NS Math Circles

Year End Report 2014-2015

Mission Statement

Nova Scotia Math Circles is dedicated to enriching the experiences of Nova Scotia students in all areas of mathematics. Our program vision is to foster enthusiasm for mathematics through interactive, creative and meaningful presentations.

Many thanks to our sponsors!

eastlink

DALHOUSIE UNIVERSITY

Executive Summary

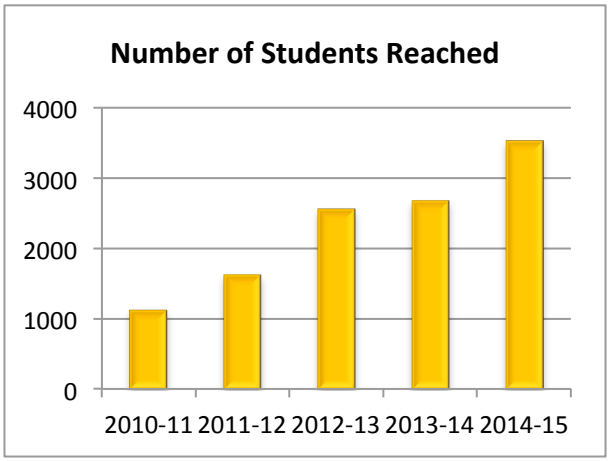
Nova Scotia Math Circles had a great year!

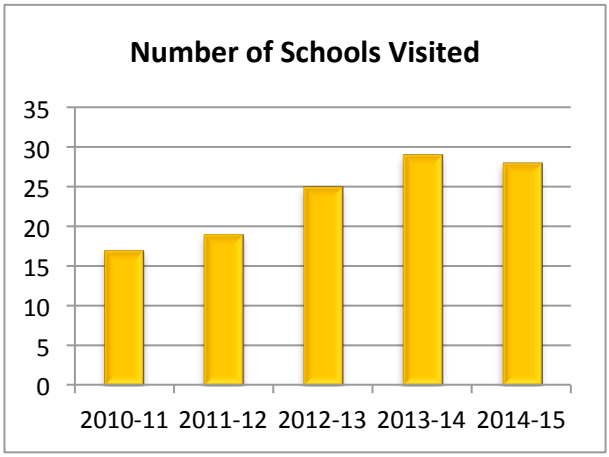
Our partnership with Eastlink, which was announced in June 2014, has enabled us to hire more students to go on school visits, as well as to acquire new materials for elementary school outreach.

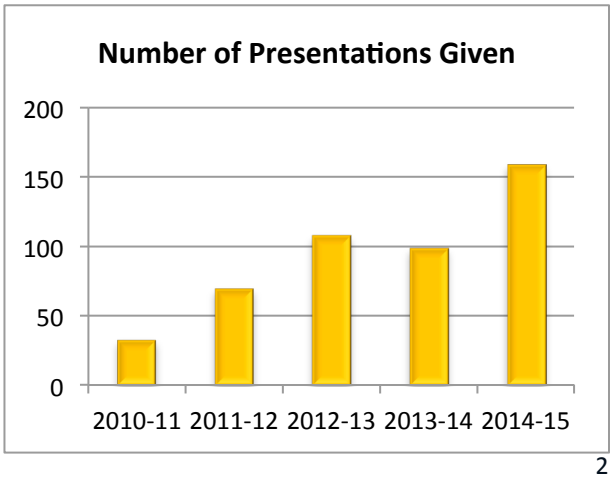
Our fall term in particular was very busy with up to four school visits per week and a week-long trip to the Tri-County Regional School Board (TCRSB). Due to the many snow days this winter, our winter and spring terms were a bit quieter, but nonetheless productive.

While the number of schools visited has remained mostly consistent over the past three years (28 this year), we have seen a large increase in the number of presentations given (159 this year) and students outreached to (over 3500 this year). In part this is due to larger schools requesting repeat visits to give every class the chance to try their hand at one of our workshops.

Our ten monthly evening talks also saw a slight increase in attendance over previous years, attracting over 380 students, parents, and teachers. Many thanks go to our volunteer presenters, a mix of faculty at several universities and Dalhousie students.



