## Submission of Articles

The *Ontario Mathematics Gazette* (*OMG*) is looking for news items, articles, and good ideas that are useful to mathematics teachers and mathematics teacher education. We are seeking submissions, preferably from mathematics teachers K–12 and other mathematics education professionals, that describe innovative and creative approaches to mathematics teaching.

Please keep in mind the following criteria when making submissions to the *OMG*:

- The ideas/activities must be of interest to the readership.
- The ideas/activities must be fresh and innovative.
- The mathematics content must be appropriate for the readership.
- The mathematics content must be accurate.
- The article must be well written and easily understood.
- The article and its ideas must be free of sexual, ethnic, racial, or other bias.
- The article must not have been previously published, nor should it be out for review by other publications.
- The article must be original.

Articles must be word-processed in MS Word, double-spaced with wide margins, not exceeding 10 numbered pages of text, and prepared according to the *Publication Manual of the American Psychological Association, Sixth Edition*. Figures and diagrams should be drawn by computer, if possible, or drawn in black ink in camera-ready form. Embedded images must also be submitted separately in jpeg or tif format. Proof of the photographer's permission is required, and for **photos of students** under the age of 18, the written permission of a **parent or guardian is required**.

You must submit **one complete copy** of your article, embedded with any tables, figures, and captioned photographs or graphics, to the Editor, Marian Small, along with **separate files for each of the text, graphics, and/or photographs**. Please e-mail all files to Marian Small at **marian.small@gmail.com**.

Your name should not appear anywhere in your article, including websites, so that your article can be sent out for blind review. Your name, full mailing address, and e-mail address must be included on a separate sheet. Upon review, you will be notified as to whether your article has been accepted for publication (as is, or pending minor or major revisions) or rejected.

The Editor reserves the right to edit manuscripts prior to publication. Once an article is published, it becomes the property of OAME.

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The views expressed or implied in this publication, unless otherwise noted, should not be interpreted as official positions of OAME.

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## ▲ About the *Ontario Mathematics Gazette*

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**Submission of Advertisements**

Advertisements for publication in the *Ontario Mathematics Gazette* should be sent to **Robert Sherk** at the above address. Courier is recommended to avoid possible delays. Deadlines for advertisements are January 23 for the March issue, April 1 for the June issue, July 1 for the September issue, and October 1 for the December issue.

Full-page advertisements are to be on 8.5" by 11" paper with a minimum of 0.5" margins and single sided. Each advertisement should be camera ready and colour advertisements should have no bleeds.

**Advertising Rates**

Advertising rates are available by telephoning, e-mailing, or writing to the Advertising Manager.

## ▲ Editor's Message

**MARIAN SMALL**



This issue represents my very first as editor of the *Ontario Mathematics Gazette*. Although I do a lot of writing, I feel a bit nervous about this new responsibility; I want to ensure that I carry on the tradition of excellence that has been established.

You will notice a few changes. Along with some of the columns with which you are familiar, you will notice a few new columns. One is intended for the intermediate teacher, although it should be relevant to many other teachers as well. Another is designed to keep you updated about the Ministry's Math Gains website and what it has to offer you, as well as other math initiatives involving the Ministry. You will also notice a feature focusing on mathematical images that we see around us and that you might want to bring to your students' attention.

In future issues, you will see articles based on students' work. I encourage you to work with your students to either co-write articles or to write articles yourselves that showcase the excellent mathematical thinking that we know is happening in many classrooms. You will also see an attempt to have more articles focused on primary, junior, and intermediate mathematics as we continue, of course, to feature ideas for the secondary math teacher.

Many teachers are hesitant about submitting an article. But if teachers did not share, our educational system would be well behind what we have achieved. I hope to be flooded with articles over the next two years so that we can share ideas that will help each of you and your students. ▲

# ▲ President's Message

DAVID ZIMMER, PRESIDENT



## The Teacher Is the Key

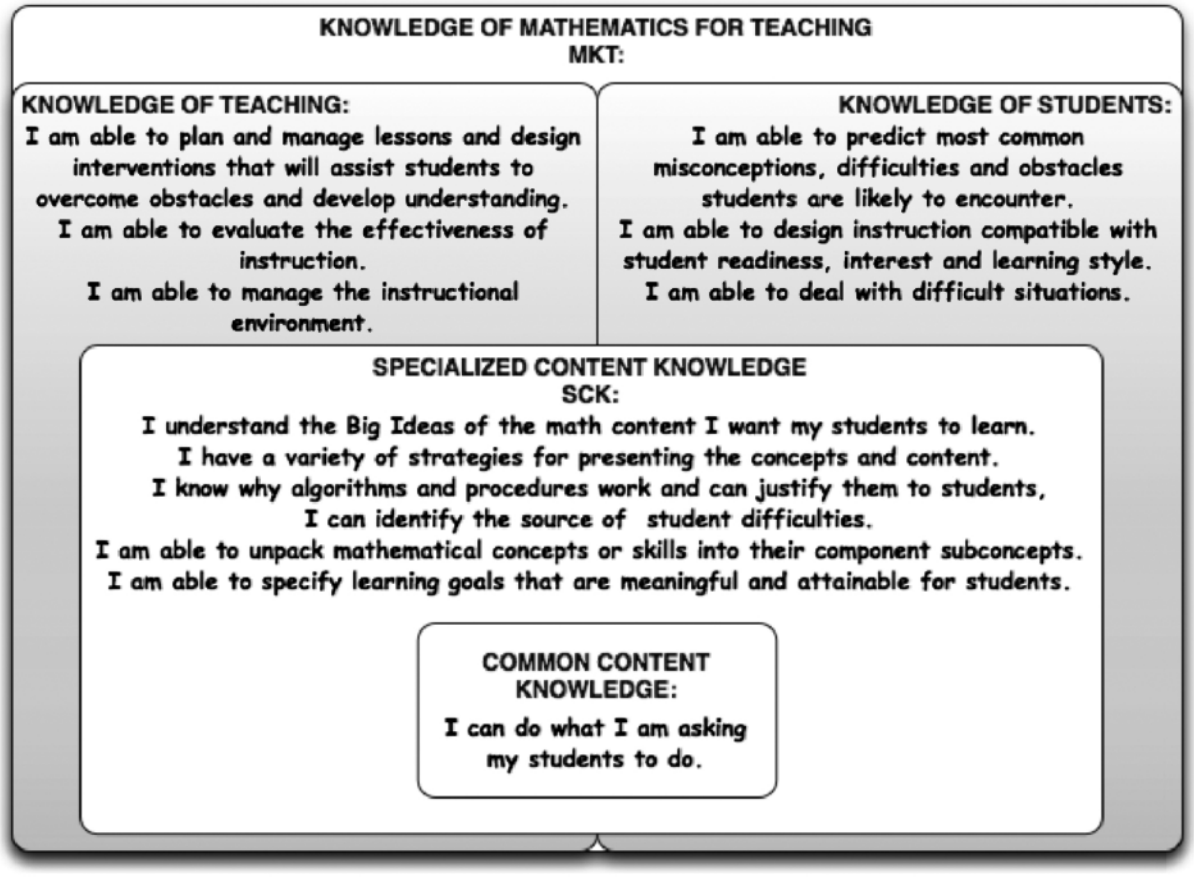
A recent article in the *Journal for Research in Mathematics Education* provided a summary of the particular kinds of knowledge pre-service teachers need to teach math content in the middle grades. I think it applies to teaching math at any grade.

As teachers, we regularly make decisions about how or whether to use a resource or instructional strategy for a particular student or group of students. These decisions require a specific knowledge of mathematics for teaching beyond that which we normally are provided at a faculty of education. This Specialized Content Knowledge (SCK) is most often acquired after we begin our teaching careers. It gets developed through experience, professional learning, collegial dialogue, and personal reflection.

OAME has always taken the position that the teacher is the key to providing meaningful and effective mathematics learning experiences for students. For that to happen, we believe that teachers need opportunities for personal and professional reflection on the effectiveness of the resources and strategies they are currently using. They need to be able to safely try out and engage in unfettered dialogue about new ideas and ways of thinking about teaching and learning mathematics.

We have been very fortunate in Ontario in mathematics education over the last few years. Many professional and learning resources (CLIPS, WINS, TIPS, and TIPS 2,0, for example) have been developed under the GAINS umbrella with the collaboration of OAME and OMCA. Teachers can select materials from these banks of resources that they feel are most appropriate to the needs of their students.

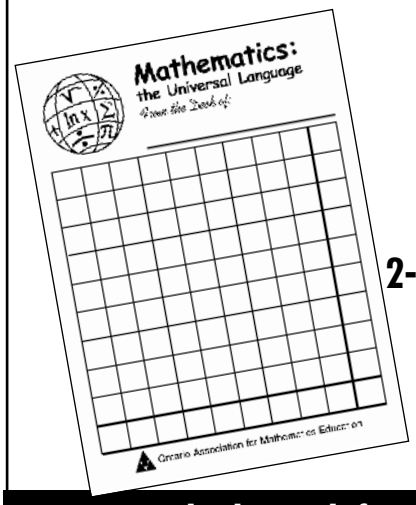
Perhaps even more importantly, GAINS initiatives have given teachers opportunities to engage in intensive professional learning and dialogue at no cost to them or their boards. Math summer CAMPPP provides an intensive residential experience within which to form a network and extend participants' specialized content



knowledge. The PLMLC programs challenge regional teams to collaboratively focus on specific math education issues in depth over time. Support for mathematics coaching activities has helped the province to establish a sustainable base for professional learning and the district level improvement of mathematics instruction. The OAME Leadership Conference will focus on Big Ideas this year and the 2011 OAME Annual Conference in Windsor will have many workshops and guest speakers to help you grow your own SCK.

I hope you have had a safe, restful, and energizing summer break. I'm looking forward to enriching my personal SCK in the new academic year and invite you to take advantage of any of the opportunities that allow you to do the same. ▲


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# ▲ Technology Corner — SMART Tricks

MARY BOURASSA



*Mary has been teaching mathematics and computer science for the past 15 years. Currently at West Carleton Secondary School in Ottawa, she is a strong advocate of the appropriate use of technology in the classroom. She has presented workshops internationally, has been involved in authoring high school mathematics textbooks, is a past Vice-President of OAME, and is Past-President of COMA. An award-winning teacher, Mary continually strives to learn new and better ways of helping students learn and love mathematics.*

Interactive whiteboards are changing the way we teach and the way students learn. Last school year, my 7-year-old spoke excitedly about what activities the class had done on the ActivBoard™ that day! Interactive whiteboards give teachers new tools to teach mathematical concepts, they promote differentiated instruction, and allow for more student participation. What this column is about, however, is creating documents that look good and keep students' attention. Be forewarned—there is really no math involved. I will be talking about SMART Notebook™, but most of the tricks can be created with software designed for other interactive whiteboards.

As I write this, the latest version of SMART Notebook™ is 10.6. Check the SMART Technologies website for updates. Let's start by looking at some of the tools.

**Screen Shade**



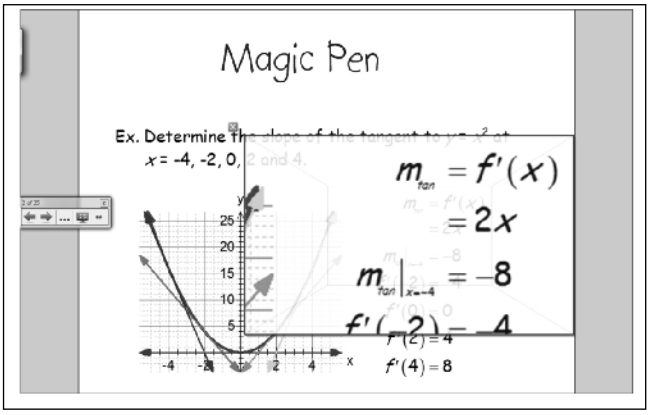
Adding a screen shade allows you to reveal information as you wish. You can reveal from the top, bottom, or either side.

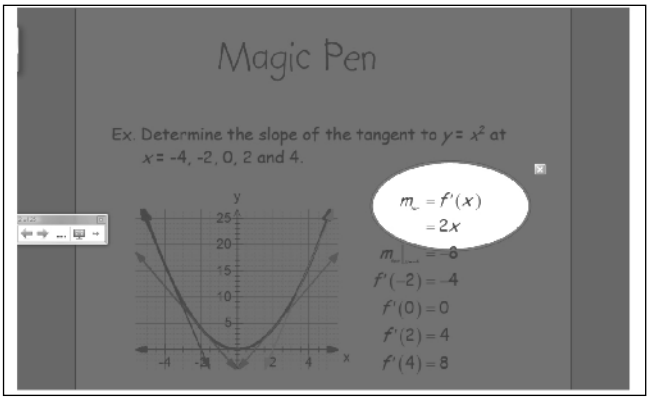
**Magic Pen**



There are three ways of using the magic pen.

1. Using your finger or the pen allows you to write or draw objects on the interactive screen. The objects slowly fade after 10 seconds.
2. If you draw a rectangle, it will zoom in on that area.
3. If you draw an ellipse, it will spotlight that area.




**Transparent Background**



Using Transparent Background mode, you can view the desktop and windows behind the SMART Notebook window. This allows you to draw in digital ink on a transparent page and save your notes in the file. Great for EQAO practice!

**Shape Recognition Pen**



This allows you to draw circles, ovals, squares, rectangles, triangles, and arcs freehand and have them replaced by the appropriate computer drawing.

**Measurement Tools**



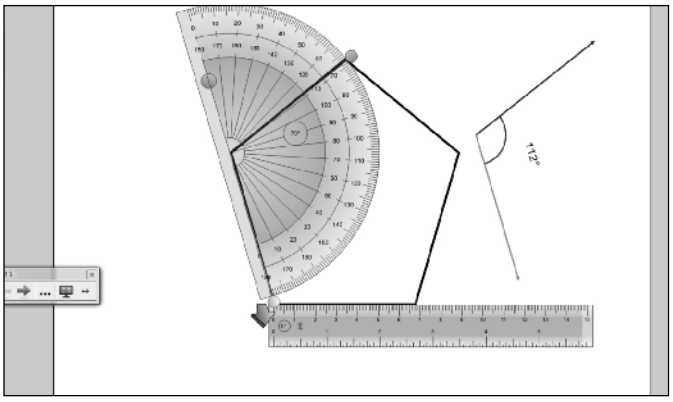
Grabbing along the centre of the ruler allows you to move it. Grabbing along the edge allows you to rotate it.



Grabbing along the outside edge of the protractor allows you to rotate it. Clicking on the blue circle on the protractor will make it a 360˚ protractor. Grabbing the green circle allows you to measure an angle, and the green arrow will "spit out" that angle for you.



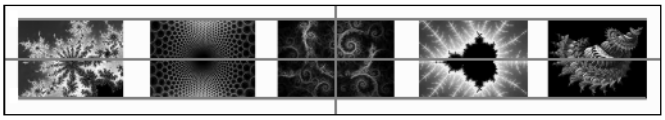
To use the compass, grab where you would if you were holding the compass in your hand to change the opening and to create the circle.




**Alignment**



You can turn on alignment so that guides appear to help you align horizontally and vertically to the centre of the page or to active objects, which includes both text and images. Notice the lines in the figure below:



**Pin Page**



This allows you to pin one page when you are using dual-page display.

**Regular Polygons**



This tool allows you to create 3- to 15-sided regular polygons.

