'écart entre les sexes commencent à avoir un effet.

Les camps varient d'un camp de jour à un camp résidentiel durant une semaine, avec quelques camps spécialisés tels que le camp Quest pour les filles et le camp Dalhousie pour les étudiants noirs.

Les camps de mathématiques engagent les élèves et leur donnent la possibilité d'affiner leurs compétences mathématiques et d'explorer de nouveaux horizons non accessibles dans un environnement classique de salle de classe.

Des activités d'enrichissement pratiques, des présentations et des interactions en groupe, des jeux, des puzzles et des concours aident les élèves à apprendre plus sur les théories mathématiques et comment les appliquer dans la vie réelle.

Dans un camp mathématique typique de la SMC, les élèves apprennent le rôle crucial que jouent les mathématiques dans l'avancement des sciences, la technologie, l'ingénierie et comment les différents domaines de mathématiques s'interagissent ensemble (STIM).

La SMC tient à remercier tous les commanditaires, les universités, les enseignants, les bénévoles, les organisateurs des camps, les parents et les étudiants qui ont contribué à faire des camps mathématiques de la SMC un grand succès en 2016!

« C'était une expérience formidable pour moi qui a renforcé mon intérêt et ma future carrière en STIM. »

– Étudiente

2016 CMS Regional Math Camps

Alberta

The Alberta Regional Camp was hosted at the **University of Alberta** from July 10-17, 2016. The overnight math camp included 29 students, 10 girls and 19 boys from Grades 8-11. The camp leader was Professor Sean Graves of the University of Alberta.

Presentations and activities included algebra, geometry, two-player games, probability, and computer programming. This Math Camp takes place in Edmonton and Calgary in alternate years. In 2017, the camp will be hosted at the University of Calgary.

British Columbia

Two CMS Regional Math Camps:

Held at the **Simon Fraser University - Burnaby Campus** in cooperation with Pacific Institute for the Mathematical Sciences (PIMS) from June 27-30, 2016. The day camp included 32 students, 9 girls and 23 boys from Grades 8-10. The camp leader was Professor Malgorzata Dubiel of Simon Fraser University.

Activities included problem-solving in combinatorics, number theory and geometry, constructing interesting 3D objects, a visit to engineering lab, and a team contest.

> "We have some physical activities and puzzles/games throughout, and have sessions as interactive as possible. After each camp, we meet to discuss what worked and what may be improved, based on our experiences and students' feedback, formal and informal."
>
> *– Professor Malgorzata Dubiel, Camp Leader*

Held at the **Simon Fraser University - Surrey Campus** in cooperation with PIMS from June 28-29, 2016. The day camp included 53 students, 23 girls and 30 boys from Grades 9-10. The camp leader was Professor Natalia Kouzniak of Simon Fraser University.

Activities included presentations about mathematics and its various applications (Mobius strip, binary numbers, fractals, geometry, problem-solving strategies, finding square root by hand using old algorithms), problem-solving sessions, games and various activities. Students presented the results of their team-work.

> "It was my first math camp. It was so much fun! And what I'm going to take from this camp is a lot of information and how we can use mathematics in our daily lives."
>
> *– Student, British Columbia Math Camp*

Manitoba

This CMS Math camp was held at the **University of Manitoba** from July 10-13, 2016. The overnight math camp included 36 students, 10 girls and 26 boys from Grades 9-10. The camp leader was Professor Don Trim of the University of Manitoba.

Topics covered at the math camp included linear algebra, Euclidean algorithm, and linear Diophantine equations.

New Brunswick

The New Brunswick Regional CMS Math Camp was hosted by the **University of New Brunswick** (Fredericton) from May 13-15, 2016. The overnight math camp included 28 students, 9 girls and 19 boys from Grades 10 and 11. The camp leader was Professor Patrick Reynolds of the University of New Brunswick.

Students worked in small groups on problems and rotated through several types of problems throughout the weekend. Students used the Polydron and Zometool to assist with problem-solving and reported that they were very helpful.

"The camp is so fun, it helps students to develop an interest in math and gives students who are interested in math an opportunity to communicate with each other and to improve together. I love this camping experience. I'm sure others like it too. Please keep it going!"

– *Student*

Newfoundland and Labrador

The Newfoundland and Labrador Regional CMS Math Camp, Blundon Seminar Camp, was hosted at **Memorial University of Newfoundland** (MUN) from May 18-20, 2016. The overnight math camp included 39 students, 10 girls and 29 boys from Grades 11-12. The camp leader was Professor Margo Kondratieva of Memorial University of Newfoundland (MUN).

The program included two talks: "Is the Universe Infinite?" by Dr. Herbert Gaskill and "Topology and Everyday Life" by Dr. Peter Booth. Dr. Eduardo Martinez-Pedroza conducted the Paper Chase activity, a mathematical scavenger hunt. Dr. Danny Dyer and Mr. Collin Kennedy organized three problem-solving sessions, while Mr. Nithum Thain presented selected solutions at the concluding session. One of the highlights of the camp was a banquet, during which the winner of the Blundon Contest was presented with the Blundon Shield, and the winners of other contests were also presented with prizes.

