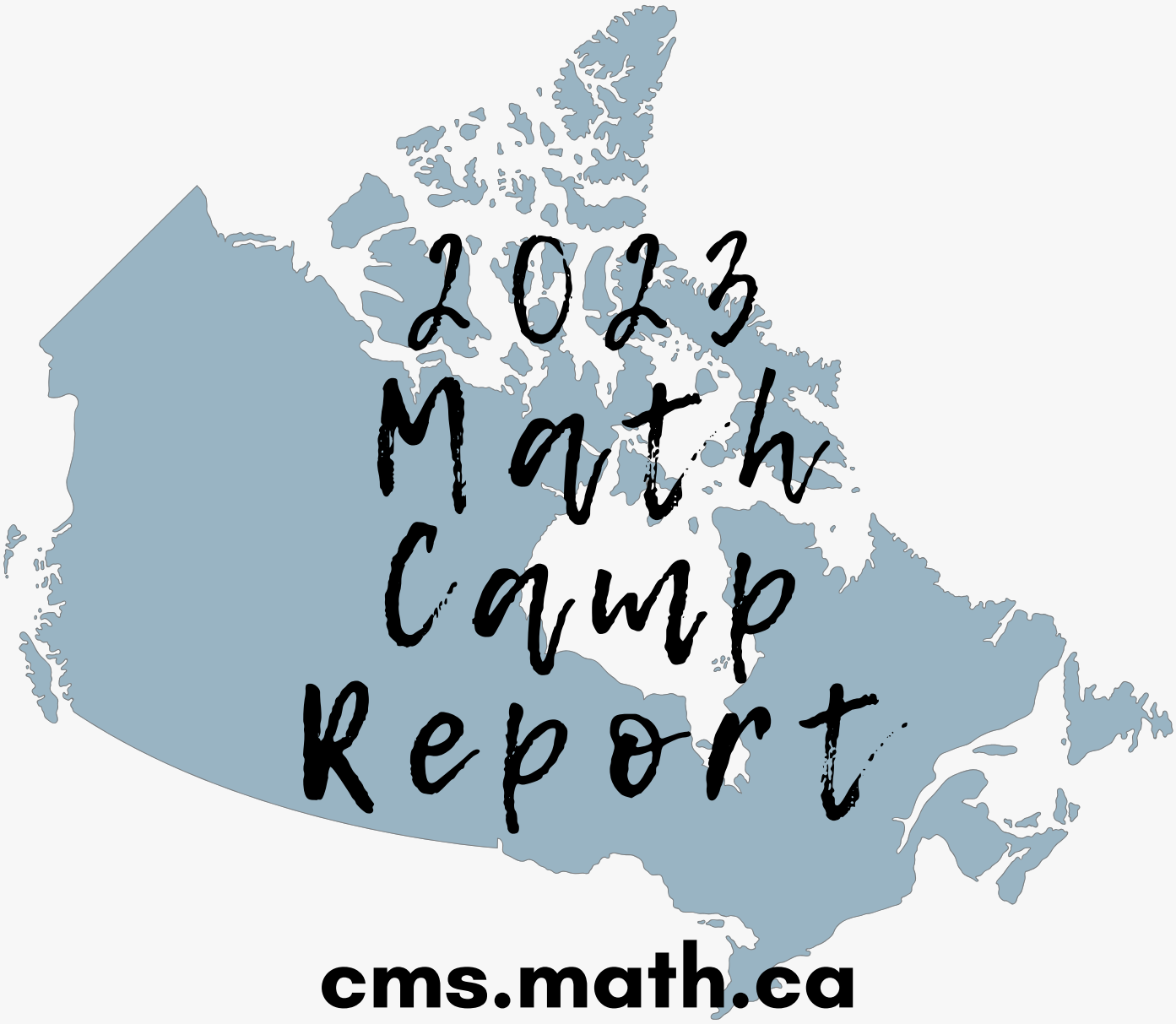
Canadian Mathematical Society
Société mathématique du Canada



2023 Math Camp Report

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About the CMS Math Camps

Since its inception in 2000, the CMS Math Camps program has captured the spirit of mathematics from coast to coast and has inspired young minds across the country. The program offers a unique opportunity for young Canadian students to explore a side of mathematics that is not accessible in a traditional classroom setting. Although the CMS gives local organizers the freedom to choose the topics and activities of their camps, the main goal of a typical camp is to engage students in an authentic learning environment in mathematics and its broad applications to Science, Technology and Engineering. This is achieved through stimulating presentations, hands-on activities, building projects and competitions. Students who attend the camps leave with new friends who share the same passion for the subject, new ideas to explore, and a fresh outlook on mathematics and the role it plays in our lives.

2023 marked the return of many in-person camps. There were several successful camps offered again this year. The CMS offered a total of 20 camps in 2023. In addition, the number of regional camps has increased since last year, reaching more young people across the country with the opportunity to participate in camps.

For 2024, a total of 25 CMS Math Camps are projected to be held around the country.

2023 Math Camps Overview

Regional Camps

There were 17 regional camps offered in 2023.
Please see below for a summary of the regional camp activities.

Simon Fraser University (Surrey Campus): CMS SFU Surrey Math Camp

Location: Simon Fraser University, Surrey, BC
Date: June 20-21, 2023 (after 3-year break)
Participants: 16 girls and 25 boys (41 total), grades: 9 - 10
Camp Organizer: Natalia Kouzniak
Topics: geometric models and construction of polyhedra followed by bridge construction challenges, mathematical modelling of biological systems; introduction to operations research (scheduling), counting, graph theory; mathematics of infectious diseases; problem solving session; logic games and puzzles

Student Evaluation Form

- Did this experience increase your interest in math, science or engineering?

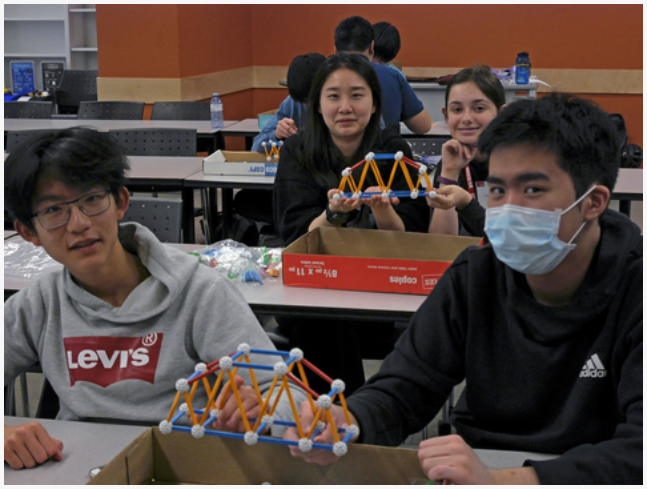
"Yes" - 37 students

- Are you considering a career in math, science or engineering?