**Grouping**

Multi-select objects, then right-click and choose Grouping > Group. This allows you to select, move, resize, rotate, or flip the objects together.

**Locking**

You can lock an object to prevent its modification, movement, or rotation. You can remove this lock at any time. Alternatively, you can lock an object to prevent its modification, but still allow movement or movement and rotation. Select the object(s), then right-click and choose Locking > Lock in Place.

**Cloning**

You can create a duplicate of an object by using the Clone command, or you can create multiple copies of an object, using the Infinite Cloner command.

To clone an object:

1. Select the object you want to clone.
2. Press the object's menu arrow, and then select Clone.
3. A duplicate object appears on the page.

To clone an object using the Infinite Cloner:

1. Select the object you want to clone.
2. Press the object's menu arrow, and then select Infinite Cloner.
3. Select the object again.
4. An infinity symbol appears instead of the object's menu arrow.
5. Drag the object to another position on the page.
6. Repeat step 4 as many times as you want.
7. When you finish cloning the object, select the original object.
8. Press the infinity symbol, and then clear the selection of Infinite Cloner.

**Attachment**



Attaching allows you to save all the resources for a lesson within the Notebook file. You can attach a copy of a file (e.g., slide show, video, Word document), a shortcut to a file, or a link to a web page. It is important to note the difference between attaching a copy of a file, which embeds the file within the Notebook document, allowing you to load that file onto any computer, versus attaching a shortcut to a file, which only points to the file and will not work on a different computer.

Now for the "tricks." It's really all about colour, grouping, and order.

**Erase to Reveal/Whiteout**



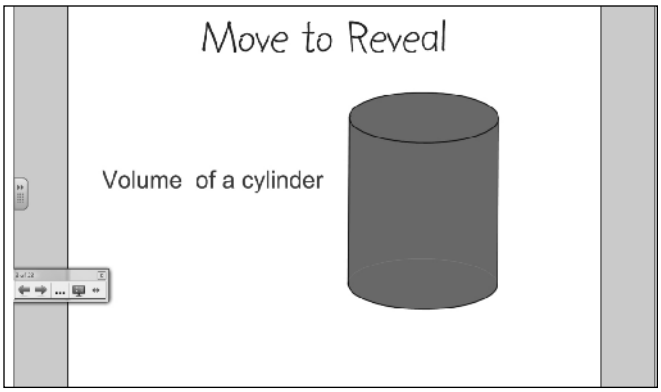
By setting the colour of a digital pen to white and making it thick, you can create whiteout! Cover solutions to problems in this way, then use the eraser to reveal them.

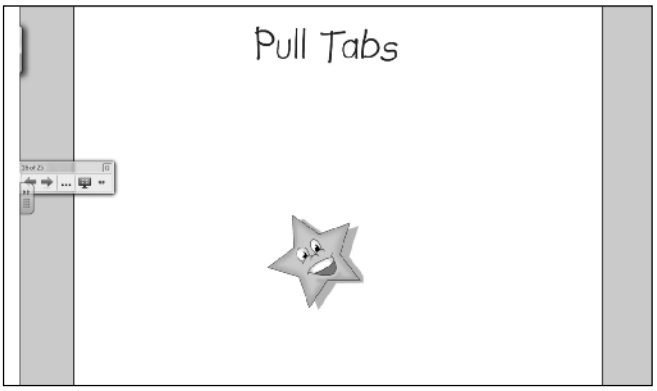


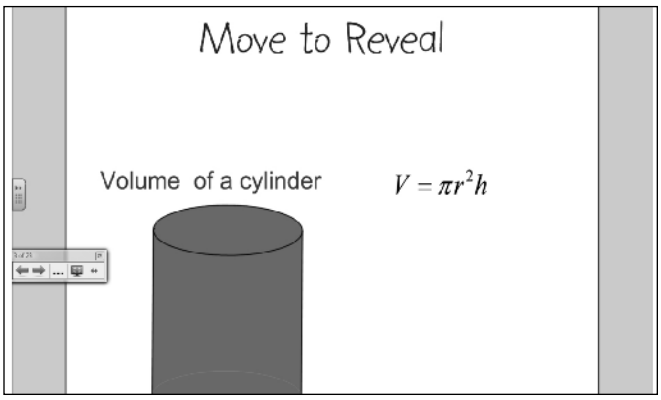
If the background is not white, type the text on the page, then choose a pen from the toolbar. Go to the pen's properties and match the colour to the background, using the eyedropper tool (click on the eyedropper, then on the background). Select the thickness for the pen and use it to cover up the text.

**Move to Reveal**

This is another way to "hide" information. Type the text you want hidden, then place an object (e.g., shape, picture) on top of it. Be sure that the object is in front of the text—you can change this property by right-clicking on the object, then choosing Order > Bring to Front.



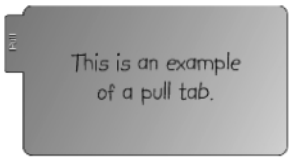







**Pull Tabs**

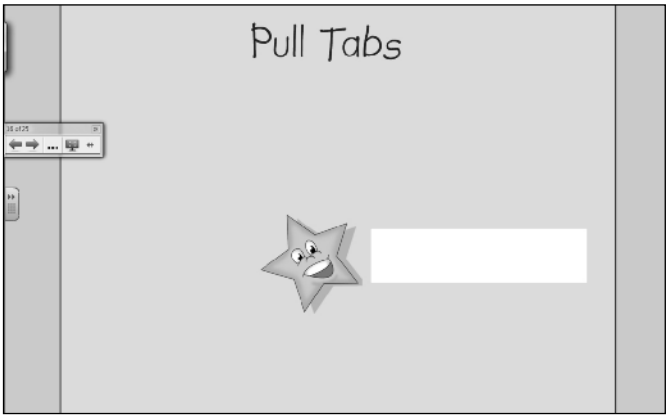


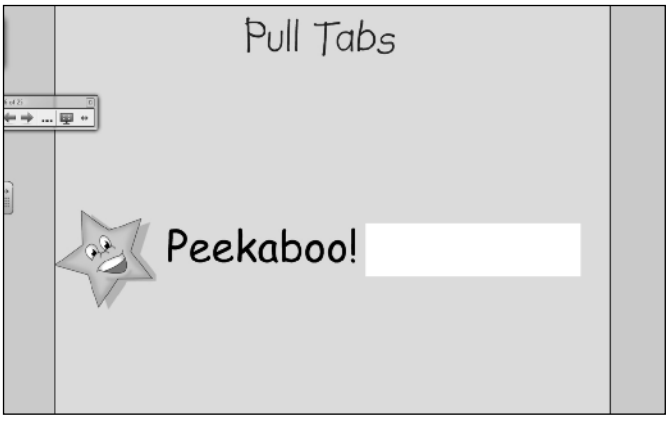

These are accessible from the Gallery and come in a variety of colours. You can set up one or multiple pull tabs to hide information until you are ready to reveal it. If you ungroup them, you can change the text on the pull. For example, you could create a pull tab with a grid on it and change the pull to say “graph.”

**You can also create something from nothing**

1. Group text, shape, or pictures with a pull (e.g., tab, arrow, star).
2. Cover items from #1 with a white shape, excluding the pull.
3. Pull to reveal items that are hiding under the shape, using the pull.

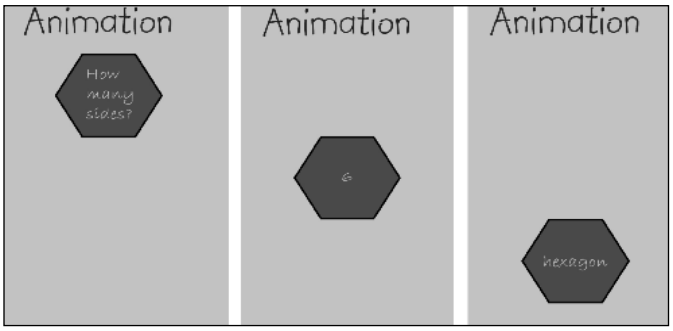
I’ll change the background colour so you can see. The pull is a star and the text is covered with a white (matches background) rectangle.



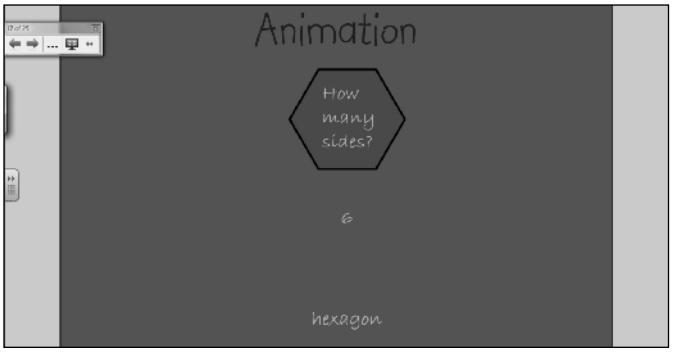



**Animation**

You can add simple animation by right-clicking on an object (including text), then choosing Properties. Under the Object Animation tab, you can select the type of animation (Fade In, Fade Out, Flip around axis, Fly In, Fly Out, Shrink and Grow, Spin); then select the direction, speed, what causes the animation to occur, and whether it repeats. It's a little hard to show animation on paper, but here is one example showing the screen each time the hexagon is clicked. Again, notice that the text colour matches the background colour, so it is not visible until the hexagon fills in a different colour on top of it. The animation chosen here is Flip around axis > Bottom Edge.

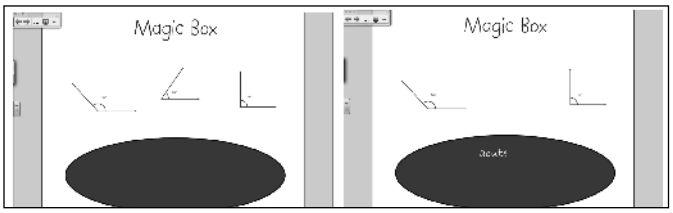



Here is the original slide with a different background colour so you can see all the objects. Note that the text is locked to prevent inadvertent movement.

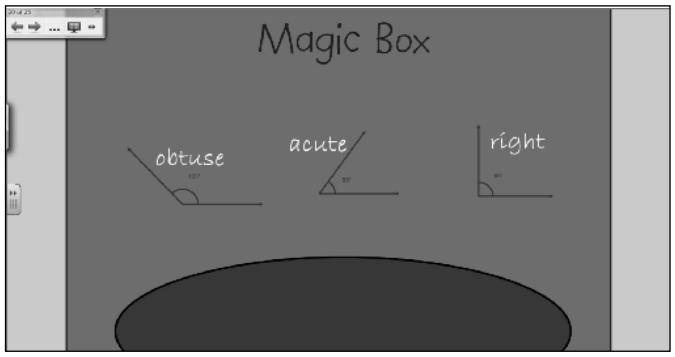



**Magic Box**

Here, the oval acts like a magic box. When the angle is dragged into the box, it changes into text telling you what type of angle it is!

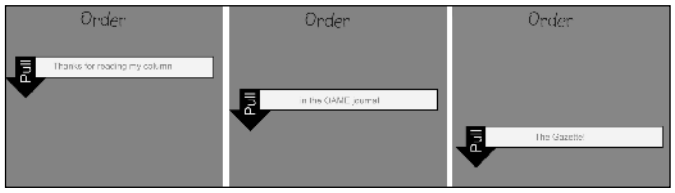



1. Create a shape (magic box) and fill it with a solid colour.
2. Create two objects (text and text or pictures).
3. Make the object that will be visible on the page the same colour as the magic box.
4. Make the text that will appear in the magic box the same colour as the page background (place it next to the visible object first).
5. Group the two objects.




**Spotlight Pull Bar**

This is my favourite. Dragging the arrow down the page reveals text.




1. Select a downward-pointing arrow from the gallery.
2. Type the word PULL; rotate it, and group it with the arrow. If it is behind the arrow, select the word "pull," press on the drop-down arrow, and bring forward.
3. Go to the shape tool and create a rectangle.
4. Select the rectangle, go to the properties tab, and fill it in with white.
5. Group the rectangle and the arrow with the word "pull" together.
6. Type the sentences.
7. Go to the properties tab; select line style, pick a colour.
8. Press on the background, go to the properties tab, go to fill effects, and select the same colour as used for the text.

There are also lots of ready-made activities and animation in the Gallery and in Lesson Activity Toolkit. You can save anything you have created or use often in My Content. Enjoy! ▲

# OAME/AOEM AWARDS FOR EXCELLENCE IN MATHEMATICS EDUCATION



The purpose of the Ontario Association for Mathematics Education's Awards is to formally recognize individuals and educators who demonstrate an outstanding contribution to mathematics education in Ontario. The successful candidate of each award enhances the learning environment, providing opportunity for students to do, see, hear and touch mathematics in a profound and meaningful way. If you know someone who qualifies for this honour, please nominate her/him/them for one of the following awards.

## OAME AWARDS

**OAME/AOEM Life Membership Award** recognizes an educator who has contributed in a significant way to OAME/AOEM; demonstrates outstanding leadership in mathematics education; and has accumulated 10 or more years of membership in OAME/AOEM.

**Award for Outstanding contribution to OAME/AOEM and Mathematics in Ontario** recognizes an individual who has made a significant contribution to OAME/AOEM, but who is not necessarily an educator or a member of OAME/AOEM.

**Award for Exceptional and Creative Teaching in Elementary Mathematics** recognizes an exceptional and creative elementary teacher who demonstrates excellence in mathematics education and contributes to the overall development of students.

**Award for Exceptional and Creative Teaching in Secondary Mathematics** recognizes an exceptional and creative secondary teacher who demonstrates excellence in mathematics education and contributes to the overall development of students.

**Award for Leadership in Mathematics Education** recognizes an educator who has demonstrated leadership by contributing in a significant way to the development of mathematics teachers and enhancing mathematics education in Ontario.

**Kenneth D. Fryer Award*** recognizes a secondary mathematics department which fosters collegiality, teamwork, and excellent classroom teaching; contributes to the overall development of students; and demonstrates leadership in the mathematics education community.

*This award was established in memory of the late Kenneth D. Fryer and is co-sponsored by the Grand Valley Mathematics Association.

**Elementary School Staff Award For Exceptional and Collaborative Mathematics Teaching** recognizes an elementary school (a school accommodating any or all of Grades JK-8) whose staff fosters collaborative and excellent mathematics teaching; contributes to the overall development of student learning of mathematics; and demonstrates leadership in the mathematics community.

