Submission of Articles

The *Ontario Mathematics Gazette (OMG)* is looking for articles, news and "good ideas" useful to mathematics teachers or mathematics teacher education. We are seeking submissions from mathematics teachers K-12 and tertiary, that describe teaching mathematics content in an innovative way.

The criteria for manuscript submission to the *OMG* includes the following:

- The ideas/activities are of interest to the readership
- The article/ideas are not widely known or practised and are innovative.
- The mathematics content is appropriate for the readership.
- The mathematics content is accurate.
- The article is well written and grammatically correct.
- The article/ideas are free of sexual, ethnic, racial and other bias.
- The article has not been published previously, nor is out for review by other publications.

Articles must be original. Your article must be word processed, preferably using *MS WORD*, double spaced on one side with wide margins, not exceed 10 pages of text and prepared according to the *Publication Manual of the American Psychological Association Fifth Edition*. Diagrams and figures should be drawn by computer if possible or neatly drawn in black ink in camera-ready form. Embedded images should also be submitted separately in jpeg or tif format. Proof of the photographers' permission is required. For photos of students, parent or guardian permission is required.

You must submit **4 hard copies** of your article to the Editor **Marilyn Hurrell** whose address appears on page 2. Your name may not appear anywhere in your article, including web sites. Your name and full mailing address and e-mail address must be included on a separate sheet. Your article will be sent out for blind review. If it is accepted as is, or with major/minor revisions or rejected, you will be notified. Once an article is accepted for publication, computer files of text, original graphics and photos will be required. E-mail submissions are welcome but must be followed by hard copies.

The Editor reserves the right to edit manuscripts before they are published. Once an article is published it becomes the property of OAME.

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▲ About the *Ontario Mathematics Gazette*

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Advertisements for the *Ontario Mathematics Gazette* should be sent to **Dean A. Murray** 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.

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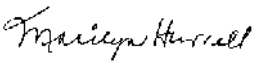
▲ Editor's Message

MARILYN HURRELL, EDITOR



This issue of the Gazette is very full, so I will be brief. There are two time sensitive articles included which you can use in the New Year. The first is an article by Lynda Colgon entitled "Black History Cairn: Owen Sound, Ontario" which deals with the Underground Railway which ended in Owen Sound and was used to help black slaves escape to Canada. February 2005 is Black History Month. The second is "The First Use of Pi" which you can use in discussions around Pi Day, March 14.

Have a very Happy Holiday Season! ▲



▲ Letter to the Editor

Dear Editor:

The **2005 Canadian Mathematics Education Forum** will be held May 6–8, 2005 at the University of Toronto.

The purpose of this invitational forum is to develop a national on-going conversation, among educators at all levels of schooling, about important issues and concerns in the development and future of mathematics education in Canada. It is the intent that groups working together in this forum will develop projects, initiatives, and statements that will outline ways in which Canadians may address these issues and concerns.

It is our hope that there will be about 200 participants, roughly equal numbers from K-12 teaching, from mathematics education research and from mathematics itself. It is important to stress that the Forum is a working meeting and that because of its nature, participation is by invitation only. Please review the OAME web site for more information and how you might participate.

Sincerely, Florence Glanfield
Co-Chair, 2005 Canadian Mathematics Education Forum▲

▲ President's Message

GORD COOKE



Gord Cooke is an Acting Vice Principal and Special Education Resource Teacher at Thousand Islands Secondary School in Brockville Ontario. He also served a stint as English Language Coordinator for the Grade 9 Assessment of Mathematics at EQAO.

Keep your eyes open for the PRISM project from the Ministry of Education. As with all such projects, the first goal is to get a cool acronym to represent what you are doing: Programming Remediation and Intervention for Students in Mathematics. This is a good one because it actually says what the project is about and suggests a logo.

Remediation is on everyone's radar these days. A recent article spoke to the rise in the number of students paying for private after school tutoring: Rise of a New Class System (*Toronto Star* Oct 3, 2004)

"The fear of failing standardized tests in school is pushing more families to pay for private tutoring All this extra help is taking a social toll, dividing families along financial lines", writes Theresa Boyle.

Quoted figures in the article see private tutoring tripling in the past six years. Much of the blame is laid at the feet of the previous government for introducing a new and compressed curriculum without adequate teacher training.

In my special education studies, I came across an article which speaks to the nature of remediation in the context of learning disabled students. This article describes the concept of number sense as being as important to mathematics learning as phonemic awareness has been to the reading research field.

