NS Math Circles

Year End Report 2013-2014

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!

AARMS

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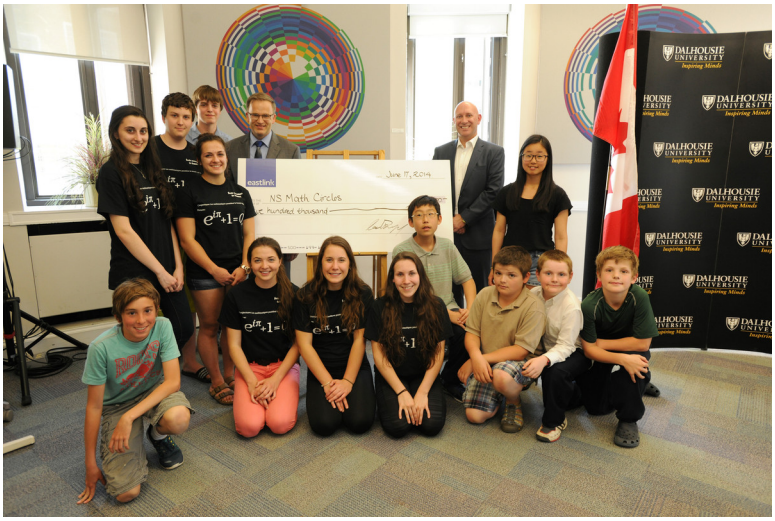
DALHOUSIE UNIVERSITY *Inspiring Minds*

Executive Summary

This past year was a very exciting one!

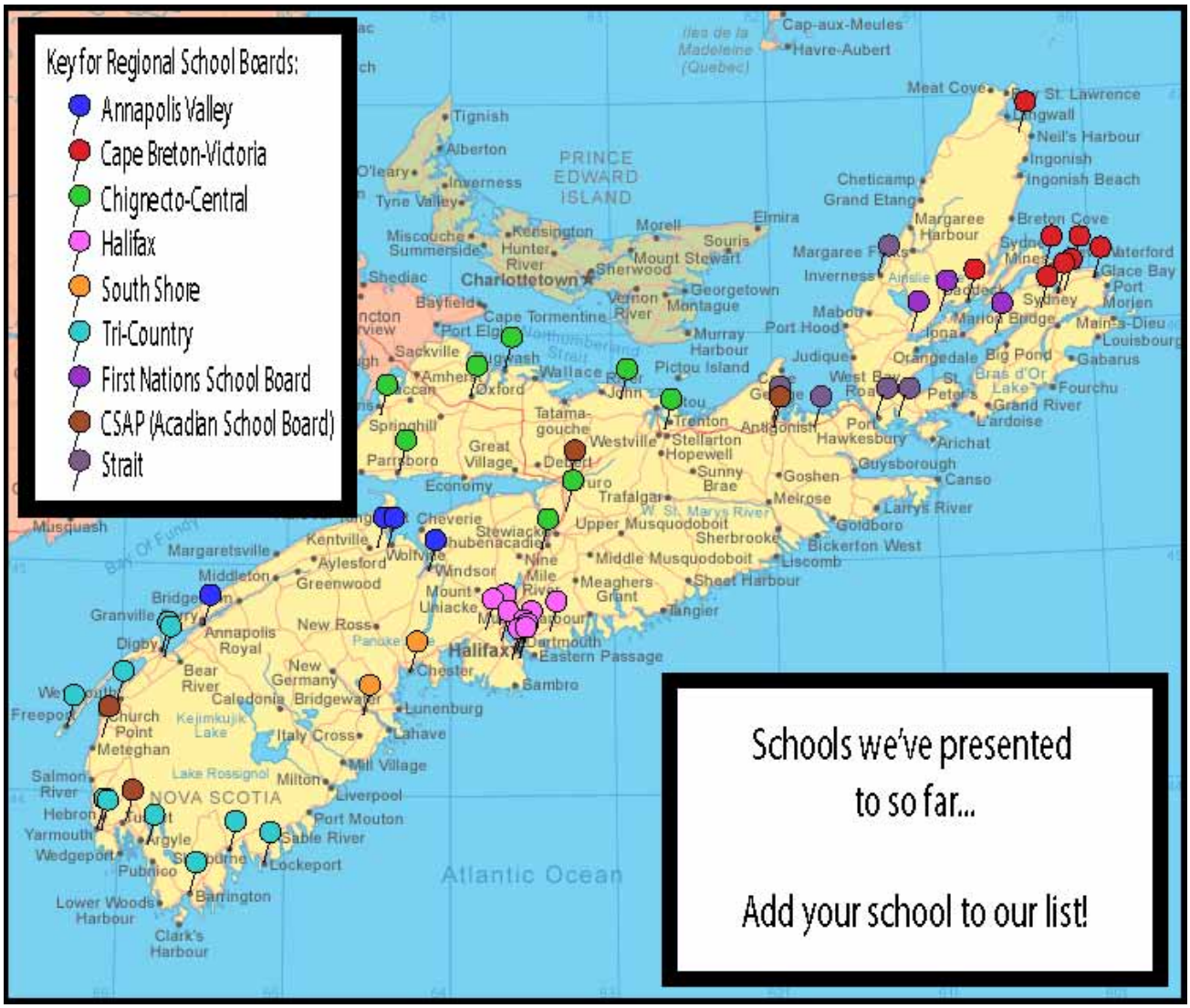
Our grant with Imperial Oil had come to an end and we were looking for additional funding. Thanks to help from External Relations at Dalhousie University we secured a 5 year partnership with Eastlink! Over the next 5 years, Eastlink will donate **half a million dollars**! Many thanks goes to Eastlink and Lee Bragg for this exciting partnership!