## OAME/AOEM Awards Nomination Process

1. Complete the Award Nomination Cover Page appropriate to the specific award, found at **www.oame.on.ca** or contact the Executive Directors for an electronic version (**EDs@oame.on.ca**). You may include a 1-page letter of recommendation.
2. Provide up to 3 letters of support, of no more than 2 pages each. These supporting documents may be gathered from a variety of sources to reveal a full picture of the nominee. The support documents will provide precise information about the nominee's contributions as they relate primarily to the specific award.
3. Include the nominee's Curriculum Vitae of up to 5 pages. (C.V. not required for Kenneth D. Fryer award and Elementary School Staff award)
4. Send the completed cover page and supporting documents by January 15, 2011 to: OAME Executive Directors

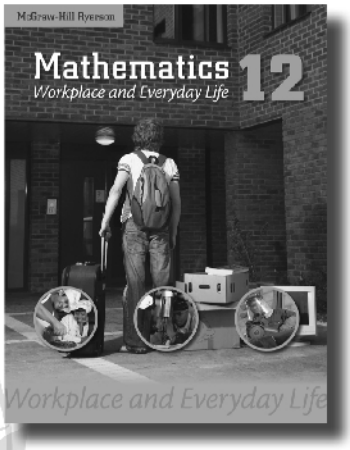
**Incomplete or inaccurate information may cause a nomination to be withheld from consideration.**

**DEADLINE: Nominations are due by January 15, 2011 to the Executive Directors (contact info above).**

**The awards will be presented at the Annual OAME Conference in May 2011.**

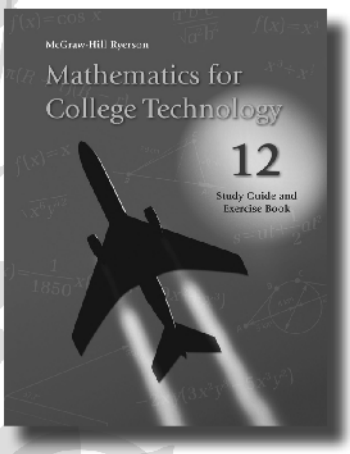
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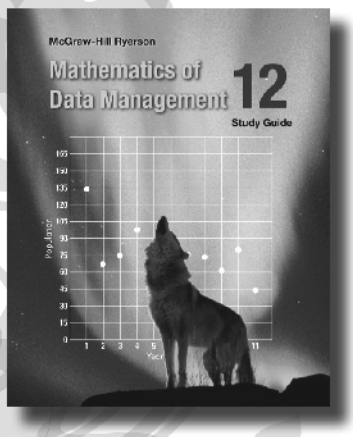

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# ▲ OAME/NCTM Report September 2010

LAURIE MOHER



*Laurie is Numeracy Consultant, JK–8 for the Kawartha Pine Ridge DSB. She has served on the Board of Directors of OAME for over 12 years.*

The NCTM (National Council of Teachers of Mathematics) has just released a new series to help teachers both develop content knowledge and learn to present the mathematic topics addressed in multiple ways. Each book in the series includes an overview of a mathematical topic, highlights the differences between what teachers and students need to know with respect to that topic, examines the big ideas and essential understandings within the topic, makes connections to other mathematical ideas, and offers questions for teacher reflection.

The first two books in the series have been released and are: *Developing Essential Understanding of Number and Numeration for Teaching Mathematics in Pre-K–2* and *Developing Understanding for Ratios, Proportions, and Proportional Reasoning for Teaching Mathematics: Grades 6–8*. There are 16 titles planned in the series. A list of future topics can be found at **www.nctm.org**.

The NCTM and four other mathematics education organizations have released a statement in support of the implementation of the recently released Common Core State Standards in the United States. The Common Core State Standards has the following mission:

> *The Common Core State Standards provide a consistent, clear understanding of what students are expected to learn, so teachers and parents know what they need to do to help them. The standards are designed to be robust and relevant to the real world, reflecting the knowledge and skills that our young people need for success in college and careers. With American students fully prepared for the future, our communities will be best positioned to compete successfully in the global economy.*
>
> (CCSSO and BGA Center, 2010)

Although our Ontario Mathematics curriculum documents provide the common standards for Ontario teachers, the U.S. Common Core State Standards can be a useful reference document for teachers as they participate in discussions about the big ideas they are working toward with students. The Common Core State Standards can be found at **www.corestandards.org/**.

## Illuminations Spotlight

NCTM's Illuminations website, **illuminations.nctm.org/**, has as its goals: providing standards-based resources for improving the teaching and learning of mathematics and providing materials that illustrate the vision for mathematics outlined in *Principles and Standards for School Mathematics, Curriculum Focal Points for Prekindergartenthrough Grade 8 Mathematics*, and *Focus in High School Mathematics: Reasoning and Sense Making.* All NCTM publications are available on their website. On the Illuminations site, you will find resources divided into four main classifications: Activities, Lessons, Standards, and Web Links. The Activities section currently contains a library of 104 activities designed to engage students in mathematical thinking. The Lessons section currently contains 551 lessons ranging from Pre-K–12. The Standards section contains information about the NCTM's *Principles and Standards for School Mathematics*, and the Web Links section contains links to hundreds of websites that have been identified by an editorial panel.

Here are some examples of the resources you will find at this site related to summer holidays:

## Pre-K–2 Activity: Bobbie Bear

In this activity, students use counting strategies to make as many outfits as they can for vacationing "Bobbie Bear," using different-coloured shirts and pants. Students make use of a computer-assisted tool to support them with the task.

## Grades 3–5 Lesson: Competing Coasters

In this lesson, students examine photos of roller coasters from across the United States and predict which one goes faster, which one is higher, which one goes farther, and which one takes longer. They then examine the data to verify their predictions.

## Grades 6–12 Activity: Boat to the Island

In this activity, students are challenged to use vectors to help a boat reach the island. Students "move" around

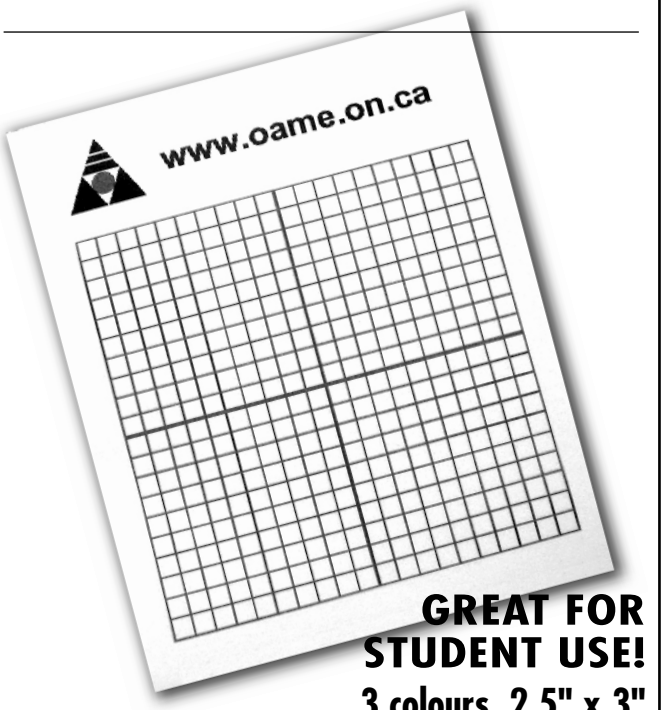
the water by changing the boat's speed. They must also account for the water current.

This site includes many activities and lessons that make use of computer technology and that will be engaging for students. New materials are frequently being added to the website, and it is worth the time to check into the many resources posted there.

### Reference

Council of Chief State School Officers and the National Association Center for Best Practices. (2010). *Common Core State Standards*. Retrieved from **www.corestandards.org/articles/8-national-governors-association-and-state-education-chiefs-launch-common-state-academic-standards** ▲

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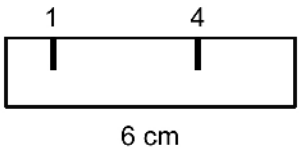
## ▲ What's the Problem? Do You Measure Up?

**SHAWN GODIN**



*Shawn is the head of Mathematics, Technology, and Family Studies at Carrie Wilson Secondary School in Orleans, Ontario. The web page for this column is **whats-the-problem.wikispaces.com**.*

*An unmarked ruler is known to be exactly 6 cm in length. It is possible to exactly measure all integer lengths from 1 cm to 6 cm, using only two marks, as shown in the diagram, at 1 cm and 4 cm, since 2 = 6 – 4, 3 = 4 – 1 and 5 = 6 – 1.*




*Suppose that an unmarked ruler is known to be exactly 30 cm in length. Find a way of placing nine or fewer marks on the ruler to be able to exactly measure all integer lengths from 1 cm to 30 cm.*

This problem appeared as Totten-M7 from the September 2009 issue of *Crux Mathematicorum with Mathematical Mayhem*, and the solution appeared in the April 2010 issue. You can check out more problems at the *Crux Mathematicorum with Mathematical Mayhem* website, **journals.cms.math.ca/CRUX/**.

Here is another problem crying out to be played with. A common problem-solving technique is to look at an easier problem. Since the problem in question deals with a ruler that is 30 cm long, which could be a bit involved, I will look at one that is 12 cm long. Also, since an unmarked ruler will always be able to measure its own length, I will not mention the 12 cm measurement, and only look to get enough marks to measure the 11 remaining integral lengths.

To aid our investigation, I will use linking cubes of different colours to represent the spaces in between the marks on the ruler. For example, the diagram below represents a 12-cm ruler with marks at 3 cm, 5 cm, and 10 cm.



Now we can begin playing. First I will start by making one mark and see if there are any patterns in the measurements I can make. I notice that when there is a single mark, I get two different measurements unless I put the mark at the centre of the ruler. For example, if the mark is at 3 cm, I can measure 3 cm as well as 9 cm (measuring from the opposite end).



When the mark is placed at 6 cm, I get 6 cm from both sides.



When I put two marks on the ruler, interesting things start to happen. If I put my marks like this:



I can only measure 4 cm and 8 cm. Yet, if I put my marks like this:



I can measure 1 cm, 4 cm, 5 cm, 7 cm, and 11 cm. Different configurations give me either two, three, four, or five different measurements. Can you find cases for each of these possibilities?

It seems that each time I add a mark, I add a number of new possibilities, since I can measure from that mark to either end or to any other existing mark. So for one mark, there were two possible measurements, and for two marks, there were 2 + 2 + 1 = 5 possible measurements (a and 12 – a, b and 12 – b, and a – b if the marks are at a and b). That means for three marks, there could be 5 + 2 + 2 = 9 possible measurements (all the distances above, as well as c, 12 – c, b – c, and a – c if the new measurement is at c), so we will need at least four marks to measure all integral lengths from 1 cm to 12 cm.

It also seems that as we add more marks, there are more possibilities for duplication. So we must be careful when choosing where to place our marks. Using a bit of logic, we see that since we must be able to measure 11 cm, a mark has to be put at either 1 cm or 11 cm. Similarly, since we must be able to measure 10 cm, we can put a mark at 2 cm or 10 cm. We could also put a mark 10 cm from our first mark, but this will result in a duplicated measurement (Can you see how?). Using these observations, we will put our first two marks as shown below.



Using this configuration, we can measure 1 cm, 2 cm, 9 cm, 10 cm, 11 cm, and 12 cm. The biggest missing measurement is 8 cm, so if we place a mark 8 cm from the right end, we get the configuration below.



Now we can measure 1 cm, 2 cm, 3 cm, 4 cm, 6 cm, 8 cm, 9 cm, 10 cm, 11 cm, and 12 cm. We can place our fourth mark at 5 cm or 7 cm and we have a complete set (with some duplication). You can check the wiki to see this visually.

This is not the only set of four marks that allow us to measure all integer lengths from 1 cm to 12 cm. I challenge you and your students to find others. You can record your results on my wiki.

For the original problem, there are many solutions. One solution with nine marks is 1 cm, 4 cm, 10 cm, 12 cm, 14 cm, 17 cm, 23 cm, 25 cm, and 28 cm. We can see we can make measurements between any two marks, or a mark and an end, or the two ends. In other words, we can treat the ends as two extra marks. Thus, if there are n marks and we use some ideas from combinatorics, there are $\binom{n+2}{2}$ possible measurements. Note that if $n = 6$, then $\binom{n+2}{2} = \binom{6+2}{2} = 28$, so six marks are not enough. For the original problem, some solvers used a computer and found some solutions with only eight marks, but none with seven marks. Feel free to post anything that you find to my wiki.

Now for your homework. Up to this point in time, I have been choosing problems that I thought a wide range of students would be able to explore using a variety of methods. I wasn't thinking about specific course or curricula. This year, I am going to try to come up with some problems that are still accessible to a wide range of students and can be solved by a wide range of techniques, but I am going to try to have some basis in the curriculum of several courses. I am particularly interested in getting students to explore and ask "what if" questions. Here if my first attempt.

A rational approximation to a real number is a rational number that is "close" to it. For example, many of us, of

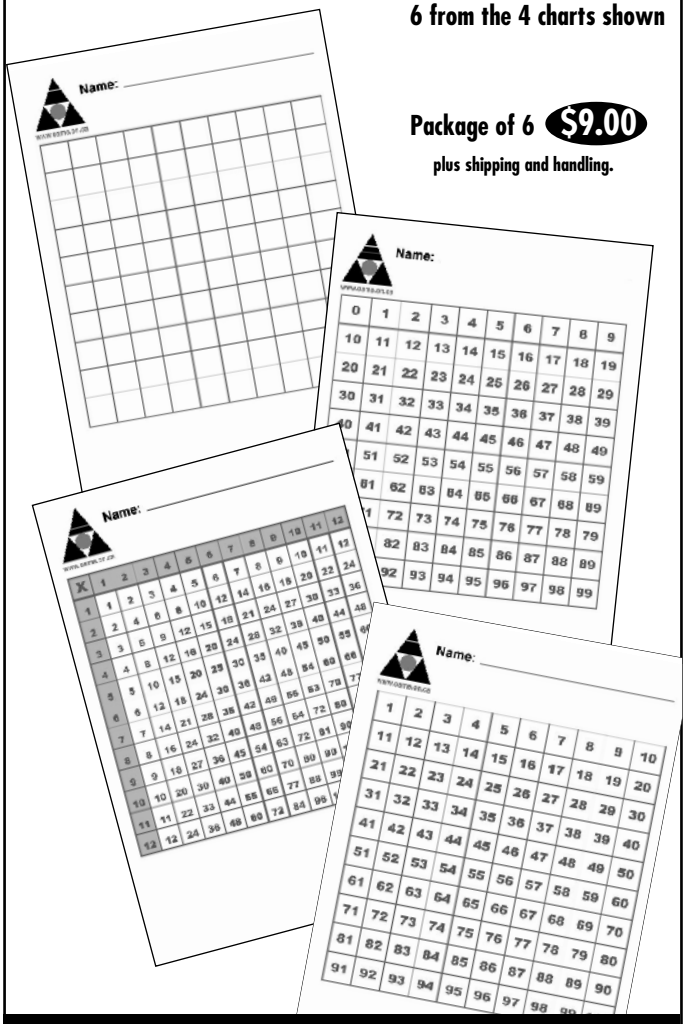
a certain age, remember using $\frac{22}{7} \doteq 3.143$ as an approximation for $\pi$. Note that it is a better approximation than $\frac{314}{100} = \frac{157}{50}$, even though the denominator is smaller. For your homework, I want you to investigate rational approximations for $\sqrt{2}$.

Until next time, happy problem-solving! ▲


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## ▲ Data Rocks – What to look for at StatCan in 2010–2011


**YVES SAINT-PIERRE, STATISTICS CANADA**




*Yves Saint-Pierre has worked at Statistics Canada in many capacities since 1990: questionnaire design, data editing and imputation, analysis, and publication. He has been sharing his knowledge with schools since 2002.*

I had the pleasure of meeting many of you at the OAME annual conference in May. What enthusiasm and exuberance for mathematics education! I am inspired to be working with people like you! And it certainly motivates me in creating new resources for data analysis. This column intends to talk about just that: our current resources and the updates to them in the school year ahead.

