

ISOMA Fall Conference 2011@Appleby College

Teaching and Learning Mathematics in the 21st Century



ISOMA Conference Details

- ❖ Appleby College, 540 Lakeshore Road West, Oakville, Ontario

Link to directions and campus map: <http://www.appleby.on.ca/page.cfm?p=1483>

Parking is available on the Appleby College Campus. Enter the Nicholas Arts Centre at the main reception desk.

- ❖ Tuesday, 1 November 2011
 - ❖ Registration begins at 4:00 p.m.
 - ❖ Session A begins at 5:00 p.m.

Keynote Address – “Is Two Plus Two Still Equal to Four?”

Dr. Miroslav Lovric, Department of Mathematics and Statistics, McMaster University



APPLEBY COLLEGE



Conference Schedule

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| 4:00 p.m. – 4:45 p.m. | Registration |
| 5:00 p.m. – 6:00 p.m. | Session A |
| 6:15 p.m. – 7:15 p.m. | Dinner and Keynote Address |
| 7:15 p.m. – 8:15 p.m. | Session B |

Registration Details

- ❖ Registration may be completed on-line by following the link below.

<https://docs.google.com/spreadsheet/viewform?formkey=dENfTFNFbnI1TDh4QXVfTnA2bG1vdHc6MQ>

Please complete the conference survey at the end of the registration form to be eligible for draw prizes at the conference.

If you have any questions about your registration, please contact jpeever@appleby.on.ca

- ❖ Costs: \$40 OAME member, \$50 non-member, \$25 students
- ❖ Please bring payment to the conference. Cash or cheque is the only method of payment accepted. Please make cheques payable to ISOMA and submit a single cheque for all teachers from one school.
- ❖ Registration opens Thursday, 13 October 2011 and closes Thursday, 27 October 2011

Keynote Address: “Is Two plus Two Still Equal to Four?” by Dr. Miroslav Lovric

Yes it is - and it will remain so for a long time! But what is different? In this talk, I plan to discuss how new developments and discoveries in mathematics, as well as social and political changes, affect the ways we use mathematics, think about mathematics and teach mathematics.

About the Keynote Speaker:

Miroslav Lovric is a professor of mathematics at McMaster University. His areas of research include differential geometry and applications to biology and health sciences, mathematics education and connections between art, mathematics and architecture.

Miroslav has been involved with various aspects of teaching, including developing interdisciplinary math courses, inquiry and problem-based courses, as well as teacher training courses. He has given numerous public lectures on a wide variety of topics that link mathematics to almost every area of human endeavour. He has taught at universities in Canada, the United States, England and New Zealand.

Miroslav is a co-leader of an international project in mathematics education, whose aim is to develop efficient strategies for dealing with issues in the transition between secondary and tertiary education. Besides publishing in his research areas, Miroslav has written several textbooks, most recently on mathematics for life sciences students. Miroslav has received numerous awards for his efforts in teaching and mathematics education, including the OCUFA (Ontario provincial) Award and the National 3M Teaching Fellowship Award.

Session A

A1: Collaboration between Mathematics and Science Teachers

Chandra Boon, Branksome Hall

This session will provide a rationale for the importance of communication between Math and Science teachers and will outline ways that teachers can work together to support student learning in both subject areas. Collaboration can be as simple as communicating about the optimal sequence of units, or it can be more elaborate such as the design of interdisciplinary projects. Interdisciplinary learning is an essential component of 21st century education, and it offers the opportunity for both students and teachers to think creatively. Example resources will be provided.

A2: Discussion-based Problems in Grade 9 Mathematics

Adam Brown, University of Toronto Schools

In this session I will present a few problems used in a grade 9 mathematics classroom that are based on the Harkness approach. Students will be able to enjoy learning and exploring some ideas while not getting bogged down with too much technique. These problems are meant to invite students to bring mathematics to the sandbox to see what they can come up with, and to encourage them to exchange ideas.

A3: Transforming your Mathematics Class into an Engaged Environment

Giancarlo Brotto, Smarttech Inc.

For more than 20 years, math educators have been telling SMART what they need to engage students in learning. All that insight is reflected in the SMART education solutions, a comprehensive collection of products, resources, training programs and support options. These solutions provide all the ingredients needed to make technology implementation a success. Join me in this session as we explore SMART Education Solutions. See the latest technology innovations (released summer 2011), resources, and support available to the education community. You will also get to experience what an interactive classroom feels like as I take you through a model lesson....you too will know how to transform your classroom into a centre of interactive learning, where students are engaged and you are inspired.

A4: The Communication Connection

Cathy Marks Krpan, Ontario Institute for Studies in Education, University of Toronto

In this session, we will explore how to assist learners to read, write and talk about mathematics. We will examine a variety of practical problem-solving activities and teaching strategies that are easy to implement and are motivating for students. We will also look at how picture books can be used to initiate insightful mathematical conversations and teach complex concepts. This session is of particular interest to teachers in the intermediate level.

A5: Using Colour and Sound to See, Hear and Solve Optimization Problems

Ron Lancaster, Ontario Institute for Studies in Education, University of Toronto

Curiosity and imagination are two of the seven skills highlighted by Tony Wagner in his book *The Global Achievement Gap*. In this session we will examine how mathematics teachers can spark their students' curiosity and imagination. We will focus on optimization problems such as the one where students find the point P on $y=x^2$ that is closest to the point Q(6, 2). We will use the Geometer's Sketchpad to provide a creative and artistic view of how the length of PQ varies using colour and sound. By looking for a certain colour or sound, it is possible to find an approximate solution to the max/min problem. We will apply this idea to several max/min problems suitable for students in grades 9 to 12.

