

The CENTRE for EDUCATION  
in MATHEMATICS and COMPUTING  
Faculty of Mathematics  
University of Waterloo  
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Le CENTRE d'ÉDUCATION  
en MATHÉMATIQUES et en INFORMATIQUE  
Faculté de mathématiques  
Université de Waterloo  
200, avenue Université Ouest  
Waterloo (ON), Canada N2L 3G1

## 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 any 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 20 to Thursday August 22, 2019**

*(Limited enrolment so it is better to register early)*

*Participant cost of \$180 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*

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



## Grades 9 to 12 Program

- Dates:** Starting Tuesday August 20 at 8:45 am, ending Thursday August 22, 2019 at 1:30 pm
- Location:** St. Jerome's University and St. Paul's University College, 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. 19	Activity
3:00 pm – 8:00 pm	Early Registration in St. Paul's University College (STP)
5:00 pm – 6:00 pm	Dinner in St. Paul's University College (STP)
9:00 pm – 10:30 pm	Pizza and refreshments in Watson's Eatery at St. Paul's University College (STP)
Tuesday, Aug. 20	
7:30 am – 8:45 am	Registration and Breakfast in St. Paul's University College (STP)
8:45 am – 9:45 am	Meet and Greet. <i>Rob Gleeson</i> About the CEMC. <i>Ian VanderBurgh</i>
10:00 am – 11:30 am	<b>Session 1:</b> Integrating Problem Solving in Grades 9 and 10. <i>Jason Van Rooyen</i>
11:30 am – 12:15 pm	Lunch St. Paul's College (SPC)
12:30 pm – 2:00 pm	<b>Session 2:</b> Kaboom! A New Trajectory for Quadratics. <i>Glen MacMillan</i>
2:15 pm – 3:15 pm	<b>Session 3:</b> Patterns and Sequences <i>Carmen Bruni</i>
3:40 pm – 4:40 pm	<b>Session 4:</b> Area Models for the Intermediate Learner. <i>Marcel te Bokkel</i>
5:15 pm – 6:30 pm	Dinner in St. Paul's University College (STP)
6:30 pm – 7:30 pm	Campus Tour beginning from the front foyer of St. Paul's University College (STP)
7:30 pm – 11:00 pm	Games, Hospitality, and Refreshments.
Wednesday, Aug. 21	
7:30 am – 8:30 am	Breakfast in St. Paul's University College (STP)
8:45 am – 10:15 am	<b>Session 5:</b> Making Math Stick and Increasing Perseverance. <i>Sheri Hill, Adrian Rawle</i>
10:30 am – noon	<b>Session 6:</b> Problem Solving Inside and Outside the Classroom. <i>Ian VanderBurgh</i>
Noon – 12:45 pm	Lunch St. Paul's College (SPC)
1:00 pm – 2:00 pm	<b>Session 7:</b> Metamobius Surfaces - the greater reality of one-sidedness. <i>Ted Gibbons</i>
2:15 pm – 3:15 pm	<b>Session 8:</b> "Am I sick? Because I think this is fun?" <i>Gisele Jobin</i>
3:40 pm – 4:40 pm	<b>Session 9:</b> Free Online Ontario Mathematics Courseware <i>Sarah Chan, Melissa Hesch</i>
6:00 pm – 9:30 pm	Banquet in Federation Hall (FED)
Thursday, Aug. 22	
7:30 am – 8:30 am	Breakfast in St. Paul's University College (STP)
8:45 am – 10:00 am	<b>Session 10:</b> "VNPS, Spiraling and Rich Tasks: what does it mean for me?" <i>Amy Scales, Thach-Thao Phan</i>
10:15 am – 11:45 am	<b>Session 11:</b> Algorithmic Problem Solving <i>J.P. Pretti</i>
11:45	<b>Session 12:</b> Wrap-up. Resource Sharing. Final Thoughts.
12:05 pm	Lunch St. Paul's College (SPC)

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

**Registration Fee:** \$180, per registrant. This includes three meals each day (breakfast, lunch and dinner) and accommodation in a dormitory room, if required.



## 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:

Kaboom! A New Trajectory for Quadratics.

*Glen McMillan*

The expectations related to quadratic relationships can be abstract and challenging for many students. In this session, Glen will share his ideas on implementing this topic with a maximum level of understanding and a minimum level of frustration for students and teachers. Some time will be left at the end of the session for teachers to share their own best practices.

### Session 3:

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 patterns is very important to help develop mathematical intuition and 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 4:

Area Models for the Intermediate Learner.

*Marcel te Bokkel*

Visual representations play a critical role in opening access to understanding for all students. In this session, we will explore the use of area models in building towards algebraic thinking for the intermediate/senior student. We will examine some teaching strategies, use some manipulatives and discuss some resources.

### Session 5

Making Math Stick and Increasing Perseverance.

*Sheri Hill, Adrian Rawle*

Have you ever wondered why students forget everything after they write the test? The team of grade 10 academic math teachers at Craig Kielburger Secondary School has piloted a new way of teaching and evaluating. Unit tests were removed; 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. The teachers found students were more comfortable with mixing concepts from various topics, and they had more time to focus on problem solving, games, and rich activities.



**Session 6:**

Problem Solving Inside and Outside the Classroom.

*Ian VanderBurgh*

In this session, we will solve some problems and talk about problem solving, both as curriculum and as enrichment.

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**Session 7:** 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 8:** "Am I sick? Because I think this is fun?"

*Gisele Jobin*

How many times do you see students so disengaged with a worksheet full of practice questions? What if instead, you hear a student say (this is an actual student quote), "Am I sick? Because I think this is fun"? I created an original activity where students are just practicing solving equations via what I call a continuum. Students start at a difficulty level that matches their ability and then they move themselves to questions of higher difficulty when ready. Since this continuum motivated students who normally don't like to practice, a colleague and I have created similar activities with topics ranging from, adding fractions in grade 7 to rational functions in grade 12.

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**Session 9:** Free Online Ontario Mathematics Courseware.

*Sarah Chan, Melissa Hesch*

The University of Waterloo has developed free online resources for Grade 9, 10 and 11 Mathematics. These resources include video instruction with interactive and exploratory features, review questions that provide immediate feedback, and student exercises with solutions. Teachers will have an opportunity to explore the content and consider how the different features can be used to enhance teaching and learning.

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**Session 10:** "VNPS, Spiraling and Rich Tasks: what does it mean for me?"

*Amy Scales*

In this session we will experience a rich task from the perspective of a teacher and a learner. We will discuss facilitator moves that can foster rich dialogue and drive learning forward. We will briefly discuss the 5 Practices for Orchestrating Productive Mathematical Discussions, VNPS, Spiraling and the work of Peter Liljedahl.

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**Session 11:**

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.