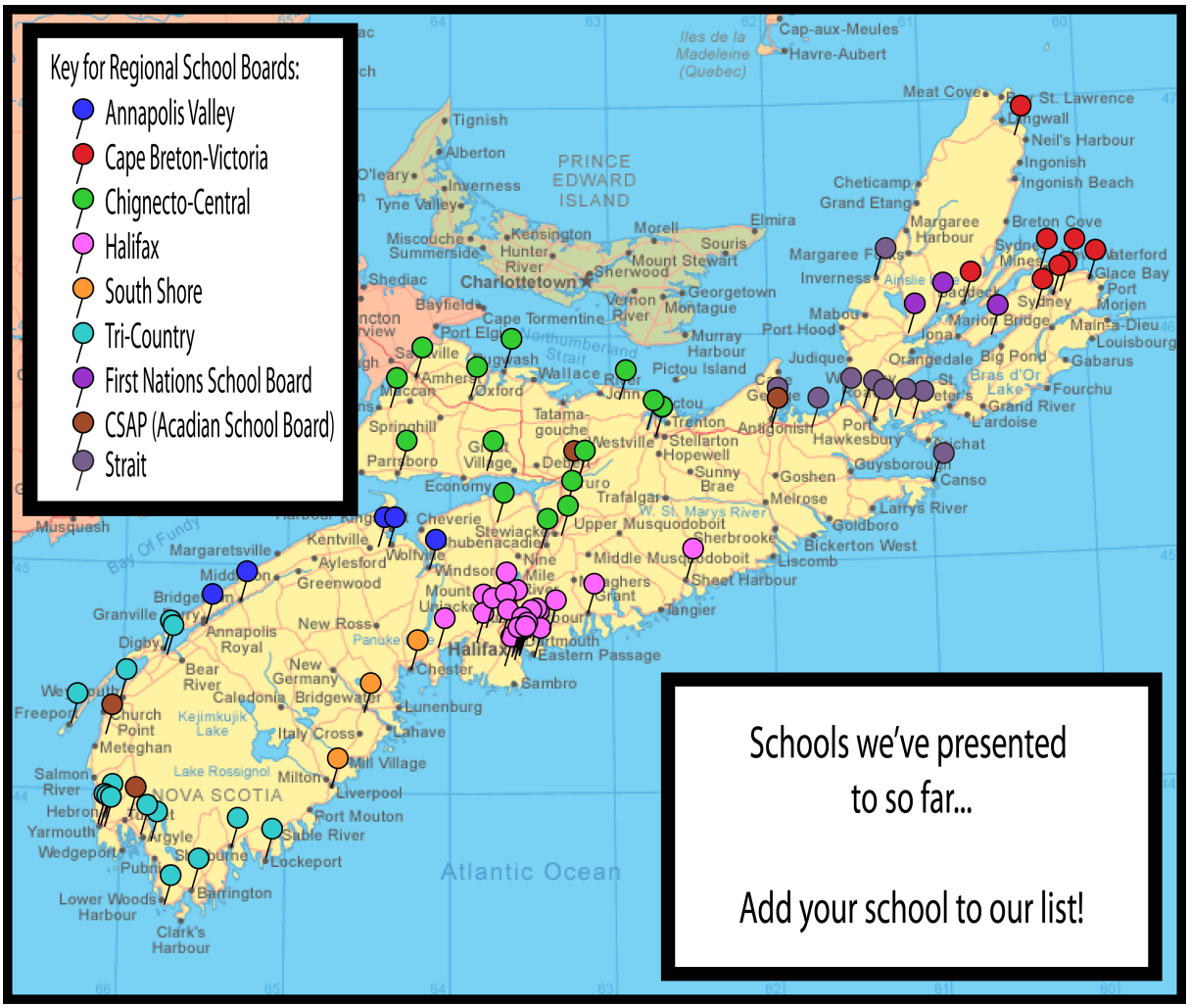




> "Students got to DO the math. They didn't spend a long time listening to instructions, a lot of learning happened in small groups with the leader."
> Lois Burns, Teacher,
> Five Bridges Junior High

As in previous years, we attended the NS Math Teachers Association Conference to raise awareness of the program. We also participated in a new initiative of the Faculty of Science at Dalhousie – Celebrating Science Outreach – during Homecoming. We heard some great comments on the program from teachers, who said that the positive feedback they received from parents, friends, and colleagues helped them decide to book us for a presentation at their school.