### If you're new to StatCan resources for mathematics and statistics...

Go to **www.statcan.gc.ca/learningresources** > (Click on) Teachers > Mathematics

What can you expect to find for mathematics and statistics education at StatCan?

**For all grades**

- An online class survey called *Census at school* (**www.censusatschool.ca**). In brief, your class fills in a survey and you get the data for your class and can analyze it with the software of your choice. The project website contains many lesson plans, as well as 16 tutorial videos to show how to use it in class. Visit *Census at school*, also on Facebook, for teacher blogs and other resources!
- A resource entitled *Statistics: Power from Data* that covers all aspects of surveys from questionnaire design and sampling to data analysis and presentation.
- Many grade-specific lesson plans.

**For high school**

- A list of data sets that can be modelled with various types of functions (linear, quadratic, exponential, sinusoidal, etc.).

- A page of data sets and questions that allow students to explore various social justice issues.

**For MDM4U**

- Data in time-series (41 million of them!) on all kinds of subjects. This data is available free of charge, from home or school, in *E-STAT*. *Cansim in E-STAT* contains the time-series data.
- Also in *E-STAT*, demographic data from the Census of 2006 (and 2001, 1996, 1991, and 1986) at a detailed geographic level.
- 27 files of Microdata (unaggregated data) from five different surveys.

## And what is new in 2010–2011?

- As a result of consultation with students, we have a new Student page this September. Please encourage students to visit it when looking for data. During the school year, videos will be added on conducting a survey, on finding data on our website, and possibly other topics.
- We are renovating our online publication entitled *Statistics: Power from Data*. A first revision will be published on time for *World Statistics Day*, October 20. Look for additions later in the school year, notably a new chapter on planning a survey.
- Watch for an *International Statistical Literacy Competition*. Details will be announced on *World Statistics Day*. Get your class involved so as to uphold Canada's ranking! Indeed, in the last competition, a Grade 8 student from Oakville, Ontario won second place in the world in the final in Durban, South Africa. Read about the previous contest on the *Teachers* > *Mathematics* page, in the *Key Resources* tab, under *Articles*.
- A new tutorial video on how to use the Teachers page.

Finally, please share this with your Social Studies colleagues. There are many opportunities for cross-curricular collaboration!

Sign up for our listserv, intended for mathematics educators: go to **www.statcan.gc.ca/learningresources** > Teachers > [Look on the right for] Keep Informed > Mathedu. ▲

# ▲ In the Middle – Building a Culture of Mathematics: Creating a Mathematical Environment in the Intermediate Classroom

**CAROLINE ROSENBLOOM**



*Caroline is currently on secondment as an Elementary Coordinator teaching mathematics in the pre-service program at OISE/UT. She has enjoyed working with intermediate students and teachers as a middle school teacher, Mathematics Instructional Leader in the Toronto DSB, and Education Officer at EQAO.*

As the new school year begins, teachers feel that tinge of panic and excitement. As teachers, we have many questions that come to mind when developing our math program. Questions like,

*How will I cover all the expectations?*

*How will I engage my students in math?*

*How can I encourage them to take risks?*

*How do I get them to write/explain in math?*

But most of all…

*How do I get my students to take an interest in and like math?*

As teachers examine their programs with their school teams, much of the focus is on how to divide strands for each reporting term. But does the planning include ways to help students become better risk takers, ways to teach how to articulate their thinking through oral and written explanations, and ways to enjoy and appreciate mathematics? At the end of the school year, what do we want our students to have learned from our class?

If we don't think about developing risk takers, then how will we really know what they know or don't know? When students say, "I know it, but can't explain it," then what part did they understand? Do we want mathematics to be a subject they just had to take at school, or do we want them to say, "Wow, I remember in math when we did…." This is the type of impact we want to have on our students.

Mathematics has been viewed as a subject that is unrelated to students' interests. We need to do a better job at having students (and parents) view mathematics as valuable, something they can be passionate about, can argue about, relate to, and see as beautiful.

I remember Dr. Ed Barbeau, mathematics professor at the University of Toronto, saying that intermediate math should be about recreational math. I understood this to mean that students should have more opportunity to problem-solve, collaborate with one another, and debate and justify their solutions. The idea of incorporating more time to just explore problems really had an impact on how I taught math. Perhaps the reason many feel they are not good at math is that they never really had an opportunity to explore mathematics and to make math a habit of mind.

So how do we program and create an environment so students are more involved in the math they do? According to child development experts (Washington State, 2010), adolescent students thrive on arguments and discussions. They are introspective. They need to feel relevant and are concerned with justice and fairness. They are very self-aware and worry about what others think of them. We should take advantage of adolescent motivations and concerns, and use them to help us teach students mathematics.

Anthony and Walshaw (2009) have developed the following set of principles of effective pedagogy of mathematics.

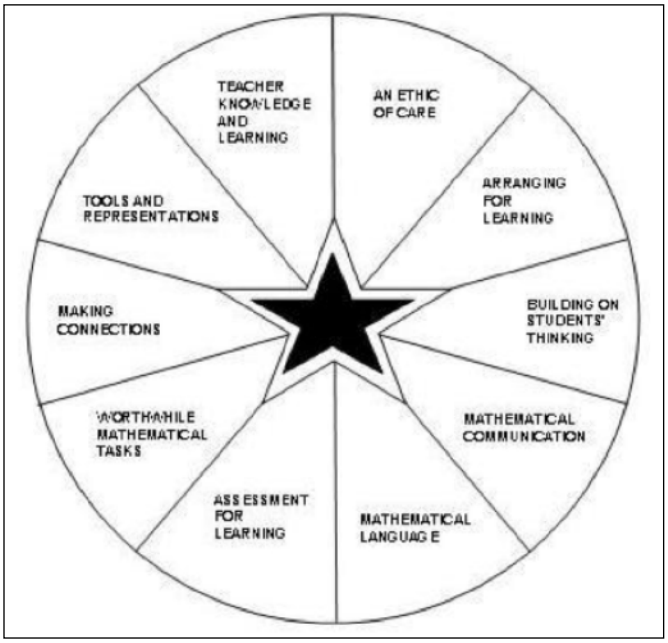



Figure 1. *Principles of effective pedagogy of mathematics.*

We can use this guide to create a diverse program that makes mathematics a habit of mind. The principles address content, as well as ways to think about and approach math.

Below are some suggested ways to help you create a culture of mathematics in your classroom for September.

## Representing Mathematics in the Classroom

- Post a variety of puzzles on the walls in class or in the hallways. Students might as well be intrigued by puzzles on the walls while waiting to come into class.
- Have games that require persistence, thinking, and problem solving available during breaks and for weekend loans. Be sure to incorporate them into your program.
- Make puzzle magazines or math storybooks available for students to read. Why not read math-related materials during independent reading time?
- Include a word wall for mathematics, to be used during discussions and debates.
- Post question prompts like, "This solution is similar to/different from this solution because…" or "I agree/disagree with your solution because…" or "I like how you represented your solution by…." Intermediate students like to debate and discuss.
- Post newspaper clippings, advertisements, photographs, or art related to mathematics inquiry. Encourage students to examine fairness and question the use of statistics in the media. Draw connections among math, patterns, art, and architecture.
- Have a variety of manipulatives and technology available in the classroom for students to represent their thinking.

## Developing Risk Takers and Questioning Skills




I noticed that my Grade 8 students left many questions blank on the first test I gave them. At first I thought they just didn't understand the math. I later realized that understanding was only part of the problem. They were afraid to take the risks needed to investigate and solve problems. Students gave up when a solution was not immediately apparent. I decided to use the game *Mind Trap* at the beginning of each class to encourage

students to take risks and ask questions. This game consists of questions that are set in a crime context. Students became more comfortable struggling with a problem, learned to ask better questions, and identified specific properties of the problem to help them solve the crime.

## Life-Size Mathematics

Students are engaged when they are part of the mathematics. The game Frogs is an excellent way to dramatize mathematics, and demonstrate problem solving, build collaboration, and introduce students to reasoning at the beginning of the year.

**CHALLENGE:**

Move all the left and right frogs to the opposite sides of their pond.

**RULES:**

- A frog can only slide onto a vacant lily pad if it is next to it.
- A frog can only hop over one other frog to land onto a vacant lily pad.
- Frogs cannot hop or slide backwards.



**QUESTIONS:**

1 What is the least amount of moves you can move the frogs?

2. What is the least amount of moves if you have 4 yellow frogs and 4 green frogs? 5 yellow and green frogs? Try it!

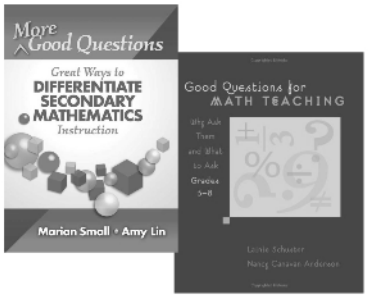
In this version pictured below, students wear Hawaiian leis to represent green and yellow frogs. Teachers act as facilitators to help identify patterns when students get stuck.



*North Option OISE/UT students dramatizing Frogs.*

## Problems for Pairs or Triads

- Students need more opportunities to regularly explore math problems. Working in pairs or triads creates a safe community, where they can struggle with a problem, contribute their own thoughts, build on one another's ideas, and debate in a more controlled setting. Eventually, they feel more confident and are able to take more risks. Puzzles like *Shikaku* (Wanko, 2010) or *Paint by Numbers* (also known as Pic-A-Pics) are great logic puzzles for students to develop their reasoning skills. *More Good Questions* (Small and Lin, 2010) and *Good Questions for Math Teaching* (Schuster and Anderon, 2005) provide great questions to further develop students' problem-solving skills and their ability to connect to the curriculum they are learning.




## Talk Time

- Adolescents love to talk, so let's give them this opportunity! Not only do we want them to talk in their math pairs or triads, but as a whole group as well. Provide students with many opportunities to debate, justify, and ask each other questions. If they don't understand another group's solution, have them challenge that group and ask questions to clarify their thinking. Use question prompts that are posted on the walls as reminders to help them focus their questions. It's such an amazing thing when you hear a heated debate about mathematics in your intermediate classroom!

In conclusion, if we want our students to value reasoning, be active participants, and to enjoy mathematics, we need to build a culture of mathematics by providing an environment to help them see and be part of the math. As teachers, we need to model problem solving and work out problems together with the class. If teachers are more excited and engaged about math, then students will be as well. Doing this at the beginning of the year will set a positive attitude and immerse students in a place that develops those habits of mind for mathematics. When you hear your students say, "I remember in math when we did…," then you know they've got you excited about math too.

## References


Anthony, G., & Walshaw, M. (2009). Characteristics of effective teaching of mathematics: A view from the west. *Journal of Mathematics Education 2*(2), 147–164.

Schuster, L., & Anderson, N. (2005). *Good questions for math teaching: Why ask them and what to ask, grades 5–8*. Toronto: Pearson Education.

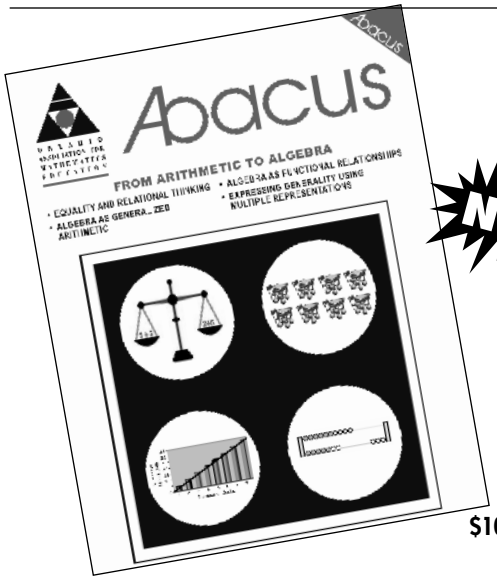
Small, M., & Lin, A. (2010). *More good questions: Great ways to differentiate secondary mathematics instruction.* Toronto: Nelson Education.

Wanko, J. (2010). Deductive puzzling. *Mathematics Teaching in the Middle School 15*(9), 524–531.

Washington State Online Foster Parent Class. (1993). *Child Development Guide*. Retrieved from **www.dshs.wa.gov/ca/fosterparents/training/chidev/cd06.htm** ▲



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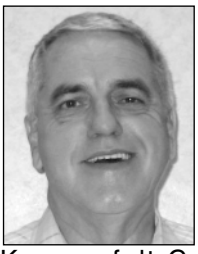
**This resource for teachers includes the concepts of equality and relational thinking, algebra as generalized arithmetic, algebra as functional relationships and expressing generality using multiple representations. With links to manipulatives and literature, it will be useful for exploring these concepts personally or with a team of teachers.**

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# ▲ What's New at EDU?


**JEFF IRVINE**



*Jeff is an Education Officer at the Ministry of Education.*


## GAINS Math CAMPPP 2010

Once again, a very successful *GAINS Math CAMPPP* was held at the Kempenfelt Centre in Barrie. Enrolment reached capacity four days after invitations were first issued, and participants who were unable to attend in person were provided with access to sessions through Adobe Connect. This year, the focus of the week was on proportional reasoning.

The beginnings of a deep understanding of proportional reasoning develop between Kindergarten and Grade 2. Math CAMPPP was an opportunity to build teacher capacity in both content and pedagogical knowledge related to proportional reasoning from Kindergarten to Grade 12. Participants delved into the big ideas in proportional reasoning, focusing on the interconnections across the grades and strands to both simplify and enrich instruction. Participants explored differentiated instruction through questioning, with particular attention to the use of open and parallel questions. Activities demonstrated the value of rich mathematical conversations, effective use of manipulatives and technology, teaching through the mathematical processes, and assessment for and of learning.

Each day included a balance of plenary and breakout sessions; Dr. Marian Small facilitated the plenary sessions. Participants had the opportunity to select one of six breakout sessions:

- Kindergarten to Grade 2: Proportional Reasoning: Laying the Foundation
- Grade 3 to Grade 6: Proportional Reasoning: Focus on Multiplicative Thinking
- Grades 7 and 8: Proportional Reasoning: Focus on Ratio and Fractional Relationships
- Grades 9 and 10: Proportional Reasoning: Focus on Proportional Thinking
- Grades 11 and 12: Proportional Reasoning: Building to More Complex Relationships

- Leaders: Creating an Environment for Mathematical Success

Artifacts from Math CAMPPP will be available shortly on the EDU GAINS website (**www.edugains.ca**).

## Professional Learning for Mathematics Leaders and Coaches Series (PLMLC)

Based on a learning-needs assessment of teachers, leaders, facilitators, and coaches conducted in August and September, the Ministry of Education plans to offer a number of professional learning activities this year. Visit the EDU GAINS website regularly to select from current offerings.

Among the planned activities are the following:

- A series of face-to-face sessions around the province, with job-embedded practice and view-and-discuss activities between sessions. Modelled on the very successful *Not Just a Three Part Series*, this series of professional learning sessions will focus on priorities identified in the learning-needs assessment.
- Adobe Connect book studies focusing on books that address topics identified in the learning-needs assessment. These virtual sessions recognize the heavy demands on teachers' time and the difficulties for many educators in attending face-to-face sessions during the school day. Last year's Adobe Connect sessions were heavily oversubscribed, and participants indicated a strong preference for more sessions with a similar format.
- Adobe Connect CLIPS (*Critical Learning Instructional Paths Supports*) studies, which will allow participants to share ideas and approaches, as well as to provide information and direction for future CLIPS development. CLIPS are research-affirmed web-based interactive learning objects for students and educators. You can visit the EDU GAINS website to access currently available CLIPS.
- Introductory Coaching Institutes, which are available on a request basis to provide supports for new mathematics coaches. These two-day institutes give beginning coaches the skills and knowledge to use the coaching cycle (co-plan, co-teach, co-debrief) to provide precise and personalized job-embedded professional learning for classroom teachers.
- Master Coaching Institutes, which are available upon request. These institutes allow educators already in a coaching role to go deeper into knowledge and skills to enhance the job-embedded professional learning experiences of the educators with whom they work.