"Understanding the concept of number sense and relevant research from cognitive science can help the research community pull together fragmented pieces of earlier knowledge to yield a much richer, more subtle, and more effective means of improving instructional practice. This article demonstrates how the number sense concept can offer a useful framework for conceptualizing interventions that will significantly enhance mathematics instruction for students with mathematical disabilities". http://www.ldonline.org/ld_indepth/math_skills/gersten_dyscalculia.html

My fear here is that tutors and others working on remediation will see this as a call for more practice on "basic" skills. Have a look at a remediation workbook from some of the commercial programs and you will see pages of similar questions designed to "automatize operations", (I'm not sure if I made that word up or read it somewhere.) Once such skills are automatized then cognitive resources are freed up to handle higher order problems.

Instead I would see effective remediation as focusing on basic understanding and concepts. Before practising multiplication, ensure that students have a deeper understanding of what multiplication is, how it differs from addition, how different models of multiplication allow us to understand its properties. What are fractions? How are they different from whole numbers? Where are they on the number line? What happens to the value of a fraction when one of the numerator or denominator changes?

This is the kind of number sense that I see being called for in the ldonline article. That's the kind of remediation I can live with.

A final related idea: has anyone experimented with "spiral homework?" This came up in a conversation I had with Stewart Craven and we both thought it had some merit. It might work like this: today's homework will consist of questions 1, 2 and 3 from page 10 which solidify the basic understanding of today's learning. Also questions 4 and 5 from page 8 which ask you to apply yesterday's learning. Finally, question 6 from page 6 that asks for some deeper thinking and inquiry based on the learning from two days ago. I think it might help reduce the need for remediation. Try it and let me know. ▲

▲ Upcoming Events

For further information on OAME Chapter Conferences contact the Chapter Representative and for NCTM conferences, contact John Kersely, OAME/NCTM Rep.

See the last page in this *Gazette* for contact information.

OAME Chapter Conferences and Events

February 17-18 2005	Thunder Bay	NWOAME Math Fest
April 21 2005	Barrie	MAC^2 Spring Conf.
June 10-11 2005	Sudbury	NOMA: OMO 2005

OAME Annual Conference

May 12 - 14 2005	NEXUS: Building Mathematical Connections: York University	hosted by TEAMS

NCTM Conferences

April 6 - 9 2005	Anaheim, California	83rd Annual Conference

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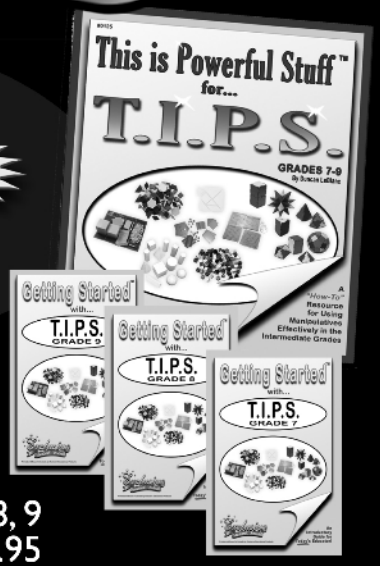
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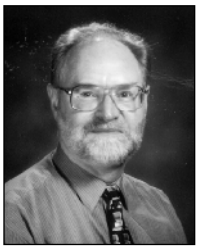


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▲ Technology Corner: Optimization Problems in Grade 9

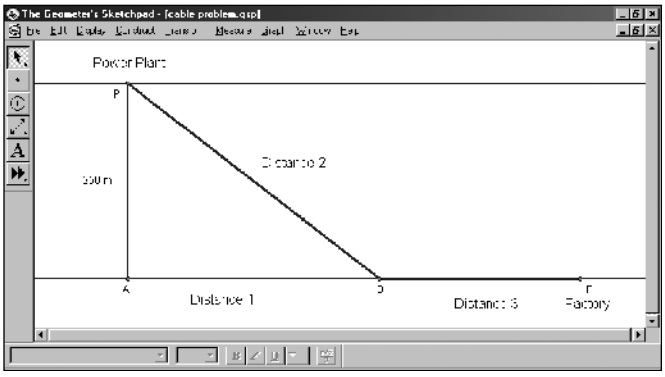
Fred Ferneyhough



Fred Ferneyhough is a mathematics department head at Harold M. Brathwaite SS in Peel and an author and tech consultant for several books. He is an avid user of and advocate for the use of technology in the mathematics classroom.

Optimization Problems in Grade 9

The following is a standard type of optimization problem in an introductory calculus course. A power plant is located on the north bank of a river at point P. A factory is located 700 m downstream on the south bank. The costs of laying cable are given as $15 per metre under water and $9 per metre on land. Find the location of point B on the south bank that will minimize the cost of laying a cable from the power plant to the factory. In the diagram below, *The Geometer's Sketchpad* has been used to model a solution. Although it is a bit tricky, the diagram could be constructed so that the distances reflect the actual numbers in the problem and students could move point B to find the optimal solution.