A great opportunity for our presentation team this year was a visit from Dr. John McLoughlin (University of New Brunswick). He led a workshop on improving presentation skills, handling a variety of situations that might arise in classrooms, and gave us inspiration for new presentations.



NS Math Circles Staff

This year Svenja Huntemann was the Program Director, taking over from Danielle Cox in September 2014. She is responsible for the organization and general direction of the program. She continues to establish and build relationships with members of the Regional School Boards, NS Math Teachers Association and math teachers throughout the province.

Dr. Richard Nowakowski remains the faculty advisor for the program. He acts as a liaison between the program and the university and works with Svenja to further the vision of the program.

Our presentation team this year consisted of two teaching assistants, Ben Cameron and Elham Roshanbin, as well as continuing presenters Abdullah Al-Shaghay, Hoda Chuangpishit, Julien Ross, and Julia Tufts. New members of the team are graduate students Bassemah Alhulaimi, Marie B. Langlois, Lucas Mol, Francisco Rios, and Holly Steeves, as well as undergraduates Brandon Elford and Justine Gauthier.

In the fall, Ben Cameron will be taking on the role of Assistant Program Director, supporting Svenja in the running of Math Circles. Three teaching assistants will be visiting schools (together with other members of the presentation team) as well as help create new presentations.

List of Presentations

- Mathemagic
- Tessellations
- Jury Duty
- NIM
- Infinity
- Graph Colouring
- Math & Art
- Limiting Processes
- Population Modeling
- Logic & Reasoning
- Fractals
- Eulerian Circuits
- Toads & Frogs
- Games on Graphs
- Fibonacci & Golden Ratio
- Planarity
- Numeral Systems
- Tower of Hanoi
- Pi
- The Hat Problem
- Prime Numbers
- Circle Geometry
- Coding Theory
- Probability
- Cryptography
- e
- Permutations & Combinations
- Math & Music
- Benford's Law
- Pascal's Triangle
- Problem Solving – Junior High
- Problem Solving – Elementary Schools

"This presentation is always successful in my classroom! Looking forward to having you back!"
Kora Lee Gallant, Teacher,
Madeline Symonds Middle School

Outreach

Local Events

We held 10 evening events, September through to June. The local events attendance was over 380 people during the school year.

September 17, 2014 Speakers: Ben Cameron and Julien Ross

Topic: Geometry

We will look at some unusual ways to calculate areas and circumferences of objects.

October 22, 2014 Speaker: Dr. Peter Selinger

Topic: Pythagorean Triples

Join us for some fun with numbers! Pythagoras's theorem states that the three sides a,b,c of a right triangle are related by a^2 + b^2 = c^2. Pythagoras was interested in finding right triangles where all three sides have integer length, such as a=3, b=4, and c=5. Such a triple of integers is called a Pythagorean triple. In this talk we'll explore formulas for generating all Pythagorean triples.

November 19, 2014 Speakers: Dr. Michele Millar (MSVU) and Holly Steeves

Topic: A Picture is Worth a 1000 Words

The title says it all: a picture is worth 1000 words. This is so true when working with statistics. It can be hard to make sense of data which is made up of a long lists of numbers. We will see that with simple tools, such as pie charts, bar charts and XY plots, we can make sense of data and gain insights into the real world. We will look at the Titanic data along with a variety of other data sets.

December 10, 2014 Speaker: Dr. Dorette Pronk

Topic: Math and Art Show

You are invited to participate in an artshow with a mathematical twist. We will see art that reveals the beauty of certain mathematical equations and constructions, and we will look at some of the math that is hiding in the background of some more traditional art. And last but not least you will have the opportunity to create your own mathematical art.

January 14, 2015 Speaker: Dr. Robert Milson

Topic: Fibonacci numbers, paradoxes and mathematical magic

We will explore the mystery that is the Fibonacci sequence through games, paradoxes, and YES! magic. However, unlike a magician, a mathematician always reveals his or her secrets! Together, we will explore the many treasures that lie hidden within this remarkable sequence of numbers.

February 11, 2015 Speakers: Dalhousie math students

Topic: Mathland

You wake up in a dark cavern. Suddenly a mathemagician appears before you. He says: "Welcome to Mathland! To help you navigate this beautiful country, its inhabitants will give you directions after you solve their quests."