"Yes" - 32 students

- *I liked doing interactive, team-building activities and touring SFU Surrey campus, visiting the robotics lab;*

- I liked that we got to see presentations from different people and learning about their research and how it impacts the world;
- I liked the engaging lectures and math puzzles. I would be definitely interested in attending future math camp;
- I liked how unique each presentation was;
- I am glad that I decided to give SFU Surrey summer math camp a try. It was a great experience. I had a good time engaging in presentations and activities;
- Overall the camp was really fun and I learned a lot of new stuff;
- I enjoyed this camp very much. I got to see math from different dimensions and expanded my horizons. I realized there are many faces of math, not just numbers in a line. The professors and volunteers were also very eager to teach and help;
- Very fun!
- I want to attend it next year!



Simon Fraser University (Burnaby Campus): SFU Math Camp (Burnaby)

Participants

56 grade 9-10 students were nominated by their teachers, representing 16 different schools in lower mainland BC. We invited 25 of these students, representing 14 schools. 24 students accepted and attended the camp - 14 female, 10 male.

Camp Activities

Cryptography was the theme of the camp this year. Students learned about a variety of crypto-systems, built cipher wheels out of paper, played with encryption and decryption, learned some elementary number theory, probability and statistics. They learned how to use these tools to crack ciphers using cryptanalysis techniques. Students also learned to use Python for cryptography and cryptanalysis. There was plenty of opportunities for students to break out into small groups and work on problems on the whiteboards. The fourth day of the camp had a 'mystery activity', which took the form of newspaper clippings from a fictitious small town university, where students had to decode a number of encrypted messages to solve the mystery. The fifth, and final, day concluded with an escape-room styled activity which put there skills to the ultimate test. This was unanimously reported as the highlight of the camp on the survey. Students ate lunch in the SFU dining commons each day. This is a buffet style dining hall that caters to a variety of dietary needs.

Delightful Notes

- Five students from the camp asked for further opportunities to explore mathematics through the summer. They have been working with the undergraduate problem solving group that meets weekly in the department.
- A group of students developed their own mystery activity and delivered it to the mailboxes of the camp organizer in the weeks following the camp. It consisted of an encrypted text containing a 'thank you' message and the identity of the senders. They used a variety of encryption techniques learned in the camp.

Student Survey (selected comments)

- *The camp was an amazing experience for me and I enjoyed a lot of it.*
- *Thank you for making this camp fun and interesting and affordable for all students.*
- *Best summer I had so far, please keep supporting so more students have chance to have this experience.*
- *It was a great event filled week, and should continue to be hosted.*
- *This camp is great.*

- *Thank you for sponsoring this program. I had so much fun and got to learn so much about math and cryptography. I not only were able to work on math and critical thinking skills, but also go to explore SFU and the university environment. Thank you lots*!!!
- *This camp has inspired me to pursue a career in mathematics and has greatly improved my math skills and navigation*!
- *This experience helped me grow in my knowledge so much and it was so much fun*!
- *This was a great camp and I had a great time while attending.*

University of the Fraser Valley: Science Rocks!

Name of Camps: Science Rocks! Cryptography, Codes, and Crime Scenes!
Camp Dates and Locations:
University of the Fraser Valley, Abbotsford Campus: July 4-7, 2023
University of the Fraser Valley, Chilliwack Campus: Aug 8-11, 2023
Grade Level(s) of Students: grades 4-7
Type of Camp: day camp
Number of days: 4
Number of students: Abbotsford: 25 (15 male, 10 female); CEP: 25 (7 male, 19 female; 7 indigenous (2m, 5f))
Number of camp instructors: 3
Number of volunteers/helpers: 2
Camp website URL: http://ufv.ca/science-rocks/

Topics/activities: Scavenger hunt (logic games), egg drop, pH mystery, math decoder, making board games, 3-d printing (in Abbotsford) and laser cutting (in Chilliwack), computer programming, photosynthesis, making slushies.

Camp Program: Sample daily schedule is available on the website.

Organizer's comments: This year was the first time all 6 of our week-long camps were filled beyond capacity, and we had double-digit waitlists! We are considering ways in which we could expand our camps. We were short of funds this year, having not received work-study grants as in previous years, or another local community grant that we had previously depended on. We also need to raise our registration fees. This year was a tight one for sponsors. The main complaint received this year was about the lunches. We'd tried a different caterer, one that supplies school lunches, but they were not very good. We will change company next year.

Additional notes: All children receive t-shirt, lunch daily, all project materials, prizes and stickers, and certificates of graduation. We meet with local indigenous educational community leaders and keep a number of seats for local indigenous children with majority of fees waived.

Media involvement: Advertising through local school districts (e-newsletters sent out), community leisure guides, radio (CIVL), facebook, twitter, UFV science blog.

Percentage of students indicating an increased interest in math, science or engineering as a result of participating in the camp: 63.3%

Percentage of students considering math, science or engineering careers: n/a (too young)

Students' Comments:

- *I really liked my teachers and my table group and the activities*!
- *It rocks*! *It's fun, yah*
- *Thank you*! *I feel like I want to come here next year it was really amazing*! *As you know, I'll be in Grade 8.*
- *It's more fun here. All my other summer camps were boring.*
- *I love science and [the teachers] were the best*!
- *It was fun because I learned new things. The facilitators were very nice and fun.*
- *I love it. It's the best camp ever*
- *Science rocks taught me a lot I didn't know before*
- *[I liked] the biology with microscopes and math games. We should do way more math and way more jeopardy*
- *Making crystals and microscopes was fun*
- *I really liked programming on scratch because I love coding*
- *I looooooooved jeopardy, it was so much fun*

Parents' comments:

- *He had stories everyday*! *He learned something new everyday, and he was excited to go every morning*!
- *Both girls LOVED the Amazing Race. Potting the plants.*
- *She really liked the science experiment in the lab.*
- *She loved making new friends who shared her interests, light sabres, making structures, and scavenger hunts.*
- *She really enjoys scratch coding and was also very amazed to see the welding shop. Women in Welding is on her mind.*
- *Coding was by far and away the favourite thing learned. 3d printing was a close second.*
- *Everyday she talked about nothing else but the cool experiments and activities she did that day*! *She couldn't wait to go back the next day. It was always the last thing she said before going to sleep. I can't wait to see what we're doing tomorrow*!
- *Excellent program*! *Keep up the great work*! *We'll be registering again next year*!
- *Our son loved this camp – it was really cool exposure to University and Science while having lots of fun*!! *We will definitely be booking again next year*!