In a previous column (*OMG* March 2003), I dealt with several solutions to this question using different approaches in a traditional introductory calculus course, including a numeric solution using the tables of values in the calculators. Now, let's take a look at a different type of solution that would be appropriate for a grade nine class – a numeric solution using either a spreadsheet, or my favourite, the lists in the TI83/84. I have found that students find the formulas in working with the lists a bit easier than the relative addressing in spreadsheets. I will be demonstrating the solution using the TI84, but any spreadsheet will work nicely. This type of solution was developed by Ross Johannsen, Carol Shiffman, Susan Holt and me while we were teaching at Central Peel SS in Brampton.

In a numeric solution we define six columns. An explanation of each column follows.

L1	L2	L3
0	------	------
100		
200		
300		
400		
500		
600		

L1 ="seq(X,X,0,70

List 1 represents the distance from point A to point B in the diagram (or the distance downstream). This is the independent variable in the problem. This has been set up to vary from 0 m to 700 m in steps of 100 m. The mark in the column header indicates that a formula has been used to calculate values in the list and has been retained. On the entry line, you can see the quotes around the formula. The full formula reads "seq(x,x,0,700,100)". Read this as "the set of values for x, such that x goes from 0 to 700 in steps of 100".

L1	L2	L3
0	250	------
100	269.26	
200	320.16	
300	390.51	
400	471.7	
500	559.02	
600	650	

L2 ="√(250²+L1²)"

List 2 holds the corresponding distances across the water on the diagonal from point P to point B. This represents the length of the cable under water. The formula is shown on the entry line

L1	L2	L3
0	250	700
100	269.26	600
200	320.16	500
300	390.51	400
400	471.7	300
500	559.02	200
600	650	100

L3 ="700-L1"

List 3 is the distance along the perfectly straight south bank from point B to point F. The formula is "700 – L1".

L2	L3	L4
250	700	3750
269.26	600	4038.9
320.16	500	4802.3
390.51	400	5857.7
471.7	300	7075.5
559.02	200	8385.3
650	100	9750

L4 ="15*L2"

List 4 represents the cost of laying the cable under water. This is calculated by multiplying the distances in List 2 by $15.

L3	L4	L5
700	3750	6300
600	4038.9	5400
500	4802.3	4500
400	5857.7	3600
300	7075.5	2700
200	8385.3	1800
100	9750	900

L5 ="9*L3"

In the same way, List 5 represents the cost of laying the cable along the bank from point B to F. This is calculated by multiplying the distance in List 3 by $9.

L4	L5	L6
3750	6300	10050
4038.9	5400	9438.9
4802.3	4500	9302.3
5857.7	3600	9457.7
7075.5	2700	9775.5
8385.3	1800	10185
9750	900	10650

L6 ="L4+L5"

Finally, the total cost is calculated in List 6. The formula is shown as "L4 + L5". I accidentally found out that the columns List 2, 3, 4 and 5 can be hidden without losing their values.

L1	L6	----- 2
0	10050	
100	9438.9	
200	[redacted]	
300	9457.7	
400	9775.5	
500	10185	
600	10650	

L6(3) =9302.34317...

If you place the cursor on the header for each column and press the DEL key the list seems to disappear. This allows us to look at the independent variable, the distance determined by the point B and the dependent variable, the total cost. In this screen, I have highlighted the cell where the cost is a minimum. This occurs when point B is placed 200 m downstream. However, there might be a point within 100 m on either side where an even smaller value occurs.

L1	L6	----- 2
140	9338	
150	9323.2	
160	9312.2	
170	9304.9	
180	9300.9	
190	[redacted]	
200	9302.3	

L6(10) =9300.09554...

To investigate this, move the cursor to the top of List 1 and press ENTER . Change the formula in List 1 to "seq(x,x,100,300,10)" and press ENTER . Not only did this update List 1 but all of the other lists even though we can't see them. The current "minimum" has been highlighted.

L1	L6	----- 2
183	9300.3	
184	9300.2	
185	9300.1	
186	9300	
187	9300	
188	[redacted]	
189	9300	

L6(9) =9300.00383...

This entry suggests that we should change the formula in List 1 to "seq(x,x,180,200,1)" and press ENTER again. For all intents and purposes, any of the values 186 through 189 will give the same cost of laying pipe.

Averaging these four values, we could conclude that the optimum placement would be to lay a cable across the water to a point around 187.5 m downstream and then along the river bank to the factory.

However, there is a bit more that we could do in this. Let's look at the formula in each list again and track them back to the beginning.