This month, you will work in teams to solve the problems from the book "Mathland- the expert version" by L.C. Norman. For each correct solution, there will be points. For each hint you need, you will loose points. The team with the most points at the end of their journey (or the end of the evening) will win a prize!

March 25, 2015 Speaker: Dr. Karl Dilcher

Topic: Logarithms

Electronic calculators didn't become widely available until the early to mid-1970s. Before that, it was slide rules and logarithmic tables that played similar roles as do pocket calculators today, at least in high schools and universities.

In this session I will present some of the history of log tables and slide rules, along with some of the underlying theory. We will also do practical examples with actual log tables and with simple paper slide rules. Every participant will receive an old Dalhousie booklet of mathematical tables, including log tables, to take home.

April 22, 2015 Speaker: Svenja Huntemann

Topic: Combinatorial Game Theory

Want to spend your evening playing and learning about games?

Combinatorial games are 2-player games with no hidden information and no chance elements, such as Chess, Checkers, or Go. I will introduce some of the techniques that are being used to study these games by taking a look at two specific ones: Nim and Domineering. If time allows, you can try out your new abilities on a few other games.

May 20, 2015 Speaker: Dr. Philip Munz (Acadia University)

Topic: Probability Puzzles and Games

The field of probability serves fertile grounds for puzzlement and bewilderment, which makes problems so fun to analyze and discuss. In this session, we will look at a few problems which apply probability and logic to find solutions. Some answers may surprise you!

June 10, 2015 Speaker: Erick Lee (HRSB)

Topic: Schur's Problem of Sum-Free Partitions

Join us for some fun partitioning numbers. Most students in elementary school learn how to work out problems that involve large numbers by splitting them into smaller units so they're easier to work with. Counting the number of ways that a number can be partitioned however is a mathematically difficult problem that leads to lots of interesting questions. We'll take a look at a partitioning game as well as some recent mathematical discoveries in the area of partitioning.

School and Program Visits

> "The younger and older students, as well as the parents, had a great time. Many were fascinated by specific challenges, and the parents will be following up at home."
> Eric Drew, Youth Services Librarian, Halifax Public Libraries

Our visits this year to schools and a variety of programs were a lot of fun! This past year we visited 28 schools. We also ran session for two home educators groups, ESL classes at Dalhousie University, and a Girl Guides group. We adapted several of our senior high presentations to work with junior high students and piloted an elementary school problem solving workshop for grades 4-6 with several classes. Our year will conclude with presentations at several math and science summer camps.

Tri-County Regional School Board (TCRSB)

Every Fall the NS Math Circles team visits the TCRSB. Both students and teachers anticipate and enjoy this outreach event. This year we again visited the TCRSB for a week long outreach trip. Math Consultant for the TCRSB worked with NS Math Circles to organize this event. During the week our team of four presenters visited 5 schools, gave 33 presentations, and worked with over 850 students.

Home Educators Groups, ESL Groups, Junior High & Elementary Schools.

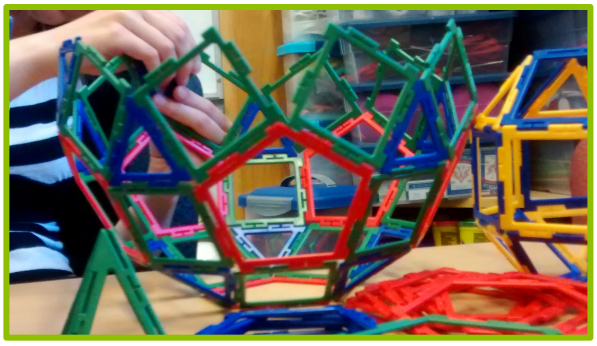
A few years ago we developed a relationship with the home educators in the HRM. This year, we continued to provide outreach to this group and they attended our local events. In addition to this group, which is running out of Dartmouth, we have also given presentations to a group of home-schooled students at the Tantallon Public Library. We gave a presentation to the ESL classes at Dalhousie University. Our Junior High program, which began last year, is extremely popular with both teachers and students, and made up the majority of school visits this year. This year, we began offering workshops for elementary school students in grades 4-6, which have received great feedback. With the funding from Eastlink, we are looking to further expand our elementary school and junior high programming.