• *Kids liked that the facilitators were not 100 years old.*
• *Excellent camp! I would highly recommend it! Thank you!*
• *I just wanted to pop in and say a very big thank you to you and the UFV Science Rocks team! The girls have really enjoyed coming for the past two years. I am sad they are aging out but so happy that there will be other kids that can enjoy the camp too! I would also like to thank you and the department for providing this to Indigenous children, and having its expenses covered. I have and will continue to let others know all about the camp and the great course leaders. Háw'aa (Thank you in Haida).*

University of Manitoba: Math Camp 2023

The Department of Mathematics conducted its twentieth Mathematics Camp, July 16- 19, 2023. Twenty students from grades 9 and 10, who stayed in residence at St. John's College, were immersed in an intensive program of mathematics and its applications. All students this year were from Winnipeg. There were nine girls and eleven boys.

There were 56 applicants for the 20 spots, which is more than double last year. As such, we had to reject many good students. We will look into options for future years including increasing the size of the camp and reducing the number of students who get invite letters. We also ran a free single day Math Day of Fun for students who were unable to participate in the full camp.

Topics covered were arithmetic in different bases, combinatorics, sequences and series and linear Diophantine equations.

Due to the increased costs and reduce funding from CMS, we increased the student fees from $160 per student to $225. We will be looking into other funding options to avoid similar increases in the future.

The camp was organized by Dr. Nicholas Harland. The person running the workshop was Dr. Michelle Davidson with assistance from Dr. Nicholas Harland and Dr. Michael Szestopalow.

The students were very passionate and eager to learn. They participated throughout and improved as the sessions went on. We found their passion inspiring and delighted in conversations with the students about mathematics. Some of the students talked with us about theories they had on their own. It was a rewarding experience for both the students and the faculty members running the workshop.

Recreational activities included going to IQ's, the pool hall on campus where students played pool and foosball, and a variety of cards/games in St. Johns College.

We had three guest speakers, Drs Nicholas Harland, Michael Szestopalow and Donald Trim.

In order for us to assess the value of the camp, from the students' point of view, students, were asked to fill out a survey. Results indicated that:
1. The majority of student preferred the Late July time which could be survivor biased.
2. A few students wanted the camp to be longer, but the median fell at 5 days. Given the camp is 4 days, it seems like they preferred a little longer, but not much.
3. All of the comments about the talks were positive, so there doesn't seem like there is any reason to change.
4. In general the student enjoyed the activities but most wished there were more organized group activities (games, sports, walks around campus) as opposed to the inside activities that were planned.
5. Most found the notes easy to understand, but other needed the help of the lectures to fully understand the concepts.
6. The students thought the topics were appropriate and balanced what they were doing in school with an extra challenge. A couple wanted some more math contest type problems.
7. Overall they were happy with St. John's, but a few students noted that the linens and pillows weren't great.
8. The vast majority said removing the overnight portion of the camp would make it worse as it would lose part of what makes the camp special. They also feel it would mean less time meeting new students away from just doing mathematics.
9. Most students gave the camp in the 7-9 range with most giving 8 or 9.
10-12. Among a few other things, getting to know other kids who have the same interests was a common answer. Most improvements were commented on earlier in the questions and revolves around has more outdoor recreational activities/sports.
13-14. Nearly all students said they were considering a career in STEM. Whether it increased their interest was mixed as those who said no said it was because they already knew they were going into that area.

Math Plus Tutors Learning Centre: MPT Math Camp

Number of participants
9 participants
Mainly from Grades (4-6). We also had a few students from grade one and seven. We applied differentiated learning to our math curriculum to accommodate those students.

Paid Subsidies
Six subsidies were used for students from families with low income group to support their entry to this math camp. The rest of participants were paid members.

Curriculum
Over the five days period participants were introduced to different math strands with applied activities, projects, and experiments.

Survey Questions and Comments
Most of the participants enjoyed their time working on activities, games, and projects. Here are a few answers to our survey and comments from the participants.

1. What has been your favorite part of MPT Math Camp so far?
"Working on ratios and proportion and making a refreshing drink"
"Learning grade 8 math!"

2. What is something that you have learned during MPT Math Camp?
"*BEDMAS from grades 7 & 8"*

3. What do you want to learn in Math Camp?
"*Fractions & Geometry*"

4. How is learning math going to help you in the future?
"*Math will help me get a good job."*
Also many students wrote that response.

5. What job do you want in the future? How will math help you in that career?
"I want to be a doctor. Math will help me do the body calculations as a doctor."
"I want to be a YouTuber. Math will help me count the money I'll earn."

6. What's your favorite subject at school?
"*Math, Science, and Art."*

7. How do you rate math on a scale from 1 to 10?
Most of the student gave math 8-10 score

8. What's the most difficult part about math that you need to focus on?
"*Fractions"*

General Comments
"Thanks to Math Plus Tutors and Canadian Mathematical Society for this wonderful camp."
"I enjoyed working on the survey at the Farmers' Market."
"I had fun working on the kaleidoscope project."
"I love art and had fun making Math Camp Tie-dye T-shirts."

Université d'Ottawa - University of Ottawa

Introduction

For the past 23 years, the department of Mathematics at the University of Ottawa has organized a summer camp in mathematics in collaboration with the Canadian Mathematical Society (CMS). Every year, 48 students from all corners of Ontario and Quebec spend the week on campus living in residence. The camp offers participants a unique opportunity to get involved in a somehow different type of mathematics. A typical day at the camp starts with a presentation given by an expert in some area of mathematics. Some presentations are given by mathematicians working in industry and government agencies to give students a real sense of what mathematics can achieve in real life. The presentation is usually followed by hands-on activities or exercise sessions to give the students the chance to practice what they learnt. After lunch, students are put in teams of four for mathematical games and challenges. This is a crucial to develop the ability of students to work in teams and under pressure. At night, students work on their homework questions and on their building projects. During the weeklong camp, there are also some social, cultural and fun activities. In addition to the wealth of knowledge acquired during the camp, students make lifetime friendships with others who share the same passion and love for mathematics.