L6 = L4 + L5 Now, trace the formula for L4 and L5 and substitute

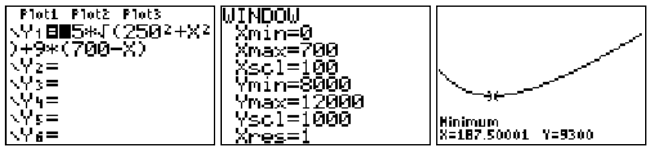
L6 = 15*L2 + 9*(700 – L1)

L6 = 15* $\sqrt{250^2 + L1^2}$ + 9*(700 – L1)

Thus L6 is completely dependent upon L1 as we stated before. Now, if we let y represent L6 and x represent L1, we have:

$y = 15\sqrt{250^2 + x^2} + 9(700 - x)$

We could then place this equation into Y1, set up an appropriate window, graph the equation in this window and find the minimum value of the function.



This approach provides a method that leads to an algebraic representation that students can develop from their work with the numeric solution. ▲

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▲ Hey, It's Elementary ~ The Context Conundrum



LYNDA COLGAN

If we are to achieve a richer culture, rich in contrasting values, we must recognize the whole gamut of human potentialities, and so weave a less arbitrary social fabric, one in which each diverse human gift will find a fitting place. Margaret Mead

The Aboriginal Teacher Education Program at Queen's

Between March and June, 2004, I had the privilege and pleasure of instructing the elementary mathematics curriculum course that is part of the Queen's Aboriginal Teacher Education Program (ATEP). In an effort to increase the representation of First Nations people in teaching and allied roles, since1991, Queen's Faculty of Education has offered both a Degree and Diploma Program in Aboriginal Teacher Education, aimed at preparing Aboriginal candidates to teach in First Nations and provincial elementary and secondary schools.

When possible, courses are not only delivered in education centres on provincial reservations by Aboriginal instructors, they are adapted to local context, local needs and include First Nations perspectives. ATEP balances First Nations specific and student-centered learning with knowledge of the teaching/learning process and research on First Nations education. Program components include courses specific to First Nations education, courses that address general educational issues and theories as well as other courses which have been adapted for community-based delivery in response to First Nations community needs and practice-teaching placements always occur in First Nation schools.

To accommodate the individual needs and situations of candidates, there are two options for completing this unique teacher preparation program. The first is an on-campus option conducted in Kingston that is a full time, one year program. This full-time program includes education courses and practice teaching that is usually completed in the student's home community (usually Tyendinaga near Belleville or other relatively near-by First Nations communities).

The second option is a two-year, part-time community-based studies option that is presently being delivered on a part-time basis in the Manitoulin North Shore at M'Chigeeng, the Western James Bay at Moose Factory, and at Fort Frances.

At Kenjgewin and Omushkego

On Manitoulin and Moose Factory Islands I worked with a number of highly committed teacher candidates, all of whom were determined to obtain their teacher certification in order to become role models and leaders in the communities in which they were born, raised and, in many cases, now raise their own children. As with other courses, mathematics curriculum was delivered through short, intensive course sessions scheduled so that those who have work or family responsibilities are able to attend without being away from home for extended periods.

On my first trip to M'Chigeeng, I left Kingston at 5:45 a.m., flying to Toronto and then Sudbury. The short flights were followed by a 3 h drive along winding northern highways through Espanola and Little Current. Class started at 2:00 p.m. and was scheduled until 9:00 p.m. (with one hour for dinner at Mom's in nearby Mindemoya). I thought I would win the "who has travelled the furthest" contest, hands down. How wrong I was. Kay had driven from Thunder Bay. Laura had made the trek from Orillia. Lorie journeyed from London. Amy and Tracey originated at Tyendinaga. Only Levy and Cynthia lived on Manitoulin, and even then, they lived a one-hour car trip across the island at the Wikwemikong Unceded Reserve.

There is no road to Moosonee. To get there, one has two options: the Polar Bear Express, a 6 h train ride from Cochrane or a one-hour flight on Air Creebec from Timmins. The Education Centre is on Moose Factory, an island in the middle of the mighty Moose River, accessible only by boat or helicopter from Moosonee. Once again, I learned that my journey was easy. Many of my students had come from small Cree communities further north on James Bay, accessible only by air. They came to class just days after returning home, having been evacuated from their communities weeks before when the ice from Hudson Bay choked the mouth of the river and flooded villages all along the Moose's trail.

In spite of the physical, fiscal and personal challenges of getting to class, in both sites, my students arrived bright-eyed and eager to learn. We were in class much of Friday, on Saturday until 9 p.m. and most of Sunday, when our respective trips home began, usually complicated by Mother Nature and exhaustion.