A6: Problem Solving through Mathematics Contests

J.P. Pretti, Centre for Education in Mathematics and Computing

In this session, I will share experiences of the Centre for Education in Mathematics and Computing in successfully using mathematics contest problems to interest and engage strong mathematics students. Attendees will work with concrete examples that illustrate how mathematics problem solving is fun and applicable. They will discuss how these exercises relate to careers and using mathematics to solve “real-world” problems. I will emphasize different ways of approaching problems and how to effectively communicate their solutions.

A7: Factoring Incomplete Squares

Fraser Simpson, University of Toronto Schools

You can extend your factoring lessons at the Grade 10 or 11 level by teaching the method of factoring certain fourth-degree polynomials that happen to be incomplete squares. In this session we will learn the technique and also discuss other extensions of the usual high-school factoring techniques, including a look at some great problem-solving questions that hinge on factoring. This will be most appropriate for teachers in grades 9 through 12.

A8: Starbucks Math - Coffee, Cost, Caffeine, and Cup Size!

Carly Ziniuk, The Bishop Strachan School

Did you know about Starbuck's new cup size, the Trenta? Take some time to examine the modeling around the Trenta, for a variety of different kinds of Starbucks treats. Although coffee will not be provided at the session, all the opportunities for great questions might leave you with a caffeine-induced buzz! This session is appropriate for teachers in grades 8 through 11.

Session B

B1: Applications of Mathematics in Industrial Robotics

James Chaykowski, St. Mildred's Lightbourn School

This session will investigate several real-world examples of industrial robotics to demonstrate how mathematics is used in engineering. Activities based on the middle and high school mathematics curriculum will be examined to show how robotics can be used to motivate curriculum and provide a basis for authentic applications. Topics will include an investigation of several robotic systems, modeling space using the Cartesian coordinate system and mathematical modeling of robotic motion.

B2: Mathletics

Jackie Heron, Mathletics

This session will introduce you to the Mathletics online learning environment, developed in Australia and now aligned to provincial outcomes. This web-based program is used daily by over 3 million students in 42 countries around the World. We will discuss tools available for both students and teachers including adaptive learning, problem solving and online support center for students as well as automated mark book, differentiated learning and teacher resources for teachers. Teachers are encouraged to bring their laptops and will be provided a temporary user name and password to access the website. All teachers will also receive a free two week trial to use in their classroom following the workshop

B3: How to Succeed in University Mathematics Courses

Dr. Miroslav Lovric, McMaster University

This session will involve an exchange of information and experiences on a number of issues that affect the transition from high school to university mathematics. How do we prepare students for success in their university courses on calculus or linear algebra? How do we design good, useful, and motivating university mathematics courses for students who will attend university in the fall of 2012? Based on actual materials that I use in my calculus courses, I plan to stimulate a mutually beneficial dialogue.

B4: Take this Course and Flip it!

Amit Morris and Deirdre Timusk, Upper Canada College

In this session we will explore the use of free software (Jing) to make our own video mathematics lessons. By freeing didactic instruction from the classroom setting, these lessons have allowed us to experiment with a ‘flipped’ course design, in which students watch the videos at home and class time is used for group work and practice problems. In addition to showing you how to create videos, we will discuss why you might want to try this ‘flipped’ approach, outline issues we have encountered, and provide some of our students’ reflections on their experience thus far.

B5: A Course in Enrichment Topics

Stephen Pulford, Appleby College

In this session we will explore a course I am teaching in enrichment topics offered to advanced level mathematics students. The course allows senior students to choose the direction of their study in the area of mathematics and how it relates to other disciplines. Effective communication in mathematics in both oral and written form is central to the course and summative assessments include student presentations to an audience of peers and faculty members in a seminar-like setting.

B6: Projects in MPM2D – How Mathematics Relates to the World around Us

Ann Shen, The Bishop Strachan School

This session will focus on projects that can be used in four units of study in the course MPM2D: Linear Models, Trigonometry, Quadratics and Geometry. Each of these projects requires students to take real-life situations, analyze the information they found and create an effective way to communicate their results to an audience. The projects were designed to inspire curiosity in students' surroundings and "see" mathematics in our everyday world.

B7: Crossing the Oblique Asymptote

Fraser Simpson, University of Toronto Schools

The Ministry Guidelines for Advanced Functions tell us to teach most of the theory of oblique asymptotes of rational functions, but they leave out the one piece of the puzzle that completes the picture. In this session we will discuss the theory behind oblique asymptotes and learn the one key idea that the Ministry has omitted. Attendees will receive sample questions that can be used with an Advanced Functions class to develop the ideas. Most appropriate for high school teachers, especially those teaching Grades 11 and 12.

B8: What is the Rest of the World Using?

Betty Temmer, Autograph

Imagine... mathematics software that is versatile enough to use in your Grade 9 class or in Calculus and Vectors; a software that allows you to dynamically explore slope triangles, analyze families of curves, do transformations using $f(x)$ notation, fit a normal curve to a data set, demonstrate cross product in 3D, and much more; a software that is intuitive to learn, highly visual and compatible with interactive white boards. The rest of the world has found it – it is called AUTOGRAPH! Come to this session to learn more about this software.

Organizing Committee

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| ISOMA Past President | Bob Perrier, St. Andrew's College |
| ISOMA Chapter Representative to OAME | Jennifer Gravel, Holy Trinity School |
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| Ontario Math Olympics Coordinator for ISOMA | Elizabeth Johnston, Greenwood College |
| Conference Coordinators | Calvin Armstrong, Appleby College |
| | Jonathon Peever, Appleby College |

Special thanks to all the presenters for their time and willingness to share their expertise with us.

Special thanks also to the members of the Appleby College community who helped to host this event.