The 2023 Camp

Our Math Camp took place this year the week of June 25-30. We had a large number of applications and we had to turn down many applicants as the space is limited on Campus. We accepted 50 students to participate from all over Ontario and Quebec. The camp was bilingual with 25 participants in French and 25 in English with many shared activities. Students stayed in residence all week with their meals in the main cafeteria. In addition to all the Math presentations, competitions and projects, the Camp included Physics and Chemistry shows as well as some social activities like an Escape Room and a tour of Ottawa. Comments from students were very positive and appreciative of the opportunity. Since this was our first Camp in person since COVID, prices of everything went up significantly and the actual cost surpassed our estimated budget. The estimated cost for the camp this year was close to 55 thousand dollars.

Few comments from participants at the 2023 Camp

- (Camp participant) *I would like to sincerely thank you from the bottom of my heart for the opportunity to attend the camp as it was truly one of the best learning experiences of my life. From the lectures to relays/challenges, I was able to explore new horizons and now have an even deeper understanding and passion for math, especially with its diverse applications. I also made new friends that are like-minded in sharing a love for math and STEM. Next year, I will be writing as many math contests as I can including the COMC and Fermat. I would love*

to attend another CMS camp next year and I am aware that most of my friends also wish to do so due to how enjoyable the camp was. Is there a camp for Grade 11, and if not would it be possible to have one with the great amount of interest there is? Thank you once again and I hope to stay in touch!

- (Camp participant) *I just wanted to write this email to thank you again for hosting this math camp. It was truly an amazing experience that will stay rooted in my mind for a really long time.*
- (A letter from a parent) *Thank so much for the amazing effort you and your team put into organizing the math camp, for giving our sons and daughters a warm welcome, and for taking such good care of 9 them in the beautiful campus of University of Ottawa. Our son Marc has very much enjoyed staying in the campus and was very happy to make a lot of new friends and experience the academic atmosphere at a completely different level. It's been a while since we've seen him so excited and happy about his and their team's achievements. I feel that he is excited about Math once again and that he is willing to dig deeper to learn more. I truly thank you for that. The friendly atmosphere on the campus, the brilliant new friends, the beautiful challenges they had to face, the teamwork and the results they obtained were wonderfully encouraging and satisfying for him and hopefully for all of them.*

Plans for 2024

We are planning on hosting a 2024 camp on campus with about 50 participants. But that depends on the level of funding we will be able to secure. With the astronomical increase of costs of residence and amenities, the actual cost of one student is close to 1200 dollars for the week here on Campus. Most families will simply not be able to afford that.

York University: Math Experience

Name of Camp: Math Experience
Camp Location: York University
Date(s) of Camp: July 10th to July 14th, 2023
Grade Level(s) of Students: 7 to 10
Type of Camp: Day Camp
Number of days: 5
Number of nights: 0
Number of Female Students: 10
Number of Male Students: 32
Number of students from visible minorities (indigenous, of color,...): 42
Number of students coming from remote areas: 0
Number of students from within the province: 41

Number of students from outside the province: 1
Number of camp Instructors: 5
Number of Student Assistants: 4
Number of Volunteers/Helpers: 4 (same 4 as the student assistants)

Please describe all efforts made to attract under-represented groups (ex: female students or visible minorities):
Strong Grade 7, 8, and 9 students were selected based on their outstanding achievement on the Pascal, Cayley, Fermat, Euclid, Fryer, Galois, CIMC or CSMC (University of Waterloo) competitions and COMC. Preference was given to females to balance out the male: female ratio.

Please describe any efforts made to help students with financial difficulties to attend the camp (for example, waiver of fees):
The organizer made financial assistance available to students. In the past, when financial difficulties were brought to my attention, I allowed the family to pay whatever they could afford. This year, there were 4 students who could not afford to pay for camp, and their fees were waived.

Please list all items provided to students in your camp (ex: handouts, project materials, books, prizes):
Students were given various warm-up problem sets (challenging contest questions from various competitions, classic problems, interesting problems collected over time.

The presenters handed out materials/questions for the students to work on, which also gave students the foundation for their presentation (to follow up their learning at home).

Please give a full description of any STEM related activity that took place in your camp:
In several of the presenters presentations, and during the daily problem solving and competition sessions, in addition to the morning warm-up and brainteaser sessions, the "process of STEM" (identifying a problem, and developing innovative and creative problem solving strategies towards solving it) was encouraged and promoted.

Organizer's Comments:
This year, I continued to promote mathematics through multi-layered questions with several entry points such that they are more accessible to a wider range of students and their ability levels.

It is increasingly harder to get students to complete their camper evaluation forms.

Please indicate what you consider are the best practices/activities at your camp that other organizers can benefit from:
-My students traditionally enjoy the brainteaser/warm-up (logic) problems at the beginning of camp, and the problem solving/team competitions at the end of camp.
-Students enjoyed ice breaker games on the first day to get to know each other

-Students enjoyed our Escape Room trip on the last day of camp and the opportunity to socialize with their peers.

Please indicate if there is any activity that you think was not very successful this year and that you will modify or eliminate next year:
-Presentations by presenters vary in the level of difficulty and student engagement. Some students had a hard time appreciating the expertise of some of the presenters, however, at my camp, I try my best to expose students to a wide range of topics. There is a clear transition from students learning from a "teacher", and a professor who lectures.
-Often times, I try out new presenters to determine if they could be a good fit and a regular presenter for future years.
Some students told me that they would prefer if there was a gradual progression of the level of difficulty of the presentations from various presenters, however, this is often difficult to do as a result of the availability of guest speakers.

Percentage of students indicating an increased interest in math, science or engineering as a result of participating in the camp: 100

Percentage of students considering math, science or engineering careers: 100

Selected students' comments
"I learned many things at math camp from the topics the speakers talked about to other things like problem solving and team competition skills (how to do relays, collaborate effectively, etc). I was alright with the level of difficulty of math camp. Some topics got challenging towards the later part of the lecture but I found it to be fine overall.
Math camp increased my interest in math since it exposed me to many new topics. I'm thinking of pursuing a career in engineering, but I'm not sure yet. Math Camp was a great experience overall. I got to meet a lot of people with similar interests/hobbies as myself and made some new friends. I really enjoyed all the lectures, whether made by Mr. Wu, the volunteers (who were great) or the guest speakers. As well, the team competitions were fine. I would definitely recommend this camp to others at my school."

