

**Title of Proposal** **The MICA Contest****Contact information***The one person and place to
Communicate with the applicant(s).*

Name	Bill Ralph
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Institution or department to administer grant funds

Name	Department of Mathematics	Contact	Hichem Ben-El-Mechaiekh (Chair)
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Summary *Less than 100 words* **Total amount requested in this competition** \$ **15000.00**

This project will encourage Ontario high school students to use computers creatively in the investigation and presentation of mathematical ideas. We will hold a contest in which teams of from 1 to 3 students create a computer based project to either investigate a mathematical problem or give an interactive presentation of a mathematical idea. Teams can take as long as they like so, unlike other competitions, the emphasis is on creativity and depth. Students will send completed projects to Brock University for grading and winners will come to Brock in the summer to present their projects to each other.

Applicants*Put any specific information on the relevant experience or expertise of an applicant in "Other".*

Name(s)	Bill Ralph		
E-mail	bralph@brocku.ca		
Position	Associate Professor		
Employer	Brock University		
Address	St. Catharines Ontario Canada L2S 3A1		
CMS member number	011005		
Current Grants	None		

Here is a summary of the contest rules with the technical requirements omitted.

- 1) **Purpose:** To promote the investigation and presentation of mathematics using computers at the high school level.
- 2) **Nature of the Contest:** Students will submit a CD containing a computer based project that falls under one and only one of the following categories.
 - A) An Investigation: Students will choose a well defined problem in mathematics and investigate it by writing a computer program.
 - B) A Learning Object: Students will choose a well defined topic in mathematics and create a computer based project that provides the user with a highly interactive presentation of that topic.
- 3) **Prizes:** Cash prizes and medals for first, second and third in each category. In addition, winners will be invited to a summer camp in which they will present their work to each other.
- 4) **Eligibility:** The contest is open to teams of from 1 to 3 students in grades 11 or 12 an Ontario high schools. Only one Investigation and one Learning Object will be accepted from each school and it must be submitted by the mathematics department.
- 5) **Deadline for Submission:** April 1, 2005
- 6) **Evaluation of an Investigation:**
 - a) Is the nature of the investigation truly original?
 - b) Is the approach to the problem novel or unusual?
 - c) Does the program allow for a sophisticated investigation?
 - d) Does the data obtained from the program really tell us something new about the nature of the problem?
 - e) Is the program's interface extremely robust, intuitive and easy to use?
 - f) Does the write-up clearly and concisely describe the purpose of the project, the nature of the investigation, the data obtained and provide an analysis of that data?
- 7) **Evaluation of a Learning Object:**
 - a) Is the presentation original or novel in some way?
 - b) Is the presentation very engaging?
 - c) Does the presentation really help the user learn?
 - d) Does the Learning Object allow for sophisticated interactivity, exploration and evaluation?
 - e) Does the Learning Object provide the user with an experience that could not be obtained in another way?
 - f) Is the program's interface extremely robust, attractive, intuitive and easy to use?
 - g) Does the write-up clearly and concisely describe the intended audience for the Learning Object, its objectives and how it was tested and evaluated by subjects?

Budget

Description	Revenue		
Money to be raised from prize donors	5000.00	5000.00	5000.00
Money to be raised by Brock	7000.00	7000.00	7000.00
CMS Endowment Grant requested	5000.00	5000.00	5000.00
Total Revenue \$	17000.00	17000.00	17000.00
Expenses			
Advertising	3000.00	4000.00	4000.00
Grading	4000.00	3000.00	3000.00
Hosting Students	5000.00	5000.00	5000.00
Prizes	5000.00	5000.00	5000.00
Total Expenses \$	17000.00	17000.00	17000.00

Other

Funding, partners, revenue potential, information on applicants such as publications or awards, at most 20 lines.

Background on Brock's New MICA Program

We have an innovative new mathematics program at Brock University called MICA: Mathematics Integrated With Computers and Applications. In this intensive program, our students learn to use computers to investigate mathematical problems and to present mathematical ideas. For example, our first year mathematics students learn to write programs to perform RSA Encryption, to study the behaviour of dynamical systems and to solve differential equations like the Lotka-Volterra equations. All of our first year mathematics teachers take this course and create an interactive learning object as a final project. Our program and faculty are focused on making the best use of computers in the study and presentation of mathematics which makes our department an ideal host for a contest of this type. More information on the department can be found at www.brocku.ca/math

Background on Bill Ralph

Bill Ralph has won several teaching awards and is particularly interested in the use of computers in mathematics. He is a recipient of the Ontario OPAS award for Excellence in Teaching with Technology for his program "Journey Through Calculus" which is an interactive CD-Rom he was commissioned to write by the Brookes-Cole publishing company. He programs in most computer languages and has been writing and designing interactive computer software for many years. Some of the learning objects that have been created by students under his supervision can be viewed at

<http://www.brocku.ca/mathematics/learningtools/learningobjects>

Project start date: October 1, 2004

Project finish date: August 31, 2007