Out of respect for the learners, whenever possible (and with the help and advice of Ed Doolittle[1]), I tried to incorporate what I knew of aboriginal traditions into my math lessons. I used beading and art, tipi construction and drum making whenever possible to illustrate and illuminate concepts and processes. Through their assignments, my students did the same, using local legends and artifacts, from corn and tamarack geese to the Gathering Spirit and Medicine Wheel to make connections between the Ontario curriculum and the reality of their children.

We learned enormously from each other, but nonetheless, I was forced to realize just how far apart our respective worlds were on two occasions, neither of which had to do with geographical distance.

The Great Pterodactyl Scare and The James Bay Goose Hunt

On the first occasion, after lunch one day, I arrived at class out of breath, screaming that I had practically been eaten by a pterodactyl just outside the Education Centre on Moose Factory. My students listened to my tale. "The pterodactyl was about five feet tall. It stood its ground as we met on that muddy road on the way to the community centre. It never stopped blinking its huge eyes at me. Even worse when it turned its bald head away, I saw these huge bright red flashes on its cheeks. I was terrified, and then all of a sudden, another one appeared, lurching out from the marsh. I stopped breathing because I could tell that they were sizing me up. I was sure I was a goner, but then for no good reason, they walked slowly into the field on the opposite side of the road. When they took flight, they gave this prehistoric cackle, their long necks outstretched, and their seven foot wingspans seeming to fill the sky. I ran all the way back here under their shadow. Let me tell you, I would rather have met the polar bears you warned me about."

My students smiled and then Andrew gently and respectfully assured me that there were no pterodactyls on James Bay. What I had seen, he explained, had been a pair of Sandhill Cranes – and he kindly said he understood how I could have come to such a conclusion since he had read that fossil evidence proved that the Sandhill Crane is the oldest still-living species of bird and has many similarities to a pterodactyl.

It was not so easy for me to explain my world when the tables were turned. At one point during my springtime course, the schools on James Bay were preparing to close for the annual goose hunt. By chance, I had been on Moose Factory when the geese began to arrive — much later than usual this year because of the unusual spring weather. As gaggles of geese began to appear overhead, the children ran happily, "calling" the geese realistically, tracking their path on the ground below. As the children's calls and the geese's trumpeting filled the air, adults too ran from their houses, looking skyward, grateful for the return of the geese, and hopeful for a major harvest of the big birds for food. It was a time of celebration. It also turned out to be a time that reinforced the clash of the contexts of different worlds.

"Did non-Aboriginals not realize", my students asked, "about the ways in which Aboriginal people used the natural environment to survive? Did non-Aboriginals not realize that Aboriginal peoples were required to adapt to the resources in the eco-area in which they resided and develop techniques to harvest food from a variety of sources and animals?"

It was difficult to answer, "yes, of course," when the reality and necessity of the goose hunt contrasted so starkly with the theme of the EQAO test that their children were being asked to write at the same time –namely, Saving the Geese.

These would-be teachers explained that the children in their communities were confused by the theme of the readings and nature of the tasks. My teacher candidates explained how difficult it was to teach their children to take pride in their First Nations traditions when something as important as a provincial assessment made their children feel that it was wrong to kill the geese upon which they depended for sustenance.

Equally important was the public face of the measurement of their children's academic success. The children's genuine distress at this clash of values and behaviours would naturally be reflected in their performance on the test and yet when the league table of results was published in the newspapers, there would be no contextual information to accompany the bald facts of

[1] *Dr. Edward Doolittle is a Mohawk Indian from Six Nations Reservation in southern Ontario. He earned his PhD in pure mathematics (partial differential equations) from the University of Toronto in 1997. Since then he has taught Mathematics, Business, Leadership, and Native Studies at the University of Toronto, Queen's University in Kingston Ontario, York University in Toronto, and the Six Nations Polytechnic. He has also studied in the Onkwawenna Kentsyokwa Mohawk Language Immersion Project in Six Nations. Currently he is Assistant Professor of Mathematics in the Department of Science, First Nations University of Canada. Dr. Doolittle was awarded a Governor General's Gold Medal for his M.Sc. in mathematics, and has been named one of the Great Minds of the University of Toronto and one of 50 top young alumni of the University of Toronto.*

achievement data. It would be reported that their children are, "below standard," with no attention to the inappropriateness of the context of the tasks the children on James Bay faced.

One Context Does Not Fit All

These two examples taken from my experiences in Northern Ontario underscored for me the challenge of creating a one-size-fits-all context in which one can embed authentic mathematics tasks. A problem that began "One Sandhill Crane left Moosonee at 12 km/h and another left Moose Factory at 8 km/h …" would have as little meaning to an inner city student in Toronto as the "Saving the Geese" task had for the children of James Bay.