## EDU GAINS Website

Over the summer, the EDU GAINS website moved to a new server. This will allow us to better serve the needs of Ontario educators. We are also changing its look. While continuing to provide access by content, the new look will also allow access by role and responsibility based on the Ministry of Education Leadership Frameworks.

While the appearance may change, the EDU GAINS website will maintain and expand its current mandate to provide educators with efficient access to a vast array of resources for classroom teachers, mathematics leaders, facilitators, principals/vice-principals, and system leaders.

Take advantage of the free RSS feed to keep you posted on additions and updates to this website.

Please address all questions and feedback to **jeffrey.irvine@ontario.ca**. ▲


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# ▲ What's Old Can Be New: Interesting Strategies for Fraction Operations

VERA SARINA



*Vera Sarina teaches mathematics at Pleasant View Junior High School in the Toronto District School Board.*

Although many students struggle with performing fraction operations, others who are comfortable with that content would benefit from new and interesting contexts in which to apply their knowledge. This article is an attempt to highlight some historical approaches that can furnish students with interesting contexts in which to operate with fractions. Included will be attention to the Ancient Egyptian and Chinese approaches to fractions, and the use of the Euclidean algorithm to determine the greatest common factor to help simplify fractions.

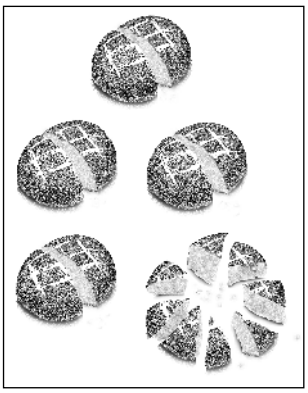
## Egyptian Fractions



Our knowledge of Egyptian mathematics is based mainly on two papyri (Rhind and Moscow) that dated around 2000 BC. Both of the papyri are sets of practical (with a few exceptions) problems with solutions.

## Writing Any Fraction as the Sum of Unit Fractions

The ancient Egyptians expressed fractions with numerators other than 1 as the sum of distinct unit fractions, e.g., $\frac{3}{5}$ would be expressed as $\frac{1}{2}+\frac{1}{10}$ (rather than as $\frac{1}{5}+\frac{1}{5}+\frac{1}{5}$) or $\frac{3}{7}$ as $\frac{1}{3}+\frac{1}{11}+\frac{1}{231}$. This system looks cumbersome, but is useful for "distribution problems."



A typical example of a distribution problem is: "How can five friends share eight pizzas equally?" In the ancient Egyptian context, the problem would look something like: "Suppose Nefer has 5 loaves of bread to share among the 8 workers."

The solution is quite simple: $\frac{5}{8}$ of a loaf to each worker. But what does this solution mean in practice? Two things—either Nefer has to break each loaf into 8 pieces and give each worker a little pile of 5 pieces, or Nefer has to cut $\frac{5}{8}$ of each loaf and give a good chunk of bread ($\frac{5}{8}$ of a loaf) to 5 workers and then distribute the rest of the bread in piles of small pieces between the remaining 3 workers. Quantitatively, both processes are fair: each worker gets the same amount of bread. Qualitatively, though, either all the workers are unhappy with their piles of crumbling pieces of bread, or some workers might feel second-class, having gotten bits and pieces, while others end up with a substantial unbroken chunk of a loaf. To avoid such an unpleasant situation, Nefer would use unit fractions. She would recognize that each worker would get more than half a loaf. Therefore, she would break 4 loaves into halves, getting 8 halves and the remaining loaf into eighths. Each worker would get not only the same amount of bread, but pieces of the same sizes. And adding up what each worker gets, we get the initial solution: $\frac{1}{2}+\frac{1}{8}=\frac{5}{8}$.

This strategy (to use only unit fractions) is an interesting context to practise fraction subtraction, while also encouraging students to consider the size of the fraction being decomposed. For example, to write $\frac{5}{9}$ as the sum of unit fractions, the student first thinks: $\frac{5}{9}$ is more than $\frac{1}{2}$, so the first unit fraction should be $\frac{1}{2}$. The student realizes that he must figure out what $\frac{5}{9}-\frac{1}{2}$ is in order to see what's left.

Since $\frac{5}{9}-\frac{1}{2}=\frac{1}{18}$, $\frac{5}{9}=\frac{1}{2}+\frac{1}{18}$.

Students might want to test their results against those calculated on a website that automatically writes

fractions in this form, **www.maths.surrey.ac.uk/hosted-sites/R.Knott/ Fractions/egyptian.html**. In fact, any fraction can be decomposed in an infinite number of ways. For example, $\frac{5}{9}$ is also equal to $\frac{1}{3}+\frac{1}{6}+\frac{1}{18}$ or $\frac{1}{2}+\frac{1}{19}+\frac{1}{342}$.

## The Greatest Common Factor (GCF) in Fraction Work

When working with fractions, students often want to simplify them using the greatest common factor of the numerator and denominator. They also use the greatest common factor to determine a common denominator when adding and subtracting. History offers some interesting approaches to calculate this value.

## Euclid's Algorithm



The ancient Greeks produced a stunning number of mathematical geniuses: Pythagoras, Archimedes, Diaphanous, etc. Euclid is one of the brightest stars of this constellation. Arguably the most influential book in the European mathematics, Euclid's *Elements* (around 300 AD) describes one of the oldest algorithms still in common use. It is a way of calculating the greatest common factor, or GCF, of two numbers, **without** listing the factors of either number. Euclid's algorithm comes in handy with large numbers, since large numbers are often more difficult to factor, while they are relatively easy to divide. The Euclidean algorithm uses division to determine the GCF.

The algorithm can be summed up in two easy steps:

1. Divide the original numbers.
2. Repeat the division process, using the previous divisor as the next dividend and the previous remainder as the next divisor until you get no remainder. The last non-zero remainder is the GCF of the original two numbers.

If we apply these steps to 114 and 138, we will find that their GCF is 6, since 6 is the last non-zero remainder.

138 ÷ 114 = 1 remainder 24

114 ÷ 24 = 4 remainder 18

24 ÷ 18 = 1 remainder 6

18 ÷ 6 = 3 remainder 0

Knowing the GCF of two numbers can help determine a common denominator when subtracting fractions, as described above, and it can also help simplify fractions.

For example, the fraction $\frac{114}{138}$ can be simplified: $\frac{114}{138}=\frac{114\div 6}{138\div 6}=\frac{19}{23}$.

Why does the Euclidean algorithm work? It can be explained by rewriting the division sentences with multiplication ones:

138 ÷ 114 = 1 remainder 24 ⇨ 138 = 1 x 114 + 24

114 ÷ 24 = 4 remainder 18 ⇨ 114 = 4 x 24 + 18

24 ÷ 18 = 1 remainder 6 ⇨ 24 = 1 x 18 + 6

18 ÷ 6 = 3 ⇨ 18 = 3 x 6

Work backwards:

18 = 3 x 6, so 18 is divisible by 6;

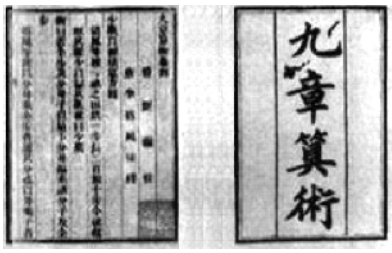
Then 24 is divisible by 6 because it is the sum of two multiples of 6 (18 and 6);

Then 114 is divisible by 6 because it is a sum of two multiples of 6: 4 x 24 and 18;

Then 138 is divisible by 6 because it is a sum of two multiples of 6: 114 and 24.

Thus, 6 is a common factor of 114 and 138. And it is the greatest common factor of 114 and 138 because otherwise, it would not be **the first** non-zero remainder that divides the divisor without a remainder.

## China – Operations with Fractions




The ancient Chinese number system was remarkably similar to our present Hindu-Arabic one. The Chinese approach to fractions is so clear and effective, that it leaves you to wonder why we never expose our students to it!

Operations on fractions are described in one of the oldest and most revered mathematical manuscripts in China, *The Nine Chapters on the Mathematical Art* (100 BC–50 AD) (Kangshen, Crossley, & Lun, 1999). Each chapter in this text is organized around a set of specific practical problems that "offer a tantalizing glimpse into a society whose daily life revolved around rice, horses, business, and the abacus" (Fukagawa & Rothman, 2008). Fractions become prominent from the very first chapter called *Rectangular fields*, which deals with areas of fields of various shapes and manipulation of fractions.

## Simplifying Fractions

The first step in dealing with fractions the "Chinese way" is to adopt their method of simplifying fractions, using the GCF of the numerator and denominator. This method does not require listing common factors and is based solely on subtraction.

To determine the GCF of the numerator and denominator you:

- subtract the smaller number from the greater number
- keep subtracting the smaller number from the greater number until the subtracted number and the difference equal each other. This is the GCF of two original numbers.

Let's apply this algorithm to the task of simplifying $\frac{51}{85}$:

- 85 – 51 = 34 Note that 34 ≠ 51.
- 51 – 34 = 17 Note that 17 ≠ 34.
- 34 – **17** = **17** Note that 17 = 17.
- 17 – 17 = 0 Therefore, the difference is 0.

The GCF of 51 and 85 is **17** because it is the last difference before 0! Magically simple and effective. The question remains: why does it work? To see why this algorithm works, we will rewrite the subtraction sentences with division ones. (Division is repeated subtraction, after all.)

85 – 51 = 34 ⇨ 85 ÷ 51 = 1 reminder 34

51 – 34 = 17 ⇨ 51 ÷ 34 = 1 reminder 17

34 – 17 = 17 ⇨ 34 ÷ 17 = 1 reminder 17

17 – 17 = 0 ⇨ 17 ÷ 17 = 1

The right-side column is the Euclidean algorithm whose "reasonability" was already demonstrated. Thus, we can see why the Chinese algorithm works.

## Basic Operations on Fractions

The ancient Chinese approach to fraction operations uses almost the same algorithm for all four basic operations. The algorithms for addition, subtraction, and division are based on one principle: use equivalent fractions with a common denominator and then deal with them as you deal with whole numbers. Do not worry about the lowest common denominator; just use the product of all the denominators as the common denominator. The answer is simplified later, using the GCF algorithm.

So to add or subtract fractions, the following rule is employed: $\frac{a}{c} \pm \frac{b}{d} = \frac{ad \pm bc}{cd}$.

For example: $\frac{7}{12} - \frac{1}{3} = \frac{7 \times 3 - 1 \times 12}{12 \times 3} = \frac{9}{36}$.

To simplify the resulting fraction, one could apply the GCF algorithm if one did not notice that 36 = 4 x 9:

36 – 9 = 27

27 – 9 = 18

18 – 9 = 9

9 – 9 = 0 ⇨ The GCF is 9. $\frac{9 \div 9}{36 \div 9} = \frac{1}{4}$.

The rule for division is simple and clear. It is based on the definition of division, to determine how many times one quantity is contained in another. In order to perform the operation, the quantities must be of the same units. The Chinese rule of dividing two fractions requires equivalent fractions with a common denominator (the product of two denominators), whose numerators are then divided.

$$\frac{a}{c} \div \frac{b}{d} = \frac{ad}{cd} \div \frac{bc}{cd} = \frac{ad}{bc}.$$

For example:

$$\frac{5}{6} \div \frac{7}{8} = \frac{5 \times 8}{6 \times 8} \div \frac{7 \times 6}{6 \times 8} = \frac{40}{48} \div \frac{42}{48} = \frac{40}{42} = \frac{20}{21}.$$

Mathematically, this division algorithm is comfortable to students because it follows the same logic as addition and subtraction of fractions and the same logic as division of whole numbers. The multiplication rule for the Chinese does not differ from the one we employ: multiply the numerators and multiply the denominators.

Each year, I start my Grade 9 academic class with a review of fractions because I know that the inability to perform basic operations on fractions can lead "to error patterns that emerge in learning algebra" (Brown & Quinn, 2007). The Chinese approach to fractions has proved to be a very helpful tool in helping my students to acquire necessary skills in operations with fractions.

## Conclusion

The Ontario Mathematics curriculum requires teachers to "bring enthusiasm and varied teaching and assessment approaches to the classroom, addressing different student needs and ensuring sound learning opportunities for every student" (Ontario Ministry of Education, 2005, p. 5). Fractions is one of the topics that leave many teachers and students uninspired. The history of mathematics provides a wealth of varied strategies, methods, and approaches, and may become a source of renewed enthusiasm both for teachers and their students. Why not try the old Egyptian or Chinese approaches instead? I did, and it worked in my classroom.

## References

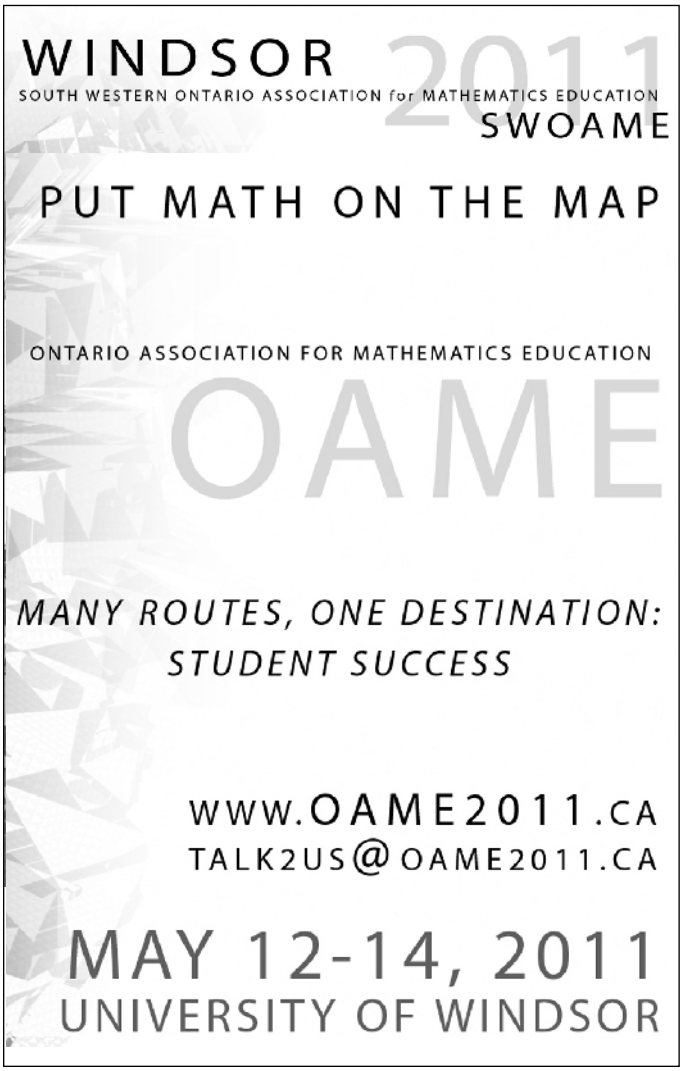

Brown, G., & Quinn, R.J. (2007). Investigating the Relationship between Fraction Proficiency and Success in Algebra. *Australian Mathematics Teacher 63*(4), 8–15.