"This camp allowed me to expand my knowledge in math and opened my eyes to new concepts which I would be interested to explore in the future. I am not too sure yet what career path I would like to pursue, however, it's probably somewhere along the lines of math, science, or engineering. Math Camp was a great experience talking to other individuals who shared a similar interest with me about mathematics and it was very inspiring to have learned from professors from all around Canada. I think it was a great experience that not only allowed me to gain more knowledge about math in general, but also allowed me to grow as a person."

"I enjoyed making new friends and learning different theorems. I would say learning about mass points and the escape room were my favourite parts of camp. I learned about cryptography and mass points. I also learned about different types of induction. The camp taught me to think in various different ways. I was alright with the level of difficulty of math camp. I think the topics were all pretty good. I would say the experience made me interested in math. I'm considering software engineering or math. I think the camp was really fun and I learned a lot about math."

"Math camp increased my interest in math, science and engineering. I saw so many of the people around me with higher skills in math than I do. I remember that one story of the kid who joined in late to a lecture yet still managed to outsmart the lecturer. This experience motivated me to try and become one of those people. To take a step in that direction, I am planning on competing in more math competitions and taking an advanced functions course next year. I am striving to be in the medical field.
Overall, math camp was a really cool experience! I met people around my age that were so much more knowledgeable in maths than I am and listening to lectures talking about cool math things (that I will probably never hear again). The volunteers and teachers were all very nice and the food was alright. I did have trouble keeping up, but the constant shift in topics helped me find a place where I excelled, which turned out to be cryptography. I really liked this experience and I would definitely recommend it to friends."

"Math camp definitely increased my interest in math science and engineering. The exploration in math is always endless. The topics are so different and it definitely showed the possibilities in math and beauty. Especially in the recursion lecture, the pattern and reasoning behind it. I think after seeing all these people who share the same or similar interests while some of them are even better than me, I think it really encouraged me to also learn more. I am not completely sure what to do for my career yet, but I am considering studying applied mathematics in university if possible.
I am really honoured to be invited to this camp, where I have got to know many new people from different schools who share the same interests. Though sometimes it can be frustrating when a problem can't be figured out. When your friends are around, the question does not seem that hard anymore. It might seem boring to listen to a 2 hour lecture, but to me, it is experiencing something new and I enjoyed it. The useful knowledge will be the important takeaways and the connection to other friends will also be lasting for long. This will be the memory that I keep for the entire high school where it remarks another milestone of mine in this endless way called math."

"My experience at math camp increased my interest in math because it showed that math was more complicated than I thought it was. Some people base their entire career on the study of one aspect of math and there really is much to explore. I also learned about logic puzzles and was exposed to different types of math that was very interesting. I am considering a possible career in math, science, or engineering (or computer science). This experience has shown me that there is so much to explore in every area of math, and there are so many areas of math (What they teach in school is just basic math problem solving and formulas and things like that). My overall camp

experience was basically what I described above. I learned many new concepts, was exposed to different areas of mathematics, was challenged, learned magic tricks, and had fun (also food !) I met people that were good at math and made friends!"

"Math camp definitely increased my interest in math! I learned a lot of new concepts and would definitely say that I am a lot more interested in really difficult math problems. I am interested in a career related to math and science (specifically anything related to space - astronomy, cosmology, astrology, etc.)
Overall, I really loved camp and would enjoy being able to have more opportunities like this. I loved being able to have a math-centered experience while also being able to make new friends. Hopefully, I will be able to be a volunteer in the future to inspire people all over Ontario (and even other parts of Canada) to do math."

"Math camp increased my interest in math, science and engineering. After seeing the activity where I needed to untangle myself from a string, I have become intrigued to how that technique worked, making me interested in the science of how each movement helped a person unravel themselves from the rope. In addition, after seeing all of the math skills I was missing, it made me interested in what other practices I am missing, making me search up more on math formulas. I may consider a career in either math or engineering depending on how much improvement I can see in my following years in high school. If I believe that I have secured sufficient knowledge in either career, I might decide to continue my education in that in the future.
From my camp experience, I have learned of many math topics, strategies, and stories. In addition, I have experienced the level that other people my age are at in math as well. I understand how much more I still need to learn and how much more I still don't know. I have met those who are extremely proficient in math and was able to learn from them about certain techniques. Furthermore, I have learned how many interesting games and activities work. I also learned the importance of problem solving and thinking out of the box when it comes to solving questions. Lastly, I have become more aware of the skill level that I am currently at and what I want to be in the future."

Western University: Math Camp at Western

The Department of Mathematics at Western University has been running a Math Camp for over ten years as part of the Canadian Mathematical Society Math Camp Program. In these years, the camp has evolved and expanded, particularly following the pandemic. This year we had three math camps running for students in grades nine, ten, and eleven/twelve that took place in late July through to early August.

Math Camp is one of our department's key outreach programs, providing high school students with the opportunity to learn math beyond the curriculum, to connect with department members and new peers, and to enhance their mathematical skills. Western Math Camp includes different hands-on activities, math talks delivered by math department members, individual problem-solving contests, and team puzzle-solving sessions.

A total of sixty-nine students from different grades attended three camps this summer. The camps ran for three days, and students had 2-3 math talks each day, puzzle solving in teams, and contest writing each day. Each camp also had a team activity that ran for three days and each team had to complete a task by the third day.

• γ-Camp (Gamma Camp for grade nine students) July 17-19, 2023.
• θ-Camp (Theta Camp for grade ten students) July 24-26, 2023.
• ζ-Camp (Zeta Camp for grade eleven and twelve students) July 31-August 2, 2023.

Students were provided with lunch and snacks on three breaks each day. Western Math Camps were held at the Math & Physics accelerator. It is ideal for running activities with teams seated around round tables in this spacious room. This room had a galley kitchen next to it, which made serving refreshments much easier.