Cognitive psychologists have proved what every teacher knows to be true: context is an integral facet of learning. Children "get it" when examples that can situate genuine mathematical concepts and understanding emerge from their own local, real world of daily experience.

As educators, we acknowledge that knowledge is not independent–it is the product of an activity in the context of the culture in which it is shaped and developed.

As educators, we believe that all children share the same characteristics in terms of their desire, potential curiosity and interest in engaging in social interactions and in negotiating with the unique 'thinker toys' their immediate environment offers to them.

Therefore, as mathematics educators we should want to help all students to call upon mathematics to solve problems of their everyday lives, to help them participate intelligently in civic affairs in their local communities, and to prepare them for jobs, vocations, or professions anywhere in the world.

Our commitment as mathematics educators, then must be to make it a priority to design compelling alternatives to traditional mathematical learning and assessment tasks–authentic experiences that enable learning and assessment to occur equitably across student groups, be they urban, rural, poor, immigrant or aboriginal. From textbooks to standardized instruments, all students must know that they are equally valued and all students must have the same opportunities for participation and success.

The challenge is daunting, but as Sitting Bull, the Dakota Sioux Chief who lived from 1834 to 1890 said, "Let us put our minds together and see what kind of life we can make for our children." ▲

▲ Census at School and other StatCan Resources for Grades 4 to 9 Mathematics

JOEL YAN, STATISTICS CANADA



Joel Yan has been part of the Learning Resources Team at Statistics Canada in Ottawa for more than 10 years. As a mathematician he is passionate about developing StatCan resources for math and helping teachers use these resources with their classes.

Census at School - Get Your Class Involved!

Last year, close to 8 000 Canadian students from Grades 4 to 12 participated in the Census at School international online survey at **www.censusatschool.ca**. Their teachers accessed their own class data to use in teaching about graphs, percent and statistics. Since October, 2004 Canadian data are also available for making comparisons. Canadian results include the following:

- physical education was by far the most popular subject, followed by math
- relatives and friends led the list of students' role models
- in elementary school more boys than girls have milk (58% compared to 51%), cold cereal (56% vs. 47%) and eggs (32% compared to 24%) for breakfast, whereas more girls have fruit juice and bagels.
- cellphone use in secondary school (43%) was almost triple that in primary school (17%)

For other interesting facts from the Canadian survey, click on the link "Data and Results" when you are at **www.censusatschool.ca**.

You can obtain a random sample of up to 200 records from the Canadian database, as well as data from other countries – the UK, New Zealand, South Africa and Australia.

What this means is that teachers can conduct this survey in their own class and obtain their class results immediately for teaching skills of "collecting and organizing data", "analysing data", and "concluding and reporting", as listed in the Data Management and

Probability strand of the grade 4 to 8 curricula. Then teachers can request data from other Canadian students for comparison with their class data. Teachers can also request data for students of the same age as their class from one of the 4 other countries participating in the survey. Students feel involved because they see themselves in the survey data. They are interested to compare themselves with other Canadian and foreign students of similar ages.

Below are the first few columns from a sample Canadian dataset selected by the random data selector. You can use these datasets to produce graphs manually or using software such as *Quattro Pro*, *Excel*, or *Fathom*.

Province	School Grade	Gender	Date of Birth	Age (years)	Height (cm)	Hand Span (cm)	Wrist (mm)	Foot length (cm)
British Columbia	4 to 8	Male	May-91	13	153	20	200	22
Newfoundland	9 to 12	Male	Nov-89	14	163	29	140	27
Manitoba	4 to 8	Male	Jun-91	12	168	22	175	29
Ontario	4 to 8	Female	Sep-91	12	155	16	165	24
Quebec	4 to 8	Male	May-90	13	166	20	160	24
Quebec	9 to 12	Female	May-89	14	163	21	161	24
Alberta	4 to 8	Female	Feb-93	11	148	13	150	23
Ontario	4 to 8	Female	Jul-93	10	134	18	140	19
Quebec	4 to 8	Female	Apr-90	14	168	20	160	25
Ontario	9 to 12	Male	Feb-86	18	175	20	180	26
Ontario	4 to 8	Male	Apr-92	11	173	16	150	26
Nova Scotia	4 to 8	Male	Aug-92	12	150	18	150	22
Quebec	4 to 8	Female	Aug-92	11	138	16	140	23
Ontario	9 to 12	Female	Sep-85	18	165	20	160	23
Newfoundland	4 to 8	Male	Dec-91	12	162	22	106	25
Ontario	4 to 8	Female	Jan-91	13	144	13	155	18
Ontario	9 to 12	Female	Sep-86	17	171	20	150	25
Ontario	4 to 8	Female	Apr-90	14	163	18	170	23

Learning activities suitable for Grades 4 to 8 and 9 to 12 engage students in creating graphs, making comparisons and drawing conclusions using class data and/or Canadian or international data; investigating themes such as their pets, how they get to school or their use of time; and verifing hypotheses like: do people who drink milk have bigger wrists?