> **"**Great experience overall, I wish it was longer.**"**
>
> *– Student*

Nova Scotia

Two CMS Regional Math Camps:

Hosted at **Dalhousie University** from July 3-8, 2016. The overnight math camp included 20 students, 12 girls and 8 boys from Grades 10-11. The camp leaders were Professors Roman Smirnov and Marie-Andree B. Langlois of Dalhousie University.

Activities included problem-solving sets and STEM skills board games. Included were A Mathemagical Mystery Tour: Large Numbers and Great Mathematicians; Party in Konigsberg – BYOG (Bring Your Own Graphs); The Math Contests including How to Solve It and Toads, Frogs, Magic. Strategies for winning games included How to Find Winning Strategies for Subtraction games, code for games, and Pythagorean Triples.

> **"**The academic part was great, there was nothing too easy.**"**
>
> *– Student*

Hosted at **St. Francis Xavier University** from May 13-15, 2016. The overnight math camp included 21 students, 14 girls and 7 boys from Grades 10-11. The camp leader was Professor Joe Apaloo of St. Francis Xavier University.

Activities included a math relay and math trivia problems, problem-solving questions, hands-on activities, and guest presenters.

> **"**I got to meet new friends while in my group and see new methods to solve problems.**"**
>
> *– Student*

Ontario

Five CMS Regional Math Camps:

An Ontario Regional CMS math Camp was hosted by **Brock University's Department of Mathematics and Statistics** from August 15-26, 2016. The overnight math camp included 28 students, 9 girls and 19 boys from Grades 7-12. The camp leader was Professor Dr. Thomas Wolf of Brock University.

The camp program included daily mini-courses covering topics such as linear algebra and calculus, number theory, cryptography, set theory, types of proofs, programming, and financial mathematics. Guest talks included one from the Royal Astronomical Society of Canada, with an observation of the sun. Archery, ropes course, a camp fire, rock-wall climbing, movies, a magic show, and games nights were part of the recreational activities.

The **University of Ottawa/Université d'Ottawa** hosted two Ontario Regional CMS Math Camps, one in English and one in French, from June 25-30, 2016. The overnight math camps took place concurrently and included a total of 48 students, 14 girls and 34 boys from Grade 10 (Ont.) and secondaire 4 (Qué.). The camps were led by Professor Joseph Khoury of the University of Ottawa and Dr. Graham Wright of the CMS.

Many presentations were provided for students focusing on mathematics, critical thinking, and innovative problem-solving. Science, Technology, Engineering and Math (STEM) careers were discussed and each student participated in a STEM project.

À l'**Université d'Ottawa,** il avait deux camps mathématiques régionaux de la SMC, un en anglais et un autre en français du 25 au 30 juin. Ces deux camps résidentiels ont eu lieu en parallèle avec activités communes et une participation de 48 élèves, 14 filles et 34 garçons de 10e année (Ontario) et secondaire 4 (Québec). Les camps ont été organisés par Joseph Khoury de l'université d'Ottawa et par Dr. Graham Wright de la SMC.

Les participants ont assisté à des nombreuses présentations sur différents sujets des mathématiques, sur la pensée critique et les méthodes créatives pour la résolution de problèmes. Les carrières en sciences, technologie, ingénierie et mathématiques (STIM) ont été discutées et chaque étudiant a participé à un projet de STIM.

> "The camp was an eye opener for me. I never thought Mathematics is used in so many things around us. I know what I am going to do for the rest of my summer."
>
> *- Student*

> «C'était le meilleur camp dont je faisais parti. Le camp m'a donné l'occasion de rencontrer d'autres étudiants qui partagent le même intérêt pour les mathématiques que moi.»
>
> *- Étudiante*

Another Ontario Regional CMS Math Camp was hosted at **Western University** from August 9 -11, 2016. The day math camp included 31 students, 14 girls and 17 boys from Grade 9. The leader was Professor Gord Sinnamon.

The camp program included problem-solving skills, fractals, investigating invariants, math relays, using mathematics in everyday life. Each student received daily handouts with puzzles, problem sheets for competitions, and a copy of Ravi Vakil's book, "A Mathematical Mosaic."

> "I liked learning about the advanced math that was not taught in my school last year. I also enjoyed the tricks and shortcuts we were taught to assist us in solving questions."
>
> *- Student*

Ontario Regional CMS Camp, Math Experience, was hosted by **York University** from July 11-15, 2016. The math camp included 34 students, 9 girls, and 25 boys from Grades 8-9, and was led by Mr. Chris Wu.

Activities included presentations and working on problem sets from various competitions, classic problems, and interesting problems collected over time.

> "I learned that we are creative thinkers, finding new solutions, and one day in the future, contributing to the world by solving previously unsolvable problems, and changing the definition of impossible."
>
> *- Student*

Prince Edward Island

The Prince Edward Island Regional CMS Math Camp was hosted at the **University of Prince Edward Island** from April 29-May 1, 2016. The overnight math camp included 19 students, 10 girls and 9 boys from Grades 10-11. The camp was led by Professor Shafiqul Islam of the University of Prince Edward Island.