Selected comments from the student feedback form *[text in brackets has been edited for better clarity]:*

• *Thank you for this camp. It was very interesting, and I learned many more things.*
• *The morning mysteries challenges were interesting and required cooperation to do many of the problems.*
• *The content was interesting for me, and the speakers were enthusiastic.*
• *I liked particularly math from the talks, so Indy 1000 was nice. I also like the team building in the morning mysteries.*
• *I enjoyed the casual less pressure involved activities as I felt I didn't have to worry about letting anyone down.*
• *I enjoyed collaborating with my group members to figure out the solutions to the problems.*
• *I liked doing a hands-on task with group members.*
• *[Thank] you so much hosting this math camp. It was a blast.*
• *I enjoyed the group work and variety of talks as well as the morning mysteries being more about logic as opposed to math [...]*
• *This math camp was a fun and interesting experience I appreciate the opportunity.*
• *Even though bitcoin challenge was as difficult, I enjoyed that it was fast [pace] and engaging. You cannot really just sit around and other do the [work] for you.*

Queen's University: Math Quest and RabbitMath

Between the two camps, RabbitMath and Math Quest, we had a total attendance of 24 campers, who joined us for a week in early August to learn, play with and do some math over the summer holidays.

Math Quest is a mathematics camp for high school girls interested in math and science who have a curiosity for exploring new ideas. With a focus on problem solving, our hands-on activities are led by female mathematicians, statisticians, and physicists. We design our sessions to be hands-on, fun and interactive, exposing our campers to areas and applications of mathematics that they might never see in a high school classroom, including interdisciplinary topics that connect math to other subjects in the sciences and arts. Although we offer a day-camp option as well, most of our campers stay for the week in the university residences, eating meals in the dining halls, and interacting with students from across the country with similar interests throughout the day and evening. We are lucky to be able to give our campers a small taste of the university experience, while providing high-quality educational programming that expands their understanding of what mathematics is and what it can do.

Mathematics is full of wonder, beauty, and creativity. At RabbitMath, our goal is to deliver this experience to high school students by giving them the chance to work (and play!) with hands-on problems that are directly related to the Ontario Math Curriculum, but which are very different from problems that you might typically find in the classroom. Our emphasis is on the navigation and analysis of complex structures. Our activities are "low-floor, high-ceiling" which means that students at different grade levels can work together on the problems that arise. Along with this, we strive to provide our campers with the chance to meet and interact with like-minded individuals from across the country, as well as the chance to learn from instructors who use math every day - all in a safe, healthy, and inclusive environment.

Since our partnership with the CMS began, we have been able to provide an exceptional and transformative experience for young people with a burgeoning passion for mathematics. The support that we've received from the CMS over the years has played a crucial role in allowing us to offer these opportunities to Canada's youth and enriching the experience of those who have attended. The financial contributions have allowed us to expand our program's reach, enabling us to offer bursaries to students who might not otherwise have had the means to attend our camp. This inclusivity has led to a diverse community of learners who come together to explore a shared love for mathematics.

Here are some quotes from the feedback we received from campers:

"Learning math ahead of my grade level was inspiring!"
"I loved all the hands-on activities"
"I really liked how we discovered more abstract concepts"
"I enjoyed learning about concepts that aren't taught in the high school curriculum"
" The different types of problem solving were great."
"The best parts were the memories, friendships and community"

Thank you to the CMS for your continued support of math camps at Queen's. We are very grateful for your support, since it allows us to share our love of math with the next generation of students.

Université de Sherbrooke: Camp collégial de l'AMQ

Thanks to the financial support we received, the Université de Sherbrooke was honoured to host the AMQ college camp. It was with great pleasure that we welcomed twenty-one people to the main campus of the Université de Sherbrooke, from June 4 to 9, 2023, to experience a week of stimulating and memorable activities. All were winners of the college version of the AMQ provincial competition.

The guests arrived on campus late Sunday afternoon for a BBQ dinner, which was our ice-breaker activity. In particular, the participants were able to meet the other participants and some of the people responsible for the upcoming math workshops. The evening ended with a visit to the main campus of the Université de Sherbrooke, organized by Salomon Lova Tina Ramaroson and Mohamed Tahiri, who acted as monitors throughout the week.

The scientific activities were launched by Sylvain Bérubé, lecturer at the Université de Sherbrooke and teacher at the Cégep de Sherbrooke. He presented a variety of combinatorial games, which stimulated guests throughout the week. This was followed by a short introduction to the theory of relativity, focusing on general relativity, by Pr David Sénéchal from the Université de Sherbrooke's physics department. Participants then had the chance to visit the laboratories of the Institut Quantique de l'Université de Sherbrooke. That same evening, a board games evening awaited everyone to avoid the bad weather outside.

For the second day of activities, Pre Vasilisa Shramchenko and lecturer Abdelilah Hamdache, both from the Université de Sherbrooke's mathematics department, led a recurring activity at

Sherbrooke: the mathematical circle. Throughout the morning, and even a little longer as some people just couldn't stop thinking, riddles and logic games kept the guests racking their brains. For the second half of the day, a lecture on linear algebra and the use and modeling of the qubit showed how the formalization of a mathematical field is essential and useful in a concrete context. The lecture was given by Jean-Frédéric Laprade, a professional hired by Institut Quantique. The day ended with a hike along the trails of Mont-Bellevue, close to the Université de Sherbrooke residences.

Then came the middle of the week, which was a little more playful. The day began with a tour of the Université de Sherbrooke's Faculty of Engineering. In particular, guests were able to visit the GAUS (le Groupe d'Accoustique de l'Université de Sherbrooke) laboratories, the Studio de création and also the Usine-école Siboire. A unique experience, without a doubt! Afterwards, Mr. Anik Trahan, a lecturer at the Cégep de Sherbrooke, gave a workshop on using equations to make drawings. For the second half of the day, guests moved to the Université de Sherbrooke sports center to play a few games of badminton. Following this physical stimulation, a short break allowed everyone to recharge their batteries so that they could compete in a game of chess. It was a warm-up for the next day.

Thursday was organized and held at Bishop's University, an English-speaking university also located in Sherbrooke. The day began with Prof. François Huard, from the mathematics department at Bishop's University, talking about Dubbell and an Euler problem, followed by Mr. Juan Carlos Bustamante, lecturer in the mathematics department at the Université de Sherbrooke, who went on to talk about projective geometry. Once again, the afternoon's theme was a little more playful. First, guests had the opportunity to play a simultaneous game of chess against a member of the Sherbrooke Chess Club. Afterwards, Mr. Sylvain Bérubé presented various film extracts in which mathematics is, at times subtly, present.