Below is a list of Census at school lessons suitable for the Ontario grade 4 to 9 mathematics curricula. All are available under "Learning activities" once you go to **www.censusatschool.ca**. These lessons listed below are organized by specific grade levels and match closely the expectations from the Ontario curriculum.

Grade 4 -5

- **WHAT A ZOO!**
  http://www.statcan.ca/02_007_e.htm
  Examine bar graphs that represent the same data but use different scales.
- **You are what you eat!**
  http://www19.statcan.ca/02/02_010_e.htm
  Build bar graphs illustrating what we eat for breakfast.

Grade 6 - 8

- **Circle and bar graphs**
  http://www19.statcan.ca/02/02_016_e.htm
  Construct circle and bar graphs and compare them. Which one is better to use?

Grade 7

- **Travel to school**
  http://www19.statcan.ca/02/02_011_e.htm
  Analyze the data using stem and leaf plots and pie charts.

Grade 8

- **Bias or no bias?**
  http://www19.statcan.ca/02/02_009_e.htm
  Consider the effect of bias on survey results.

Grade 9

- **Do you have big feet?**
  http://www19.statcan.ca/02_006_e.htm
  Create a scatter graph of foot size against height.
- **Exploring Linear Functions**
  Request and receive data from the international Census at School site, transfer the data from a spreadsheet into a statistical software program, and model the data.

Additional Census at School lessons are available on the site for secondary mathematics. We will be adding new activities and lesson ideas to the web site as this project develops. Ask your principal for the Census at School brochure/poster that was sent to all K-12 schools in Canada in late October.

Get your students actively engaged in statistical data enquiry by participating in Census at School at www.censusatschool.ca.

Statistics Canada's E-bulletin for Teachers

Our bimonthly electronic Learning Resources Bulletin alerts teachers to the very latest free resources available on the Statistics Canada site. See previous issues under *News and Forums* on the Teachers' page at **http://www.statcan.ca/english/edu/news.htm**

To subscribe, send an e-mail to listproc@statcan.ca Leave the subject line blank, and in the body of the message, type 'subscribe statcanedu', followed by your first and last names. ▲

OAME/AOEM Awards Nomination Process

Deadlines

Nominations for awards to be presented at the Annual Conference must be received by January 31 of the calendar year in which the conference takes place.

Nominations received after January 31 will be considered for awards to be presented during the next three calendar years. A nomination will be allowed to stand for three consecutive years. After that time, the nomination must be renewed. A standing nomination may be amended at any time by the original nominator. The nominator need only inform the chair of the Awards Committee in writing of the proposed changes to the nomination form.

The OAME/AOEM Nomination Form

Write a letter supporting the nomination of your candidate for the indicated award. Provide specific and detailed information about the nominee's activities as they relate to the following areas of consideration:

- demonstrations of excellence and creativity in mathematics education;
- specific contributions to mathematics education in the school, region, province or nation;
- demonstrates leadership in mathematics education in the school, region, province or nation;
- support of and contribution to the activities of OAME/AOEM, and
- contribution to the development of students both within and outside of the classroom.

Please include any additional information that you feel may be relevant to the nomination, but which may not be specifically mentioned above.

The Nomination Cover Page

Complete the Nomination Cover Page and attach it to your letter of recommendation for the nominee.

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

OAME/AOEM Life Membership Award

The Life Membership Award is given to recognize a person who has contributed in a significant way to OAME/AOEM; demonstrated outstanding leadership in mathematics education; and has accumulated 10 or more years of membership in OAME/AOEM.

Kenneth D. Fryer Award

In Memory of the late Kenneth D. Fryer, OAME/AOEM, in conjunction with the Grand Valley Mathematics Association, established the Kenneth D. Fryer Award. The award is to be given annually to recognize a mathematics department which fosters collegiality, team work, and excellent classroom teaching; contributes to the overall development of students; and demonstrates leadership in the mathematics education community.

Award for Outstanding Contribution to OAME / AOEM and Mathematics in Ontario

This is to recognize an individual who has made 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

The award is presented annually to recognize an exceptional and creative elementary teacher who demonstrates excellence in mathematics education by contributing to the overall development of students.

Award for Exceptional and Creative Teaching in Secondary Mathematics

The award is presented annually to recognize an exceptional and creative secondary teacher who demonstrates excellence in mathematics education by contributing to the overall development of students.