Activities helped students improve math and statistics problem-solving skills, such as group problem-solving math games and puzzles.

Québec

Two CMS Regional Math Camps:

The CMS is pleased to announce a new Québec Regional CMS camp hosted by the **Dawson College** in conjunction with AMQ, Association du mathematique. in Québec from June 26-July 1, 2016. The overnight math camp included 23 students, 8 girls and 15 boys who were from Secondary School, IV –V. Campers were from across the province. The camp leader was Professor Andreea Panait.

The camp program was titled, *Mathematical Induction: Pascal and Fermat*, and it included the binomial theorem, elementary number theory, graph theory, probability, and enumerative combinatorics.

Le camp mathématique collégial-Université de Montréal

Ce camp mathématique de la SMC a eu lieu à l'Université de Montréal du 29 mai au 4 juin 2016. Ce camp résidentiel a accueilli 22 élèves, 4 filles et 18 garçons du niveau Cégep. Le camp a été organisé par la professeure Christiane Rousseau de l'Université de Montréal. Les campeurs ont été sélectionnés parmi les meilleurs au concours mathématique collégial de l'AMQ. Les deux meilleurs ont été invités au camp, puis les meilleurs de chaque cégep. Les sujets abordés dans ce camp incluent (parmi autres): La finance mathématique, les structures mathématiques, les enquêtes mathématiques, les nombres réels, le cube de Rubik, les mathématiques de l'Origami et les mathématiques de l'intelligence artificielle.

> « Le camp est extrêmement instructif, et présente plusieurs volets des mathématiques avancées de manière intéressante et accessible. Le fait de se situer à l'université et de pouvoir échanger avec des étudiants, professeurs et chercheurs est très enrichissant. »
>
> *- Étudiante*

Saskatchewan

The Saskatchewan Regional CMS Math Camp was hosted at the **University of Regina** on March 20, 2016. The day-long camp included 67 students, 25 girls and 42 boys from Grades 1-12. The camp leaders were Professors Patrick Maidorn and Sadia McInnes of the University of Regina.

Students were split by grade groups. The program included mathematical games, probability, knot theory, cryptology, pi, and geometry, as well as one additional session on physical logic mazes that was enjoyed by all age groups.

Math Camp for Black Students

The specialty Math Camp for Black Students was hosted at **Dalhousie University** from July 1-6, 2016. The overnight math camp included 30 students, 19 girls and 11 boys from Grades 6-8. The camp leader was Professor R.P. Gupta of Dalhousie University.

Activities included math problem-solving skills, computers, and mathematics. Students also visited a Discovery Center, museum, and Black Cultural Center.

Math Quest Camp for Girls

MathQuest is a summer camp held at **Queen's University** for high school girls interested in math and science who have curiosity for exploring new ideas. The 2016 camp ran from August 14-22, 2016, and included 30 high school girls. The camp leader was Professor Siobhain Broekhoven of Queen's University.

The focus of this camp was on problem-solving, with hands-on activities led by female mathematicians, statisticians, and physicists.

Winter IMO Training Camp

This winter training camp held at **York University** is for potential members of Math Team Canada to start advanced training for the *International Mathematical Olympiad* (IMO). It was hosted by York University and was led by Professor Neal Madras. 14 students attended this camp that was held from January 5-10, 2016.

"It definitely opened my eyes to a lot of things, not only in terms of mathematical ideas, but also opportunities to enrich my education in the field."

- Student

Summer IMO Training Camp

In the summer of 2016, students selected for Math Team Canada underwent two weeks of intensive competition training at the **Banff International Research Station** (BIRS). Math Team Canada, consisting of 6 team members and 1 substitute member trained at BIRS from June 26-July 9, 2016 prior to traveling to Hong Kong for the 57th *International Mathematical Olympiad* (IMO). Training was organized by Professor Jacob Tsimerman, University of Toronto and Robert Morewood, Team Leader. Hunter Spink, Deputy Team Leader, and Patrick Lopatto, Deputy Team Observer, assisted with the training.

Math Team Canada placed 12th out of 109 participating countries, an outstanding performance!

National CMS Summer Camp

The National CMS Math Camp was held at the **University of Toronto**. 22 students, 4 girls and 18 boys from across Canada attended. This overnight camp was held from July 23-30, 2016. The camp leader was Dr. Pamela Brittain, University of Toronto. This training camp is for potential future members of Math Team Canada.

Campers took part in math contest preparation, research, and other math exploration activities.

The program also included field trips around Toronto and the University of Toronto campus.

CMS Math Camps – Partners and Sponsers
Camps Mathématiques de la SMC – Partenaires et Commanditaires

The Canadian Mathematical Society is proud to have partnered with provincial governments, universities and organizations in staging the 2016 Math Camps. The success of CMS Math Camps is built on the organization and volunteer contributions from the following program partners:

La société mathématique du Canada est fière d'avoir collaboré avec les gouvernements provinciaux, les universités et les organisations pour mettre en place le programme des camps mathématiques de 2016. Le succès des camps mathématiques repose sur l'organisation, le support et la contribution des bénévoles des partenaires suivants:

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