Fukagawa, H., & Rothman, T. (2008). *Sacred mathematics: Japanese temple geometry.* Princeton, NJ: Princeton University Press.

Kangshen S., Crossley, J.N., & Lun, A. W.-C. (Eds.). (1999). *The nine chapters on the mathematical art: Companion and commentary*. Oxford and New York: Oxford University Press; Beijing: Science Press.

Ontario Ministry of Education. (2005). *The Ontario curriculum, grades 1–8: Mathematics (revised)*. Toronto: Queen's Printer for Ontario. ▲







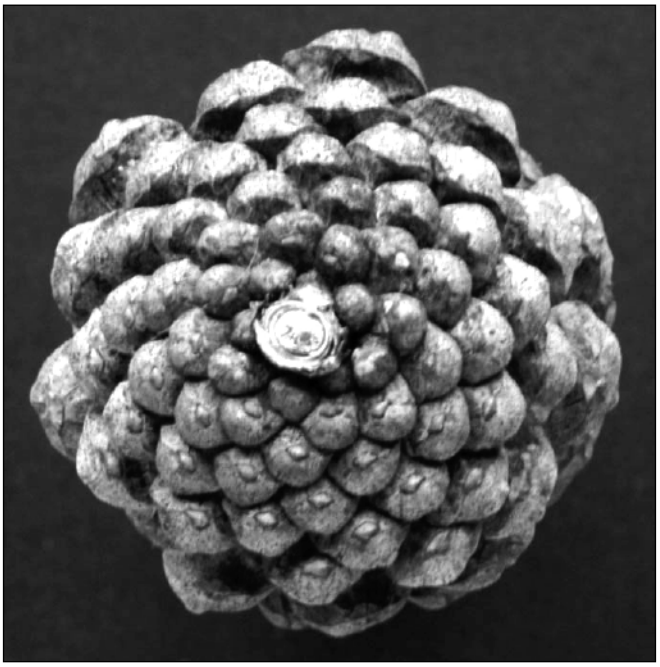
# ▲ Mathematical Images


**FRANK MARINGOLA**

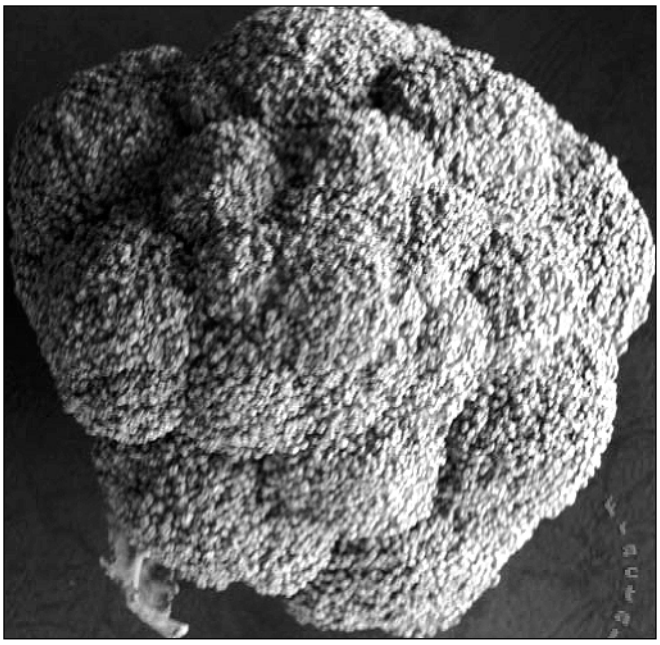


*Frank is an English teacher working for The Centre for Skills Development, affiliated with the Halton District School Board and the Ministry of Citizenship/Immigration. He is also working on a book for Communication Technology for Teachers with interdisciplinary applications; a unit on photography will have students exploring mathematics.*


This column will share some images around us that are connected to mathematical patterns and concepts.



The pine cone interests me as an example of a mathematical pattern in nature. I envision objects and ideas in terms of their mathematical or numeric aspects. This approach is a way to obtain self-knowledge and/or spiritual growth and development. The pine cone attracts me due to its pleasing perfectly circular shape. Its perfect geometric shape highlights the interdisciplinary potential between biology and mathematics.



The broccoli patterns are interesting. They are of a fractal nature. The study of this natural occurrence shows the pleasing aspect of natural objects. It is said that the reason Pythagoras fell in love with mathematics as a child is because of his father's trade. His father, a gemologist, found geometric patterns in the gems. This passion for patterns pleasing to the eye can be passed on to others. Magnifying a fractal and focusing on a portion of that fractal reveals the same details as the original.



The image of this flower once again reminds me of Pythagoras' father. The mesmerizing and timelessness of the image is equal to any gem. ▲

# ▲ New OAME Executive Directors

**INTERVIEWED BY:**
**ANNE YEAGER, VICE-PRESIDENT, OAME**



*The following is an interview with Fred and Lynda Ferneyhough. Fred and Lynda have recently assumed the position of Executive Directors for OAME.*

***Anne:*** *Hi, Fred and Lynda. Beginning in September of 2010, you'll be the Executive Directors of OAME. Tell us a little bit about what you anticipate about this experience.*

**Fred:** We've been job-shadowing Dave and Sue Hessey, so we've started the transition. It's really hard to say until you start doing it, since you don't really know what the whole job entails. I've been warned by Sue about the volume of the work.

**Lynda:** Sue has really helped by providing documentation about the details of the job.

***Anne:*** *One or both of you have been a member of the Board or Executive of OAME for at least nine or ten years. Describe your involvement with OAME to date.*

**Fred:** I started as Chapter Rep for CHAMP around 2001, did that for three years. Then I ran for the Board of Directors and then moved into the Executive.

**Lynda:** I took over as CHAMP Rep when Fred went on the board. I chaired Publications and Curriculum Committees. Then I became VP, for the last two years.

***Anne:*** *Explain how you will be an asset to OAME as you move into this position from the other positions you've held within OAME.*

**Fred:** I have lots of contacts across the province, certainly. We know a whole ton of people.

We are familiar with the structure of the board. We know how this organization operates. We know who is on the committees and the strengths of the members.

Also, we are well known to people in the Ministry, with publishers, with OMCA.

***Anne:*** *What motivated you to apply for the position of ED of OAME? In other words, why do you want to work for OAME in this capacity?*

**Lynda:** I think the Executive Director position is best held by a couple than not, because there is a lot of work for one person. So it is more manageable with two, and being a couple means easier coordination. Some of the job requires a voluntary time commitment, and that is fine.

**Fred:** We are both retired and we wanted to keep our connection to mathematics in Ontario.

**Lynda:** We have both been math educators, and we've worked well together in other projects, so we expect to work well together in this.

***Anne:*** *Why do you think you'll be successful as Executive Directors of OAME?*

**Lynda:** We both have good organizational skills and I can keep my eye on Fred.

***Anne:*** *Tell us about some of the things you hope to contribute to OAME as the EDs.*

**Lynda:** When you go into a new position, you need to first learn the position before you make a lot of changes. One thing I am still a little shocked at is OAME membership. I think it is very low; we'd like to see it bloom.

**Fred:** Because of our experience, we will be able to support the Constitution Committee if the Board wants to consider a new structure.

**Lynda:** I think it is important that teachers know about OAME. The *Gazette* is amazing. If we really want to be a voice in any changes, we need to have more people involved in the whole process.

***Anne:*** *What is your philosophy toward the work that you'll be doing?*

**Fred:** OAME is the only educational organization that I know of that has Executive Directors. So we are kind of unique. I personally see it as an opportunity to serve others. As Executive Directors, we serve the organization on a daily basis. The President and other Executive members may have full-time jobs, and much of our work is to support them.

***Anne:*** *Over the past year, you've been shadowing Sue and Dave Hessey, the present Executive Directors. Do you anticipate any particular challenges, and if so, what are they and how might you overcome them?*

**Lynda:** Finding room for all the stuff at our house will be a challenge. It's scary that we're going to need a truck to move it all. It's a good job our kids have all moved out!

**Fred:** Anytime you work with people, you have challenges. You have to have a thick skin.

**Lynda:** It's a good time of year to begin. Using the software for the memberships, website, etc., will be a bit of a learning curve. But I am hoping that the fall will be a less busy time, since memberships are mostly done around conference time in May. It is reassuring to know that Sue and Dave will be available for help if we need them.

***Anne:*** *How will you know if you've been successful as Executive Directors of OAME?*

**Fred:** If we don't quit in the first year.

**Lynda:** I don't know, maybe how successful we are at troubleshooting when things come up.

***Anne:*** *What is your management style?*

**Fred:** As department heads, we were very different. I was more hands on, and Lynda trusted people to go with the direction set at the beginning of the year. I was more directive; Lynda was more of a guide.

***Anne:*** *With that in mind, do you see that as a concern?*

**Lynda:** We complement each other; we've always worked well together.

**Fred:** We've been together 35 years; this isn't going to break us.

***Anne:*** *What are you most looking forward to in this position?*

**Fred:** Continued affiliation with math teachers in Ontario.

**Lynda:** I think of this as my volunteer work commitment, so it is something I can do for math teachers. I am looking forward to the satisfaction of helping out.

***Anne:*** *Thanks, Fred and Lynda, for your time. I am sure OAME will benefit from your leadership as OAME Executive Directors. I, for one, am looking forward to working alongside you next year.* ▲

# ▲ Math by Video on Facebook

**Judith Koeller**



*Judith is a Lecturer in Mathematics at the University of Waterloo and chairs the Fryer, Galois and Hypatia Contest Committee. She explores the use of technology to support and enrich teaching math.*

Ask a group of high school students how they spend their spare time, and "Facebook" is bound to be mentioned. Facebook, the social networking website, abounds with material on entertainment, sports, and politics.

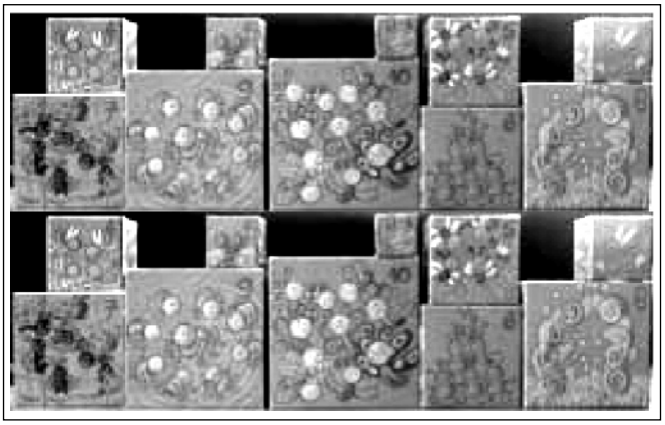
Facebook is wildly popular with young people. Part of the popularity is the opportunity to connect with other people, and part of it is the opportunity to share personal experiences. It might make sense to use Facebook to bring math alive to students, who often do not view math as a potentially personal experience.

University of Waterloo's Centre for Education in Mathematics and Computing (CEMC, **www.cemc.uwaterloo.ca**), best known for the Canadian Mathematics Competitions (Gauss, Pascal, Cayley, and others), hosts the Facebook group "CEMC: Centre for Education in Mathematics and Computing." In 2009–2010, high school students and others were challenged to post online their video solutions to the math problem of the week. Showcased are some excellent videos, submitted by students, solving problems involving chickens, dominoes, and Lite-Brite pegs. Other students could then review and comment on the solutions. Some math problems were based on video interviews with math professors and graduates working in business, connecting accessible math problems to their real-world applications.

Why does math work so well by video?

## Setting Richer Problems

An interesting math problem, based on an actual life setting, can be tedious to explain in detail. Many problems created for the Canadian Mathematics Competitions are inspired by a rich context: mixing liquids, designing three-way light bulbs, and piling up a set of nesting blocks. Conveying these contexts with precise words can bog down a problem, and language can be an impediment for students new to speaking English. Thus, problems are sometimes stripped of their context to ensure that they are concise and clear.



Problem 6: *Block Piles of Equal Height*

If a picture speaks a thousand words, then a video speaks a googol words.[1] Problems explained by video can quickly impart a context, a pattern, or an algorithm, setting up students to solve an interesting and meaningful problem. In "Problem 6: Nesting Blocks of Equal Height," a one-minute video conveys a description of a set of blocks, an example of configuring them in piles of equal height, and three increasingly difficult questions based on creating piles. In "Problem 13: Hockey Team on Tour," a two-minute video explores the classical "travelling salesman" optimization problem with teams in a real Ontario hockey league. The video shows two related applications: to streamline manufacturing and shipping and to treat patients with hydrocephalus.




Problem 13: *Hockey Team on Tour*

[1] *googol = 1.0 x 10100.*

## Richer Problem Solving by Students

Students can often arrive at the answer to a math problem without knowing or explaining why. To create a video solution, students must explain their answer, and give some thought to presenting it both orally and visually. The process of creating a video encourages students to review their work far more than is necessary with a traditional written solution.

The impact to a student watching his or her own video solution will outweigh many teacher admonitions to "Show your work!" Spoken and presentation skills are extremely important, but they can be difficult to emphasize in the classroom setting. Further, when students work in groups to create a video, some students' confidence will be bolstered by their ability to contribute a strong narration or an effective computer effect.

## Some Subtle Benefits

There remain in society some negative stereotypes about mathematicians, with implications about gender, ethnicity, appearance, and hobbies. Videos about mathematics can dispel some of these stereotypes by providing images of many different kinds of people doing mathematics.

Students are not always inclined to review their solutions to identify and correct errors, but they may inadvertently hone those skills by analyzing the videos of other students. And because it is interesting to watch a video solution by another student, participants are encouraged to look at different ways of approaching the same problem.

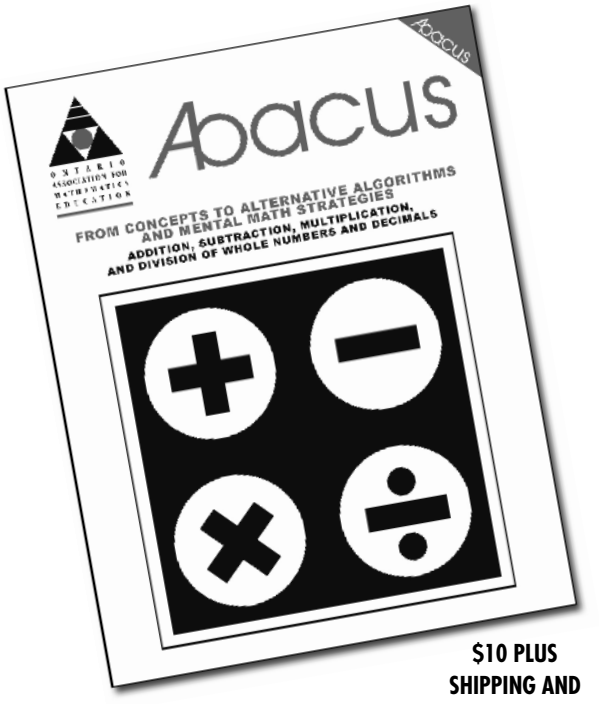
Many high school students who are very strong at mathematics aren't aware of the career opportunities awaiting math grads. "CEMC: Centre for Education in Mathematics and Computing" showcases some interesting applications of mathematics, some math graduates who have gone on to successful careers, and ways in which mathematics can influence the world.