The final day of activities featured a number of lectures on different mathematical topics. At the start of the day, Anik Trahan spoke about the origin of logarithms and Benford's law. Another lecture on the origin of the normal law was given by Pr Éric Marchand, from the Université de Sherbrooke's mathematics department. The day ended with a session of the game: go fish. However, Pre Emily Cliff presented a version of the game that uses the uncertainty principle and is an excellent exercise in logic.

A huge thank you to everyone who helped us organize this second edition of the AMQ math camp. Your time and energy were not wasted - far from it!

University of New Brunswick: UNB/CMS Math Camp

The twenty-first edition of the UNB-CMS Math Camp at the University of New Brunswick, Fredericton, took place May 26-28, 2023. The three-day residential camp is an exercise in enrichment and an opportunity to recruit young people into mathematics and related fields. The Camp seems not to be a significant recruitment tool for UNB; however campers consistently state on exit surveys that the Camp increases their interest in mathematics and that they intend to study math, science, or engineering after high school.

The Camp had to be cancelled in 2020, 2021, and 2022, and so we had some time to re-think how to organize the camp and recruit campers. Previously, students were invited based on performance in various math competitions, but this year we sent invitations to all high school principals across the province, asking them to notify math teachers and potentially interested students. It appears that the message did not reach all high schools equally as we had only 21 applicants, but in future years we will be sure to remind the high schools to get the message out. We were able to accept all students who applied, and in the end we had 19 campers: 10 female, 8 male, 1 non-binary. This gender parity was a beautiful thing to see, as the previous competition-based invite format resulted in heavily imbalanced gender ratios.

Accommodation and meals are our greatest expenses. This year we asked campers to pay a $40 registration fee to help offset costs.

During the 52 or so hours that students were on site we had several engaging problem-solving sessions which saw students working in small groups (and meeting peers from other schools in other parts of the province) and presenting their solutions to the group. As usual, we had several guest speakers visit the camp, including a visiting speaker from UNBSJ, giving various talks. On Saturday evening we played our traditional game of "Basketball math" at the gym, which encourages group participation in solving problems that get progressively more challenging.

Some quotes from past surverys are:
"The camp brought many people who share similar interests and goals together, this is what classroom in regular school can't do. It allows students to know others from different regions in the province as well."

"This camp was an amazing opportunity to explore the wonderful world of numbers and look at math from a completely different perspective compared to school."

"Great opportunity for students who are good and interested in math to get out of their comfort zone, challenge themselves and interact with other students from around the province."

We will be continuing this valuable outreach project in 2024.

Memorial University: "Blundon Seminar" Math Camp

Name of Camp: Blundon Seminar camp
Camp Location: Memorial University
Date(s) of Camp: May 25
Grade Level(s) of Students: 10-12
Type of Camp: Residential Camp
Number of days: 1
Number of nights: 0
Number of Female Students: 7
Number of Male Students: 22
Number of students from visible minorities (indigenous, of color,...): 16 poc
Number of students coming from remote areas: 6
Number of students from within the province: 29
Number of students from outside the province: 0
Number of camp Instructors: 6
Number of Student Assistants: 4
Number of Volunteers/Helpers: 2
Camp Website URL (if available): https://www.mun.ca/math/com/com-blundoncamp/

Please describe all efforts made to attract under-represented groups (ex: female students or visible minorities):
Students are selected based on their results in various written math contests including Blundon Contest, COMC, Euclid, Fermat, etc. We made our best afford to invite students interested in mathematics from under-represented groups. This year 7 girls attended the event and 16 people of color. We hope to be able to invite students from remote parts of the province in the future with help of our sponsors.

Please describe any efforts made to help students with financial difficulties to attend the camp (for example, waiver of fees):
There is no fee to attend the camp. We provide meals for the entire duration of the camp for all students attending the camp. We try to cover students' transportation to St. John's from outside of the town.

Please list all items provided to students in your camp (ex: handouts, project materials, books, prizes):
During the camp students were participating in various problem solving activities. At the end students were given a list of the problems they attempted to solve and detailed solutions. Students were also given math books on problem solving as well as various prizes, money awards and memorable gifts.

Please describe all efforts made to increase awareness of your camp in the community through media involvement: journal articles, radio or TV, interviews, etc:
The camp was featured in the CMS Report and CAIMS newsletter. This camp is by invitation only but we advertise other related problem-solving activities in the teachers' network. We will try to publicize it in the media too.

Camp Program:
During the seminar the students attend one-hour talks given by professors from MUN on various mathematical topics and applications in science and engineering. There are several problem-solving sessions as well as other activities such as Mathletics and Papers Chase.

Please indicate what you consider are the best practices/activities at your camp that other organizers can benefit from:
During the seminar the students attended a one-hour lecture. There were two problem-solving sessions, Paper Chase and a Pizza party, prior to which the award ceremony took place.

Please indicate if there is any activity that you think was not very successful this year and that you will modify or eliminate next year:
It seems that in general all activities were enjoyable for the students.

Percentage of students indicating an increased interest in math, science or engineering as a result of participating in the camp: 90

Percentage of students considering math, science or engineering careers: 90

Students' Comments:

- *I loved working together to solve math problems. It was very rewarding.*
- *Really good experience.*
- *I liked paper chase, food, meeting new friends, and lecture.*
- *Very fun, loved the problems*!
- *I got to learn some new concepts while also encountering some old once.*

Specialty Camps

There were 3 specialty camps offered in 2023.
Please see below for a summary of the specialty camp activities.

University of Calgary: Math Attack Summer Camp for Girls

The 2023 Math Attack Summer Camp for Girls was an 8-day overnight camp that was held at the University of Calgary and the Banff International Research Station (BIRS) from Sunday, August 13th - Sunday, August 20th. The camp brought 21 grades 6 - 10 students who identify as girls together to engage in fun mathematical activities and build connections. Students stayed in the university residence for the first five nights of the camp and stayed at the Banff Centre for the last two nights.

The camp aimed to encourage girls to pursue their passion for mathematics and make connections with peers who shared similar interests. Throughout the week, students engaged in mathematical sessions that explored topics such as graph theory, topology, data science, statistics, and actuarial science. They investigated how x-ray machines work using tomography techniques, explored the mathematics behind blockchains, and competed in a Crypto Hunt and math-based Escape Room. These sessions exposed students to 14 female role models, including recent high school graduates, undergraduate math students, graduate math students, mathematics faculty, and mathematicians in industry.

