The CENTRE for EDUCATION
in MATHEMATICS and COMPUTING
Faculty of Mathematics
University of Waterloo
200 University Ave. W.
Waterloo, ON, Canada N2L 3G1

www.cemc.uwaterloo.ca

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3-DAY ANNUAL SUMMER CONFERENCE for GRADES 9 to 12 MATHEMATICS TEACHERS

The CEMC at the University of Waterloo provides professional development opportunities for mathematics teachers. Our programs respond to the need for practical and enrichment information that can be implemented immediately in the classroom. This August, we offer a three-day conference, with focus on curriculum, extensions and enrichment aimed at university preparation.

The sessions on curriculum will focus on problem solving at the academic level. This conference will increase your tools and skills and enhance your teaching of mathematics.

While the curriculum sessions are directed specifically at teachers from Ontario, teachers from any province or country will benefit. This conference attracts teachers from all over the world and offers an excellent opportunity to meet and exchange ideas. Teachers should have some previous teaching experience in an elementary or high school.

Whatever your personal, professional or mathematical goals, our conference can give you the edge you want.

Tuesday, August 22 to Thursday August 24, 2017

(Limited enrolment so it is better to register early)

*Participant cost of **$150** includes accommodation, meals, conference materials, and harmonized sales tax* (HST)

Participation is restricted to two teachers per school

Accommodation in a dormitory room is provided at no additional cost, if needed

Registration Now Open!

Follow the link **http://www.cemc.uwaterloo.ca/events/mathteachers.html** *to register online*

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Grades 9 to 12 Program

Dates: Starting Tuesday August 22 at 8:45 am, ending Thursday August 24, 2017 at 1:30 pm

Location: Mathematics and Computing Building, University of Waterloo

Program: The conference will help to supplement your teaching of mathematics on problem solving and provide some new resources and teaching strategies.

Monday, Aug. 21	**Activity**
3:00 pm – 8:00 pm	Early Registration in St. Paul's University College (SPC)
5:00 pm – 6:00 pm	Dinner in St. Paul's University College (SPC)
9:00 pm – 10:30 pm	Pizza and refreshments in Watson's Eatery at St. Paul's University College (SPC)
Tuesday, Aug. 22	
7:30 am – 8:45 am	Registration and Breakfast in St. Paul's University College (SPC)
8:45 am – 10:00 am	Meet and Greet. *Dean Murray* About the CEMC. *J.P. Pretti*
10:15 am – 11:45 am	**Session 1:** Integrating Problem Solving in Grades 9 and 10. *Jason Van Rooyen*
Noon – 12:45 pm	Lunch in the Mathematics and Computing Building (MC)
1:00 pm – 2:30 pm	**Session 2:** Effective Teaching Practices. *Rachel Iacobucci*
3:00 pm – 4:30 pm	**Session 3:** Algorithmic Problem Solving. *J.P. Pretti*
5:15 pm – 6:30 pm	Dinner in St. Paul's University College (SPC)
6:00 pm – 8:00 pm	Centre for Education in Mathematics and Computing (CEMC) and Grand Valley Mathematics Association (GVMA) teacher resources available for purchase.
6:30 pm – 7:30 pm	Campus Tour beginning from the front foyer of St. Paul's University College (SPC)
7:30 pm – 10:30 pm	Games, Hospitality, and Refreshments
Wednesday, Aug. 23	
7:30 am – 8:30 am	Breakfast in St. Paul's University College (SPC)
8:45 am – 10:15 am	**Session 4:** Making Math Stick and Increasing Perseverance. *Sheri Hill, Lindsay Kueh*
10:30 am – noon	**Session 5:** Understanding Secondary Mathematics: Returning Focus to the Why. *Rich Dlin*
Noon – 12:45 pm	Lunch in the Mathematics and Computing Building (MC)
1:00 pm – 2:30 pm	**Session 6:** Can You Swing It? The Mathematics Behind Voting. *Stephanie Chin*
3:00 pm – 4:30 pm *Choose a session*	**Session 7a:** Social Justice and Mathematics. *Mike Frankfort*, Gerard Lewis **Session 7b:** Metamobius Surfaces - the greater reality of one-sidedness. *Ted Gibbons* **Session 7c:** Functions and Calculus, and Expectations in First Year. *Mike Eden, Conrad Hewitt*
6:00 pm – 9:00 pm	Banquet in Federation Hall (FED)
Thursday, Aug. 24	
7:30 am – 8:30 am	Breakfast in St. Paul's University College (SPC)
8:45 am – 10:15 am	**Session 8:** Patterns and Sequences. *Carmen Bruni*
10:30 am – 12:15 pm	**Session 9:** Mind the Gaps. *Michael Jacobs*
12:15 pm – 12:30 pm	**Session 10:** Wrap-up. Resource Sharing. Final Thoughts.
12:30 pm	Hot Lunch in the Mathematics and Computing Building (MC)

Register, view program online, by visiting http://www.cemc.uwaterloo.ca/events/mathteachers.html

Registration Fee: $150, per registrant. This includes three meals each day (breakfast, lunch and dinner) and accommodation in a dormitory room, if required.