We also need to thanks AARMS, the Atlantic Association for Research in the Mathematical Sciences for providing some financial support for two of our outreach trips, one to the Tri-County Regional School Board, and another to the Chigneto-Central School Board.

In an effort to raise awareness of the program, NS Math Circles appeared on CTV Morning Live with two students to demonstrate some of the activities we do when we go into the classrooms. Also, an article regarding the program was published in the Community Herald. We also continued to have a presence at the annual NS Math Teachers Association Conference.

Overall, this year we visited 29 schools, 13 of which were new schools, did our annual trip to the Tri-County School Board and our first week long trip to the Chignecto-Central School Board. This year we gave 10 evening talks with a total attendance over 350 people and we had many new faces attending this past year. We gave 99 talks across Nova Scotia. This resulted in over 2300 students outreached to on trips.



NS Math Circles Staff

This year Danielle Cox was the Program Director. She is responsible for the organization and general direction of the program. She continues to build to establish and build relationships with members of the Regional School Boards, NS Math Teachers Association and math teachers throughout the province. Danielle gave a presentation at the NS Math Teachers Association Conference in October 2013.

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

With the increase in school visits, our Presentation Team has expanded! Abdullah Al-Shaghay, Julien Ross, Hoda Chuangpishit, Svenja Huntemann, Elham Roshanbin and Alain Gamache continue to be active members of presentation team. New members include undergraduate student, Julia Tufts and graduate student Darien DeWolfe.

This is year marks the last year of Danielle Cox as the Program Director, in Fall 2014, Svenja Huntemann will take on this role.

List of Presentations

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

Outreach

Local Events

We held 10 events, September through to June. The local events attendance was over 360 people during the school year.

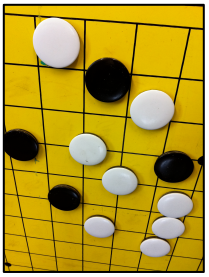
September 25, 2013 Speakers: Svenja Huntemann

Topic: History of Problem Solving

Join us while we take a stroll through some of the most influential and interesting problems throughout history. We will see if we can solve some of them on our own!

October 23, 2013 Speaker: Danielle Cox & Julien Ross

Topic: Games on Graphs



Join us for an evening of games! We will look at various games on graphs, such as Cops & Robbers. We will see if we can use some graph theory to figure out how to win these games!

November 20, 2013 Speaker: Elham Roshanbin

Topic: Problems in Number Theory

In this talk we will explore the subject of Number Theory! Primes, cryptography, divisibility...we will explore famous and interesting problems.

December 11, 2013 Speaker: Dr. John McLoughlin (UNB Fredericton)

Topic: A Sequence of Problems

Whether is is the way we arrange objects, the manner in which a set of numbers is organized, sequences are fundamental to mathematical organization and problem solving. Join us to play with a range of problems focused around the theme of sequences with diversions into mathematical puzzles, factorials, geometric/arithmetic series, along with some curious insights about less familiar mathematical sequences. Be prepared to do some mathematical thinking and problem solving as the emphasis will be on learning through doing math.