During the camp, there was also plenty of time for friendship building and physical activity. Evening activities included sports, swimming, board games, karaoke, and a walk along Bow Falls Trail. On Friday, students also took some time to explore the town of Banff and hiked up Tunnel Mountain.

There was no registration fee for the camp and all meals and accommodations were provided.

- *It was encouraging for me to meet more girls that excel in STEM. We really bonded over the course of this camp by working on challenges together and talking about similar interests.*
- *I really enjoyed attending this camp. I learned a lot, and my appreciation for mathematics grew beyond measure. Leaders were so amazing, impactful, inspiring and insightful. I wish I never had to leave, I had such a blast*!
- *I am extremely grateful for the opportunity to attend this camp. I was able to connect with people who I wouldn't have met otherwise as they came from all over Alberta and we attend different schools. I was able to make friends who I intend to keep in contact with even after the camp is over. After I complete high school, I would like to attend the University of Calgary, and this program allowed me to meet professors that I may meet again in a class a couple years down the road. Additionally, this has given me insight into what's in store for me in classes like this.*

• *Before I came to camp, I thought math was anything to do with numbers, if there were numbers it was math, if there weren't numbers, it wasn't math. But I realized that math is everywhere, even the smallest thing in the whole universe is math. Before I didn't know if I would be interested in math, but now I know even if I don't like one small thing about math, there are so many more things I can do in the math field.*
• *This camp reinforced the idea that mathematics is such a field of various areas, and ties in with so many different applications, pretty much anywhere within our world. We use mathematics to understand, describe, develop and sharing knowledge about our world, and it connects everyone no matter race, gender, religion, or sexuality, math is inclusive*!
• *Prior to this camp, I thought that math was only about numbers and performing complicated calculations. However, I learned that excelling in mathematics also requires good communication skills thanks to Dr. DeDieu. I also rarely connected math with the medical field, but I learned about how CT scans require geometry through our tomography session with Tracey Balehowsky.*
• *This camp has shown me that math extends beyond the classroom, and plays a vital role in many of my hobbies. From robotics to math puzzles, this camp has done a fantastic job of balancing the realistic applications of mathematics, with the recreational side that makes people fall in love with math to begin with.*
• *This camp provided an environment that was inclusive and open. All the chaperones and speakers were brilliant and encouraging, which definitely did inspire me to explore my own passions for STEM opportunities.*

Dalhousie University:
Black Educators Association/DAL Math Camp

The 2023 BEA/DAL math Camp was held 2 July to 7 July 2023. The camp was attended by 16 campers; 8 boys and 8 girls. They were chaperoned by 4 undergraduate students, who accompanied the students to all their activities. The students were broken into two gender-balanced groups. One group participated in the Math class in the morning while the other worked on the programming part. After the mid-morning break, they switched.

The Math sessions covered mathematical card tricks, puzzles. The underlying mathematics for two of the card tricks is Error-Correcting Codes. The class explored binary numbers - holding contests on how fast they convert the numbers. They then analyzed the tricks. The last card trick used ternary arithmetic. The puzzles were chosen to highlight different approaches to solving the puzzles. The students also did matchstick geometry puzzles. The math sessions were instructed by Nauzer Kalyaniwalla and Kwamena Aidoo.

The coding sessions introduced the basic structures of programming by making the students write programs to draw polygons. Once all the students were able to successfully complete the exercises, they went on to create either a small game or an animated story. Every student

completed a project by the end of the camp. The coding sessions were instructed by Nathan Brown and Semilore Kayode.

A special treat for the students this year, was a preview of Prof. Jason Brown's Music and Mathematics talk (with live musicians!) at Bridges. It is not often that we hear loud rock music playing out of the Math Department's colloquium room. Outside of the academic sessions, the students visited the Nova Scotia Tattoo, went bowling and went to see the new Spiderman movie (voted on by the campers as a significant movie they had to see together!).

The camp this year was restricted to 16 students due to the lack of room availability. The residence rooms were reserved for the participants of NIAG 2023, which was being held the following week in Halifax. The 2024 camp will have 24 students.

Yukon University: Entrepreneurship Camp

The Entrepreneurship Camp garnered an exceptional level of engagement from our youth this year, with each participant reporting substantial learning and a well-rounded and fun camp. We started the week with young entrepreneurs crafting their business ideas using the "Business Model Canvas", a valuable resource teaching youth about key resources, cost structures, and revenue streams for establishing a successful business. Students also acquired the skills to price their products effectively, ensuring both competitiveness and profitability.

Throughout the week, students delved into various mathematical concepts essential for sustaining business operations. The culmination of their efforts was the "Dragon's Den" pitch, in which they presented their products to a panel of mock investors. This experience prompted students to contemplate the level of investment required and the percentage of their business they were willing to offer to potential investors.

Over the course of the camp, participants applied diverse mathematical tools, including arithmetic, fractions, and percentages, to craft exceptional business plans. Additionally, students honed their abilities in public speaking, teamwork, and innovation, skills pivotal in their personal and professional development.

Since the camp was a huge success, we have decided to launch an Entrepreneurship After-School Club this fall. Several students who participated in the summer camp have already registered for this exciting opportunity, indicating a sustained interest in math and entrepreneurship and a desire to continue their educational journey in this field.

Full Camp List

Simon Fraser University (Surrey campus): CMS SFU Surrey Math Camp

Simon Fraser University (Burnaby campus) : SFU Math Camp (Burnaby)

University of the Fraser Valley: Science Rocks! (Abbotsford)

University of the Fraser Valley: Science Rocks! (Chilliwack)

University of Manitoba: Math Camp 2023

Math Plus Tutors Learning Centre: MPT Math Camp

University of Ottawa

Université d'Ottawa

York University: Math Experience

Western University: Math Camp at Western (Gamma Camp)

Western University: Math Camp at Western (Theta Camp)

Western University: Math Camp at Western (Zeta Camp)

Queen's University: RabbitMath

Queen's University: Math Quest

Université de Sherbrooke: Camp collégial de l'AMQ

University of New Brunswick: UNB/CMS Math Camp

Memorial University: "Blundon Seminar" Math Camp

Dalhousie University: Black Educators Association/DAL Math Camp

Yukon University: Entrepreneurship Camp

University of Calgary: Math Attack Summer Camp for Girls