Discover Math Days

This year NS Math Circles ran the annual Discover Math Days on April 27th and 28th at Dalhousie. We doubled our number of presentations from 2 to 4, giving a morning and an afternoon round-robin workshop on two different days. One day was for grades 6-7, and the second for grades 8-9. In total, we outreached to 146 students during Discovery Days.

Outreach to Teachers

As in previous years, our outreach was not just for students, but also for (future) teachers. In October, we visited a class of future secondary teachers to introduce the program and talk about how to use hands-on activities to get students engaged.
Later that month, we also attended the annual Nova Scotia Math Teacher Association's conference. There, we had a table advertising the program, and gave two workshops about using games to introduce mathematical concepts.



We visited and worked with schools in 5 of the Nova Scotia school boards this year. These schools are:

Chignecto-Central Regional School Board
Hants North Rural High (2 visits), West Cholchester Consolidated, Winding River Consolidated

> "Students were required to apply relevant operation skills in novel situations. They had a great time and enjoyed the change from regular classroom work. ☺"
> Brenda Vaughan, Teacher, Halifax Central Junior High

Halifax Regional School Board
Cunard Junior High (2 visits), Duncan MacMillan High School, Eastern Shore District High, Elizabeth Sutherland School (3 visits), Five Bridges Junior High (6 visits), Halifax Central Junior High (3 visits), Harrietsfield Elementary School, Herring Cove Junior High, Joseph Giles Elementary School, Madeline Symonds Middle School (3 visits), Rocky Lake Junior High (2 visits), Saint Mary's School, Sir Robert Borden Junior High, Sycamore Lane Elementary School

Straight Regional School Board
Dr. John Hugh Gillis Regional High School

South Shore Regional School Board
South Queens Middle School

Tri-County Regional School Board
Drumlin Heights Consolidated, Evelyn Richardson Memorial Elementary School, Lockeport Regional High, Maple Grove Education Centre, Meadowfields Community School

Private Schools
Halifax Grammar School, Halifax Independent School

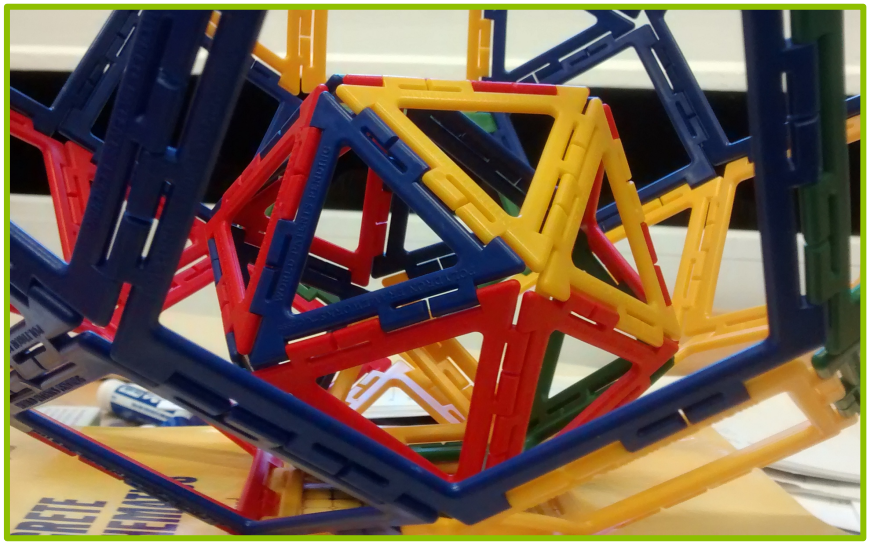
For the upcoming year, we are hoping to dedicate more of the fall term, when further travel is possible, to visiting schools in the Cape Breton-Victoria Regional, Chignecto-Central Regional, First Nations and Straight Regional School Boards. We had planned to visit these regions in April of this year, which was unfortunately not possible to the number of snow days in the winter. In the upcoming year we will also have two teaching assistants that speak fluent French, which means that we will be able to visit schools in the Acadian School Board again.

> "Great job! Thanks for an excellent day."
> Katie Bracken, Teacher, South Queens Middle School

2015-2016 Program Goals

With the continuing funding from Eastlink we plan on expanding our elementary and junior high programming, while maintaining our senior high outreach.

We have purchased many new materials and will use these throughout the summer and the upcoming year to create new presentations.



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