January 15, 2014 Speaker: Alain Gamache (CSAP)

Topic: Taxicab Geometry

Most of us have learned to measure things in a two dimensional environment using the "as crows fly" method. But what happens if we remove that freedom and force you to only measure horizontally and vertically? This is the idea behind Taxicab geometry, a fun and simple way to approach non-Euclidian geometry.

February 12, 2014 Speaker: Danielle Cox
Topic: Mathematical Deception
Explore famous paradoxes, riddles and math problems that have surprising answers.

April 2, 2014 Speaker: Dr. Paul Muir (Saint Mary's University)
Topic: A Brief Introduction to Computational Applied Math
Mathematics is useful! Mathematics is applied most everywhere; examples include weather prediction, global positioning systems (GPS), medical imaging, and financial modeling. Most applications lead to mathematical models; these are systems of equations whose solutions tell us something about the application. The study of methods that allow computers to solve mathematical problems is called Computational Mathematics or Numerical Analysis. In this session, we will learn about a few famous algorithms from computational mathematics and use them to obtain approximate solutions to some mathematical models arising in several applications.

April 30, 2014 Speaker: Dr. John McLoughlin (UNB Fredericton)
Topic: Problem Solving with Probability
How can something with an answer from 0 to 1 be so intriguing? We will open with a few problems to introduce core probability principles before stepping onto the playing field of probability. Whether tossing two headed coins or people randomly arriving at a coffee shop or figuring out the chance of winning a tennis match after a rain delay, be prepared to play with probability. All are welcome from total novices to those relatively familiar with the core concepts. A range of levels will be shared in the problems, and some of the ideas will surely be new to all present as a way of extending your own mathematical horizons. Enjoying mathematics and solving probability problems are not mutually exclusive!

May 21, 2014 Speaker: Dr. Nauzer Kalyaniwalla (Dalhousie University)
Topic: Cryptography on the Internet
Imagine a universe with a largest integer, where you can multiply, but can not divide. Addition in this universe follows the rules of 'clock' arithmetic. In such a universe there exists functions that are easy to compute from given input. But finding the input from a computed function is beyond computational reach. However, there is a trapdoor! A secret key allows the input to be found trivially. This means that anyone can encrypt a secret message, but only the intended recipient can decrypt the message. This application of number theory has widespread use on the internet.

June 11, 2014 Speaker: Dr. Thomas Duck (Dalhousie University)
Topic: Games of Chance (or Why The House Always Wins)
Games of chance like shooting dice, blackjack, roulette, poker, slot machines and the lottery are ruled by math. We will play some of these for fun, and learn how the calculation of odds, probabilities, and "expectation values" can be used to assess risk versus reward. The results will show how the House (almost) always has an edge, ensuring that over the long term they win and gamblers lose.

School Visits

The school visits this year have been wonderful! This past year we visited 29 schools, 13 of which were schools we had not previously visited! Some of which were elementary and junior high schools. We also ran session for home educators groups, ESL classes at Dalhousie University and piloted a junior high problem solving workshop with several classes.

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 5 schools were visited, 21 presentations given and over 440 students were outreached to. This trip was partially funded by AARMS.

Chigencto-Central Regional School Board (CCRSB)

A region for which we wanted to strengthen our presence in was the CCRSB. NS Math Circles has a strong relationship with the Math Consultant for that region, Darleen MacKeen-Hudson, who is also a member of the executive committee for the NS Math Teachers Association. This year we visited 9 schools in the CCRSB, resulting in over 700 students outreached to and 37 presentations.

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. We also gave presentations to the ESL classes at Dalhousie University. Last year, we provided presentations to enriched junior high students within the Halifax Regional Municipality (HRM), this year we visited 9 junior high schools in HRM and several elementary schools. With the funding from Eastlink, we are looking to further expand our junior high programming and to begin programming at the elementary school level.

Discover Math Days

This year NS Math Circles took part in the fourth annual Discover Math Days. This year we ran 2 round robin workshops presentations. One was for grades 6-7, another for grades 8-9. During this event we saw 83 students.

2014-2015 Program Goals

With the new funding from Eastlink we plan on expanding our junior high programming, while maintaining our senior high outreach. We also plan on developing workshops for elementary grades.

NS Math Circles

Dept of Mathematics & Statistics
6316 Coburg Road
PO Box 15000
Halifax, NS
B3H 4R2

www.nsmathcircles.com
Office: 902.494.7036
Cell: 902.401.4075
Email: mathcircles@dal.ca

[Recipient]

Address Line 1
Address Line 2
Address Line 3
Address Line 4