## Conclusion

Students are already using Facebook to network socially. By presenting them with mathematics in this context, we offer a chance to interact with other students interested in math, and to enjoy mathematics in a whole new way. By encouraging students to create a video solution to a math problem, we enrich student opportunity for mathematical expression and understanding.

In 2010–2011, watch the Facebook group "CEMC: Centre for Education in Mathematics and Computing" for exciting new kinds of mathematical enrichment and challenges. ▲


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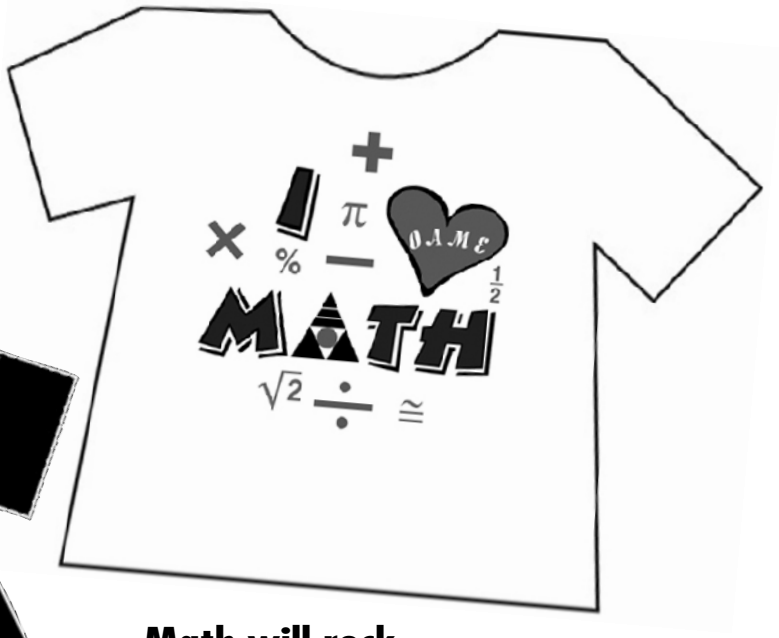
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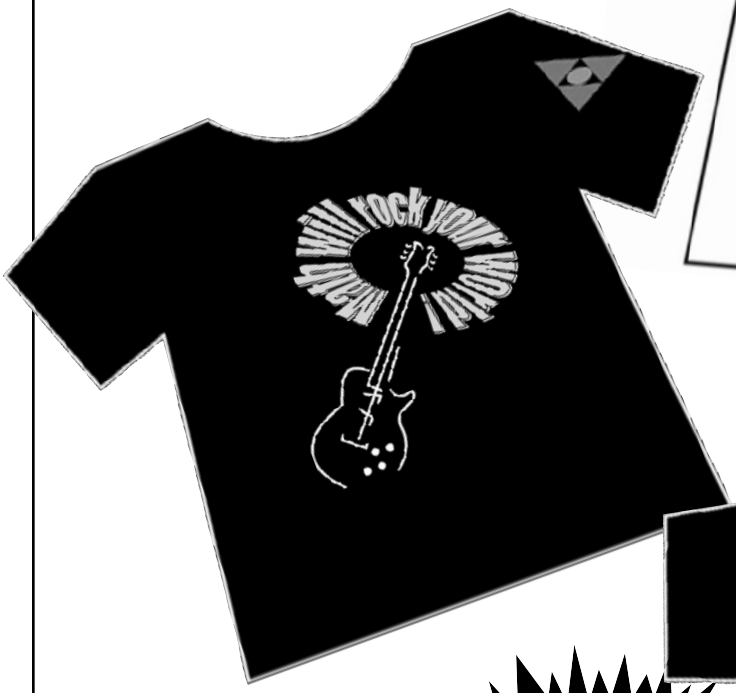
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# ▲ The Venncouver Olympics

**GREG CLARKE**



*Greg Clarke is the Secondary Programme Coordinator for the Simcoe Muskoka CDSB as well as the OAME webmaster. Currently, he is on assignment with the Ministry of Education (CLIPS and GAINS projects). Check out CLIPS at* ***oame.on.ca/CLIPS****.*

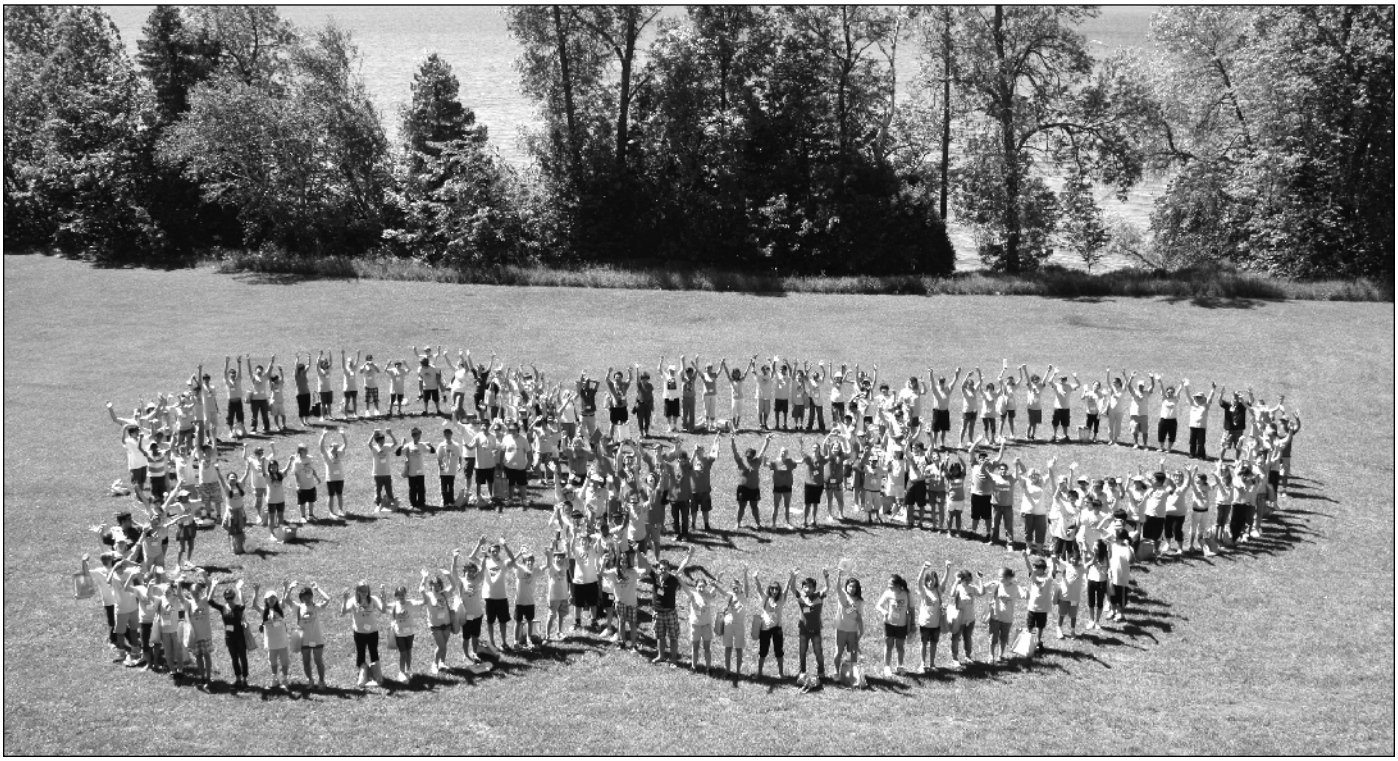
They came, they solved, they Venned. In true Olympic spirit, this year's "mathletes" solved problems faster, higher, and stronger this year—and had a great time doing it!

**The Venncouver Olympics**

The 2010 Ontario Math Olympics had 124 mathletes from 31 teams across the province compete at the Ontario Educational Leadership Centre, a camp facility just outside of Orillia, Ontario, on May 28 and 29. Teams arrived by car, by bus, by taxi and plane, from as far away as Thunder Bay to the north and Windsor to the south. To get them ready for the journey, many teachers, parents, and OAME chapter members took part in planning regional competitions, assisting teachers in preparing for the contest and, of course, coaching the Grade 7 and Grade 8 students who competed.

This year's Ontario Math Olympics (OMO) was hosted by the Mathematics Association for Cottage Country (MAC$^2$), the OAME chapter from Simcoe County and the District of Muskoka region. It was a big undertaking for our small chapter, but our dedicated group of 16 core volunteers tackled it with determination, and organized an event that ran without a hitch.

Upon arrival, each team was greeted by the welcomers at the registration table. Team members were then introduced to their cabin counsellors and brought to their cabins. Since this year's venue was a leadership camp setting, boys stayed in one cabin, and girls stayed in another cabin, with mathletes from six or seven teams sharing a cabin with one or two cabin counsellors. Mealtimes were organized family style in the camp dining hall, and the cabin groupings became the temporary family for the mathletes while at the OMO. It proved to be a great opportunity to meet new



friends and discover others who share the same interests.

While participants were arriving before supper, each team was given a scavenger hunt to complete, which included filling in the blanks on the camp map, identifying key landmarks around the site, and solving the most spread-out game of Sudoku probably ever published. (Clues to squares were spread throughout the scavenger hunt.) After dinner was over, the students were grouped according to cabin, and were asked to solve a mystery, CSI style. This gave the students the opportunity to get to know their cabin mates and cabin counsellor well, while doing some group problem-solving and having lots of fun doing so. The competition to solve the crime was intense (who took the two host mascots from the registration table), and students had to search for clues, then solve math puzzles spread out around the camp; use Geometer's Sketchpad and a hand-held GPS unit to track down a location; and be observant to reach the answer… the camp photographer did it!

The opening ceremonies took place around the campfire after the mystery was solved. Teams returned to their cabins and were escorted to the campfire by the Math Olympic torchbearer—complete with torch, toga, and laurel wreath. Team chants were part of the ceremonies and everyone got involved. After a quick snack, the mathletes returned to their cabins, and prepared for the next day of competition.

The OMO competition this year was modelled after Olympic events. The individual event was called the Hurdles, and consisted of a series of math problems, with more challenging ones spread throughout the contest at regular intervals. The pairs event was the Triple Jump— each team of four was split into two, and groups of two had a computer with which to solve a set of calculation problems (three in a row were needed for a complete triple jump, points were accumulated based on how many complete jumps were done in the time allotted, and the complexity of those calculations). The group event was called Basketball, and like its namesake, it had four quarters—each quarter a different math problem to solve, using manipulatives, a graphing calculator, or pure logic. The final event of the OMO was held after lunch, with all teams competing at once in the open air on a soccer pitch—the Team Relay. For many, this was the highlight of the games because it combined the thrill of solving math problems with the excitement of a race. Teams solved problems one at a time; then one team member had to run the answer to the proctors (a



set route so that every team travelled the same distance). A correct answer gained the team the chance to solve a new problem, an incorrect answer meant they had to run back to the team and try again. (After the third miss, they could pass and choose a new problem.) The excitement was palpable, and it was as thrilling to watch as a spectator, parent, or coach as it was for those who participated.

On the way back to the dining hall for the closing ceremonies, all mathletes, coaches, volunteers, and organizers had to stop for the requisite group photo. The closing ceremonies celebrated everyone who came to the OMO 2010—since all mathletes who participated were winners. Prizes were awarded to individual students who performed best during each of the competitions, as well as the overall gold, silver, and bronze medals awarded to the teams with the highest overall accumulated scores. A number of other awards celebrated accomplishments throughout the weekend: cleanest table at dinner, cleanest cabin (that was a tough one!), best chant, team spirit award, best detectives award, leadership prize, greatest helper award, most congenial, and most humorous.

As is OAME policy, the final accumulated overall scores are used to award the gold, silver, and bronze medals, but no other ranking is revealed. The rationale for this is simple: Any team that makes it to the provincial finals of the OMO is a winner and deserves congratulations on that accomplishment. There is no value in knowing whether your team placed fourth or thirty-first—as long as you did your best, which is all that matters. The top three teams are recognized and they were this year:





**Gold medalists** – top overall score combined after four events – Y4MA South: Jessica, Vanessa, Brian, Reyno, coach Chitra George (all from Cummer Valley Middle School)

**Silver medalists** – second place overall – CHAMPogascar: Jane, Ryan, Michelle, Jeffrey, coach Melissa Dockeray (from Homelands School)

**Bronze medalists** – third place – TEAMS 1: Camille, Neerajen, Katrina, Albert, coach Laurissa Werhun (combined team from Toronto schools)

After the ceremonies were over, the majority of the teams left for home. However, five teams stayed for a second night and enjoyed a special activity after supper. An evening of First Nations cultural exploration was provided, including the opportunity for everyone present to make a dreamcatcher. Everyone who stayed—mathletes, coaches, chaperones, and organizers— were able to take part in this, and it was a great way to wind down and relax after the day's excitement—and some beautiful dreamcatchers were made in the process. A final campfire was also held, once it got dark, and then all returned to cabins for a well-earned sleep.

An event of this magnitude could not be pulled off without a huge amount of work by some very dedicated volunteers. Many thanks go out to the core 16 who managed this feat, including co-chairs, Greg Clarke, Danielle Blair, and Bill Morrison; sub-committee chairs, Jeff Irwin, Ursula Irwin, Kyla Kadlec, Andrew Morrison, Trish Steele, Kim Tait, and Diane Vetter; local OMO coordinator, Bruce McKay; and other committee members, John Egsgard, Monique Kadlec, Cheryl McGinnis, Betty Nelsons, and Paul Szczokin. Though initially each person was either a sub-committee chair or member, in the end, everyone pitched in as needed, doing whatever was required. It was a true team effort, with great results.

For those who are interested in continuing to exploring the puzzles created for the OMO 2010, you can find both the Practice Questions created for the Regional playdowns (and answers), as well as the actual OMO 2010 contest questions (and answers), on the OMO 2010 website. Go to **oame.on.ca/OMO2010/** to find the files. These links will also be posted on the OMO page of the OAME website for future reference.

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Finally, the organizing team would like to thank the sponsors of the OMO 2010: OAME, UnionGas, the MultiCare Group, Think Fun, Texas Instruments, Flooring by Design, Spectrum Nasco, Exclusive Educational Products, Pearson, Georgian College, Downtown Orillia, Scholar's Choice, Signcoe Print & Design, the Simcoe County District School Board, Simcoe Muskoka Catholic DSB, and, of course, the host chapter, MAC$^2$. ▲

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# NOMINATIONS FOR OAME/AOEM BOARD OF DIRECTORS 2011–2012

Each year, elections are held for a President-Elect, a Vice President (3-year term), and 6 to 9 Directors (up to a 3-year term) of OAME/AOEM. OAME/AOEM members running for Director will declare their intent to work on either Grades JK–6 or Grades 7–12 issues based on their personal experience, expertise, and interests.

**Nominations for these positions are to be submitted by 4:00 p.m., January 14, 2011, to:**

**Beverly Farahani, Past President**

Include the nominee's qualifications with the Nominations Form. A nominee must be a member of OAME. By March 2011, the Nomination Committee will publish a slate of candidates on the website, including qualifications, for consideration by the membership. Voting will be on the website, and is open to all OAME/AOEM members. The election results will be released at the Annual General Meeting of the OAME/AOEM in Windsor, May 2011.