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Synopses of Sessions for Math Teachers' Conference – Grades 9 to 12 Teachers

Session 1:
Integrating Problem Solving in Grades 9 and 10.
Jason Van Rooyen

This session will examine the when, where and how of using problem solving in grades 9 and 10. A wide variety of problems will be examined and discussed, with varying levels of difficulty.

Session 2:
Collaboration of Teaching Practices.
Rachel Iacobucci

In our teaching practice we have all come up with great ways to teach a certain lesson, as well as examples and activities that really engage and enrich student learning. Sometimes this means revamping an entire course or unit, and other times these ideas can be really short and simple, yet tremendously effective. Given time constraints we all struggle with, this session will focus on the latter…providing bite-sized ideas across many courses that really help students 'get-it'. Participants are asked to come with their own ideas too; creating a wealth of knowledge that will make student understanding just that much better!

Session 3:
Algorithmic Problem Solving.
J.P. Pretti

A collection of fun and engaging problems that are algorithmic in nature will be presented. Solving computational word problems requires students to think in an organized and systematic way. These types of problems also highlight connections between math and computer science. The examples in this talk have been used successfully in workshops for high school students with no background in computer science.

Session 4:
Making Math Stick and Increasing Perseverance.
Sheri Hill, Lindsay Kueh

Have you ever wondered why students forget everything after they write the test? The grade 10 academic math team at Craig Kielburger Secondary School piloted a new way of teaching and evaluating. Units and unit tests were removed; instead, weekly cumulative quizzes and thinking assignments were implemented, along with cumulative homework. Three main goals were to attack deficiencies in basic skill development, increase retention of learned skills, and increase problem solving ability. Students were more comfortable with mixing concepts from various topics, and they had more time to focus on problem solving, games, and rich activities.

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Session 5:
Understanding Secondary Mathematics: Returning Focus to the Why.
Rich Dlin

This session will cover motivation and methods for a return to a more pure approach to secondary mathematics. The focus is on the *why* of mathematics and not so much on the *how*. Topics will range from "simple" things like exponent rules and solving equations, to more sophisticated concepts like teaching students to think deeply about zero and infinity, and why limits really are a big deal. This type of approach makes math easier to understand, and pays huge dividends as students progress through to grade 12.

Session 6:
Can You Swing It? The Mathematics Behind Voting.
Stephanie Chin

This session will assess different voting strategies that are commonly used and will touch upon ideas that were suggested by the Canadian government to ratify how we elect officials. It will also examine various paradoxes of voting.

Session 7a:
Social Justice and Mathematics.
Michael Frankfort, Gerard Lewis

In this session, we will work through mathematical explorations that address issues of social justice, such as bullying, fairness and the affordability of food. The group will discuss issues and approaches to incorporating socially relevant contexts into inquiry-style mathematics lessons in grades 7/8/9. We will share some examples and problems from our own classes that demonstrate mathematics and social justice.

Session 7b:
Metamobius Surfaces - the greater reality of one-sidedness.
Ted Gibbons

Since its discovery 170 years ago, one-sidedness has been relegated to variations on the Mobius strip and the Klein bottle. Ted has broken this barrier with his creation of the Metamobius Process, which generates an almost endless series of fascinating one-sided surfaces that are fundamental to defining the greater reality of one-sided geometry - metamobius surfaces. And because of their intrinsic beauty, these surfaces have even become a geometric art form. Ted will present a delightful, fun-filled overview of one-sidedness, including metamobius models and his creation of a one-sided grammatical structure! He will then lead an interactive workshop where participants can learn the simple basics of the Metamobius Process to create their own metamobius surfaces.

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Session 7c:
Functions and Calculus, and Expectations in First Year.
Mike Eden, Conrad Hewitt

In this session, the First Year Calculus Course Math 137 at UW offered by the Faculty will be presented. Information on the changes for this course beginning September 2017, and the online version offered will be discussed. As well, how students are adjusting to math at university will be deliberated. Solutions to some sample types of first year problems will be presented, to illustrate the STYLE and SCRIPT of our version of an exemplary solution.

Session 8:
Patterns and Sequences.
Carmen Bruni

In this session, we will discuss a selection of sequences that can be integrated throughout grades 9-12. The ability to recognize a pattern is very important and does help develop mathematical intuition. This session will provide teachers with some examples of sequences that can be used in the classroom. These sequences are largely influenced by the BIRS conference Integer Sequences K-12.

Session 9:
Mind the Gaps.
Michael Jacobs

It is very common for students coming into Grade 9 to have gaps in their knowledge. However, sometimes these misconceptions have gone unnoticed by both teachers and students. Together we will look at some tried and tested diagnostics that will expose these misconceptions. We will look at why such misconceptions occur and what we can do to rectify them thus easing the transition from Grade 8 to Grade 9.