**NOMINATION FORM**

I nominate _____

for the position(s) of:

☐ President-Elect ☐ Vice-President ☐ Director

If for Director, area of personal experience/expertise, interest: ☐ Grades JK–6 or ☐ Grades 7–12

Nominee's Address: _____

_____

E-mail: _____

Telephone: H (_____) _____

Telephone: Home (_____)_____ Work (_____)_____

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Nominator's Name : _____

Nominator's Address: _____

_____

E-mail: _____

Telephone: Home (_____)_____ Work (_____)_____

# ▲ Directors' Dialogue

ANN MICHELE STENNING



*Ann Michele Stenning is a mathematics teacher at South Collegiate Institute with the Thames Valley DSB. She enjoys mentoring new teachers and learning new ways of how to address the various learning styles of her students.*

## OAME Board of Directors Meeting June 11–12, 2010, Friday, June 11, 2010

OAME's new president, David Zimmer, welcomed everyone and then outlined this year's vision for OAME. David would like to make the 2012 curriculum review process a priority and begin to discuss large issues that teachers face. Sue Hessey, OAME's executive director, reported that all directors will receive a CD of written items instead of paper copies. Laurie Moher described two new areas on NCTM's website and announced the release of the U.S. Common Core Standards at **www.corestandards.org**.

Laura Tonin told directors of the 210 presenters at OAME 2010 and thanked Greg Clarke, Cathy Lynch, and the executive directors for their assistance. COMA had the most attendees along with delegates from all over the world. The board of directors thanked GOLDEN for a wonderful conference. Nicholas Chevalier reported that SWOAME is hosting OAME 2011 on May 12–14, 2011 at the University of Windsor. The planning committee is in full swing and job-shadowed at OAME 2010. Greg Clarke reported that the Ontario Math Olympics at the Ontario Educational Leadership Camp in Orillia was very successful. Thirty-one teams and 124 students, along with their coaches, enjoyed a scavenger hunt and mystery activity, as well as individual, team, technology, and relay races. The overall winners came from Y4MA, CHAMP, and TEAMS.

David Zimmer announced that from March 3–5, Leadership 2011 will focus on big ideas. Keynote speakers include Skip Fennell and Richard Epp.

Myrna Ingalls from the Ministry of Education shared the Ministry's vision of working relationships that would be grounded in flexibility and partnership. The bottom up would focus on collective capacity building, and leadership initiatives would come from the top down. Educators are asked to continue to focus on differentiated instruction, while fostering students' willingness to share and listen. She reported that there would be a continued focus on developing a climate of fearless listening and speaking; questioning to expose and evoke thinking; and responding to provide appropriate scaffolding, with increased precision and personalization.

David Zimmer honoured Stewart Craven. Stewart is the retiring *Gazette* editor and was also an Ontario Science Centre teacher and program coordinator for the Toronto DSB. The board gave Stewart a standing ovation to thank him for his contribution, and Stewart commented on math education over the years. Bill Otto honoured Dave and Sue Hessey, retiring Executive Directors. Bill spoke of the Hesseys' hospitable nature toward all board members, their strong work ethic, and dedicated leadership. The board gave the Hesseys a standing ovation; then Dave and Sue recalled highlights from their years as Executive Directors. This was followed up by a motion that "the OAME Board of Directors extend to Dave and Sue Hessey their sincere gratitude for a job well done and their best wishes for a well-deserved, happy, and full retirement." This motion was carried unanimously.

## Minutes from Standing Committees Saturday, June 12, 2010

### Communications Committee

Robert Sherk reported that pre-service teachers will receive access to the *members only* section of OAME's website. They will also receive promotional items from OAME as a way of promoting the organization. OAME's website may also include an *Ask a Teacher* column in the future. Progress on the 40th-anniversary *Gazette* for 2012 has been made, with a Facebook page devoted to the celebrations. Search for "OAME" on Facebook and join!

The *Gazette's* new editor, Marian Small, has invited former columnists, colleagues, and others to submit articles to the *Gazette*. Look for a Grades 7–8 column and other new features in upcoming issues. In the *Abacus*, you can look for key notions of measurement.

Board members were given an update on OAME's finances by Dave Hessey, and Beverly Farahani reported on Leadership 2010. This conference made a profit and organizers received positive feedback on the event. Greg Clarke reported improvements to OAME's website.

**Outreach Committee**

Cathy Hall indicated that this committee is seeking to raise the visibility and importance of our awards. The committee is considering the possibility of sponsorship or prizes to go along with the awards.

The committee is seeking ways to support chapters through information sharing.

There will be further investigation into insurance and liability related to OMO events.

Several issues related to conference planning were also raised.

**Strategic Planning and Renewal Committee**

Bill Otto reported for this committee. There was a significant discussion of the notion of social equity as becoming a more visible part of OAME's presence and work. A variety of approaches to bring attention to this direction were suggested.

Several constitutional issues need attention. One issue is the replacement of board members who have resigned or who request leaves of absence. Another issue is whether the new committee structure is perceived as a positive move.

**Curriculum Committee**

Jan Crofoot and Dwight Stead reported for this committee. One of the issues raised was providing feedback to OCT on P/J AQ course structure.

There was an indication that the focus of the committee this year would be attention to increased K–6 math resources from LNS and on the OAME website. In particular, information related to the new full-day Kindergarten program, IWB lessons, suggested picture books, and a list of helpful documents were proposed as useful to be developed and/or included.

There was a suggestion that future board meetings have professional development sessions focused on Big Ideas and on the Curriculum Review surveys.

**Other Actions**

Tim Sibbald (two-year term) and Len Rak (one-year term) were appointed as Directors to replace Directors who had left the board after the most recent elections.

## Chapter Reports Submitted by Chapter Representatives

**CHAMP** – Rep: Shaun Knowles:

Once again, this year was very busy for CHAMP, from the Fall mini-conference, to the Grades 7 and 8 contests, OMO trials for Orillia, and CHAMP year-end presentation ceremony. At the conclusion of our year, we held our annual CHAMP and OMO presentations at the Peel DSB Office. There were well over 100 participants who enjoyed some light refreshments and then the presentations of the trophies and medals. It was a fun year for our executive and for all those who were touched in some way by CHAMP. We look forward to next year for some more great things to happen within the CHAMP region.

**COMA** – Rep: Beata Myhill:

The Ottawa chapter has continued to grow and is actively promoting math in our community. Our "Pay it forward" initiative sponsored 20 members for the 2010 OAME conference through the use of monies earned by our 2009 conference. Registration, accommodation, and supply teacher costs were covered for members chosen by lottery over the course of the year. Additionally, to make it for feasible for members to attend the provincial conference, COMA provided transportation on the "COMA COACH" at minimal cost. Approximately 45 teachers came on the coach, and many others travelled to the conference on their own. In April, we again hosted our local Math Olympics in preparation for the provincial OMO competition. At the end of May, we rounded out the year with a Secondary Forum attended by about 30 teachers, presented by Ron Watkins on "Talking Less; Listening More."

**GOLDEN** – Rep: Laura Tonin:

The Golden committee would like to thank everyone who participated in OAME 2010. Hopefully, if you came to the conference, you had an informative and enjoyable time meeting new people and seeing new math ideas and technologies. The organizing committee was very pleased with how well everything went and enjoyed seeing so many educators from across the province (and beyond) come together in Niagara. Altogether, there were 1046 conference attendees and 210 presenters. People came from Ontario, British Columbia, Prince Edward Island, the United States, the Bahamas, and South Korea to attend the 278 sessions (many of which were full). There were 38 exhibitors for people to check out in the Exhibitor's Area. The hospitality events were well attended. People were able to explore Clifton Hill

and the Casino, or experience some of Niagara's wine on the Winery trip. Approximately 170 people attended the banquet, which was held at Elements restaurant overlooking beautiful Niagara Falls, where delegates could enjoy the view along with a fabulous meal! MCIS is open to receive feedback on the conference. If you have not done so already, please give us your comments. The 15 of us on the GOLDEN Committee would like to give special thanks to Sue and Dave Hessey for their guidance and support, and the 2008 and 2009 conference teams for their advice and support. Thanks to Greg Clare and Cathy Lynch for their support with MCIS. We also appreciate COMA for "paying it forward" and sending so many of its teachers to the conference. Thank you as well to all of the presenters for their time and energy.

**GVMA** – Rep: Barry Ferguson:

NO REPORT

**ISOMA** – Rep: Jennifer Gravel:

Next year's ISOMA Math Olympics will be hosted by Greenwood College. The ISOMA executive is now beginning to plan next year's chapter conference, to be held at Royal St. George's College in early November. More details on the conference (date, theme, contact information) will be available in the Fall.

**MAC²** – Rep: Paul Szczokin:

MAC² has been very busy over the last few months, organizing and finalizing plans for the Ontario Mathematics Olympics, which took place on May 28–29. The dedication and hard work of the Co-Chairs Greg Clarke, Danielle Blair, and Bill Morrison, and all other OMO committee members, were evident during the weekend event. Thanks to our main sponsor, Union Gas, and all the sponsors who helped make OMO a successful event. The MAC² Annual General Meeting will be held in September, at which time, elections for committee members will take place. MAC² will soon be saying goodbye to our hard-working and dedicated president, Kyla Kadlec, and welcoming our new president, Cheryl McGinnis. We are currently working on our Fall mini-conference, which is tentatively scheduled for sometime in October. Also, we are creating a funding application form so that our OAME / MAC² members would be eligible to apply for support in hosting a mathematics event within our communities for students and parents.

**NOMA** – Rep: Cheryl Geoghegan:

The first half of 2010 has been an energetic several months in the NOMA region. In response to online surveys submitted by chapter members, four Spring workshops were organized for the region. North Bay was home to one; the other three were slated for Sudbury. The locations and the topics were selected by the organizing committee in direct response to chapter members' input on how they would like to see a mini-conference take shape. Some new OAME members were recruited during registration, and participants gave very positive feedback on all workshops. The work of North Bay members must be recognized, as they have responded so positively to efforts at uniting far reaches of this very large chapter area. We enjoyed hosting the region's Grades 7 and 8 students at OMO, once again held at Lasalle Secondary School in Sudbury. We always appreciate the numerous volunteer hours given in the interest of promoting mathematics appreciation in our young people. This year, the Venncouver Olympics theme went over well, and the materials provided by MAC² were a terrific help in planning and executing the event. Our young teams were enthusiastic through the entire day. Our final meeting of the school year will be a celebration of great teamwork, before we head into summer.

**NWOAME** – Rep: Tom Boland:

NWOAME has once again had a very busy second half of the year. On March 12, we hosted our Annual Pi-Day, with Pi-themed events happening at three elementary school sites, up from one site last year. The event attracted Grades 5 and 6 students from a number of schools across the city to the host sites, where Grades 7 and 8 students led junior students through a host of activity stations. At the stations, students engaged in games and activities all related to Pi. Pi-Day was well attended and promises to remain a very successful event for NWOAME. On April 22, we hosted a Spring Math Night for all members and their guests. The evening was sponsored by The Faculty of Education at Lakehead University. There were two feature speakers, hot hors d'oeuvres, and a cash bar. Ralph Mason, from the University of Manitoba, spoke about success for all at the secondary level, while Nicole Walter-Rowan, a teacher with Lakehead Public Schools, did a presentation focusing on the use of games in elementary math classes. On April 17, we held our Regional Math Olympics, which saw over 110 Grades 7 and 8 students compete for a chance to represent the region at the provincial competition. The event was a great success, and at the time of writing this report, the winning teams are actually competing in the Provincial Championship.

The NWOMAE executive also had a successful meeting with directors from both local school boards. The main purpose of the meeting was simply to engage in dialogue with respect to our ongoing quest to remaining an important voice in math-related education and professional development in Northwestern Ontario. Lastly, NWOAME held its Annual General Membership meeting on May 19, 2010. A new executive was elected and plans were set into motion for an exciting year to come. Maria Casaola, who received the OAME Elementary teacher award in May, is now chair of NWOAME.

**PRMA** – Rep: Alison Macaulay:

The PRMA Chapter has recently engaged in a book study of *Accessible Mathematics: How Did You Know?* by Steven Leinwand. Members have discussed ideas presented in the book and have reflected on their experience of using them in the classroom.

**QSLMA** – Rep: Lisa Dougherty:

The QSLMA Chapter has been involved with supporting our local OMO event this past April. Thanks to Geoff Roulet and the Math curriculum students at Queen's University for helping ensure the participation of 23 teams. The winning team will be representing QSLMA at the provincial OMO in May with financial support from QSLMA. Our executive met in May and selected the new chapter representative, Lisa Dougherty, an experienced elementary school teacher. Work is continuing as we plan our Fall mini-conference, set for Saturday, November 6 at Queen's, as well as for the May 2012 provincial conference, to be held at St. Lawrence College in Kingston.

**SAME** – Rep: Debbie Drape:

NO REPORT

**SWOAME** – Rep: Nicholas Chevalier:

SWOAME has had a very busy past couple of months. The OAME 2011 planning committee brought a delegation of leaders to Brock University for OAME 2010 to learn more about hosting and planning the conference. Chairs of each committee shadowed members of GOLDEN, while the promotional committee put on a fantastic display booth including great promotional giveaways. As a committee, we felt like we left a lasting impression that will hopefully continue and result in a great OAME 2011. We have continued to look locally (Windsor-Essex-Chatham-Sarnia) for support and began to promote our conference in other areas, such as Michigan. We are currently encouraging local school boards for greater professional development opportunities.

**TEAMS** – Rep: Santina Fantetti:

In April, TEAMS hosted a very successful and funtastic Math Olympics. It was a great turnout and the students really enjoyed the day! About 140 students from Grades 7 and 8 took part in the event. It was wonderful to see students eagerly engaging in individual and collaborative mathematics problem-solving activities. Currently TEAMS is working on OMO 2011. The executive is planning visits to Victoria College of the University of Toronto to see how the site can be best used. Planning is now in full swing for OMO 2011 as we search for volunteers. If interested, contact one of our directors. In addition, TEAMS is soliciting presenters for its Fall mini-conference. This year, the mini-conference will be held at Dante Alighieri/Bathurst Heights on October 28, 2010. Go to the OAME website in the Fall to register.

**WOMA** – Rep: Ann Michele Stenning:

WOMA did not host professional development this Spring. However, some time was spent informing local educators about OAME and obtaining names of potential presenters. WOMA should be ready to run a mini-conference in the Fall.

**Y4MA** – Rep: Ada Cartaginese:

Y4MA recently held the Intermediate Mathematics Olympics Competition in Thornhill. It was well attended, with schools coming from all over the region. Our Math Teams attended the Ontario Mathematics Olympics Competition and represented Y4MA with great success, with one team receiving a gold medal. Congratulations to Y4MA South, also known as Cummer Valley Middle School! We would like to thank the organizers, volunteers, and the participants for making the IMO a great event. Y4MA is currently in the process of planning the Fall conference. Please stay tuned for further information. ▲

## ▲ Call for Manuscripts

The *Ontario Mathematics Gazette* is inviting manuscripts for all grade levels.

Instructions for submission of manuscripts are found on page 1 of any *OMG*.

**Contact the Editor**
for further details.