AWARD NOMINATION COVER PAGE

INTENDED AWARD *(please check one)*

- ❑ **Life Membership**
- ❑ **Kenneth D. Fryer**
- ❑ **Award for Outstanding Contribution to OAME / AOEM and Mathematics Education in Ontario**
- ❑ **Award for Exceptional and Creative Teaching in Elementary Mathematics**
- ❑ **Award for Exceptional and Creative Teaching in Secondary Mathematics**

Nominee's Information:

_____

Name of Nominee (Principal and Department Head for K.D. Fryer Award)

_____

_____

School, Organization, or Business Address

Telephone Number ( ) _____

Fax Number ( ) _____

Home Address _____

_____

Home Phone ( ) _____

Nominator's Information:

_____

Name of Nominator

_____

_____

School, Organization, or Business Address

Telephone Number ( ) _____

Fax Number ( ) _____

Home Address _____

_____

Home Phone ( ) _____

SEND TO: Judy Dussiaume

▲ Photo Math - A New Way of Picturing Math

RON LANCASTER
INDEPENDENT MATHEMATICS CONSULTANT



Ron Lancaster is a Lecturer in Mathematics Education at the Ontario Institute for Studies in Education at the University of Toronto. He is also an independent mathematics consultant and works with teachers, students and educational organizations in North America, Asia and Israel.

"A picture is worth a thousand words" is an expression that is often used to convey the importance of using images to make a point. The point of this column is to go beyond this notion and promote the idea that in fact "A picture is worth a thousand numbers". Photos with Math is what readers can expect to find in every Photo Math column and the emphasis will be on seeing and doing mathematics everywhere. Teachers may want to assign these questions to their students as part of an overall effort to make connections between the curriculum and the world around us. Establishing these connections is at the heart of the new Ontario curriculum as well as the new NCTM document, Principles and Standards for School Mathematics. It is hoped that these questions will inspire students to be more creative and playful and that in the end, students will develop an ability to see the world from a different perspective.

Teachers and students are encouraged to pose mathematical questions related to their own encounters and to submit these problems along with photographs to the author for possible publication in future columns. Photos can be sent via e-mail or by regular mail to the author of this column.

I am delighted that for the third issue in a row of the *Gazette* all the material for the Photo Math column has been created by readers of the *Gazette*. The submissions began with the terrific work by Peter Saaramaki and then Julian D'Angela, George Fawcett and Paul Lessard stepped in with material from their photo collection. This math trio from Hamilton has kindly supplied material for this entire column and I would like to thank them for their contributions.

Paul, George and Julian continue to look for new ways to help teachers capture the interest of reluctant learners. Their "Can You See the Math" table-top poster series combines this picturing math differently idea with concrete materials. The series includes the Chinese Checkers poster and the Dominoes poster along with extensive teachers' guides. Pattern blocks and dominoes fit perfectly on their respective posters to encourage students to share their thinking by displaying their ongoing solutions.

They are continuing their "Great Math Adventure Series" to help educators respond to Early Math Strategy, Junior Math Strategy, TIPS and student success.

George and Julian spoke at the NCTM Regional Conference in New Orleans in November 2004. They can be contacted at: **glfawcett@hotmail.com**, **dangela@cogeco.ca**.

Photographs offer a "Young Math Authors" curriculum building math opportunity. Aha! Can you see the Math in all the usual places? These hands-on inventive math investigations help teachers hook kids into exploring, discovering, describing and writing about their math encounters. "Success for all is the goal."

These visualizations bring our reluctant problem solvers into the mysteries and marvels of Math in their everyday lives. Let's make sure they benefit from the math they encounter each and everyday.

The math photo collection is designed to capture students' interest as well as their natural sense of exploration. These explorations of shapes, patterns, numbers and extensions come alive through the inter-connected concepts. These activities open for each student a whole new world rich with mathematical opportunities. The on-going opportunities make it easier to provide age-appropriate challenging activities for every student regardless of skill and readiness level.

The "Can You See The Math" photo collection addresses several key issues in mathematics education: reluctant problem-solvers, low-acheiving boys and success for all.

Each photo investigation encourages rigor, persistence and the celebration of a variety of solutions as students preview, review and reflect on the math that is happening. Students consistently rethink questions like, "Can I describe the pattern?", and "Can I design my own?" and statements like, "Explain my thinking!", and "Describe my findings in my math journal!"

Indeed these photo celebrations are designed to help students "Do what mathematicians do when they encounter math in their day-to-day lives".

Working with these materialsencourages students to collect and share their own photos and to discuss math that emerges from them. If kids learn to love math, they will love to learn math!

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Photo 1

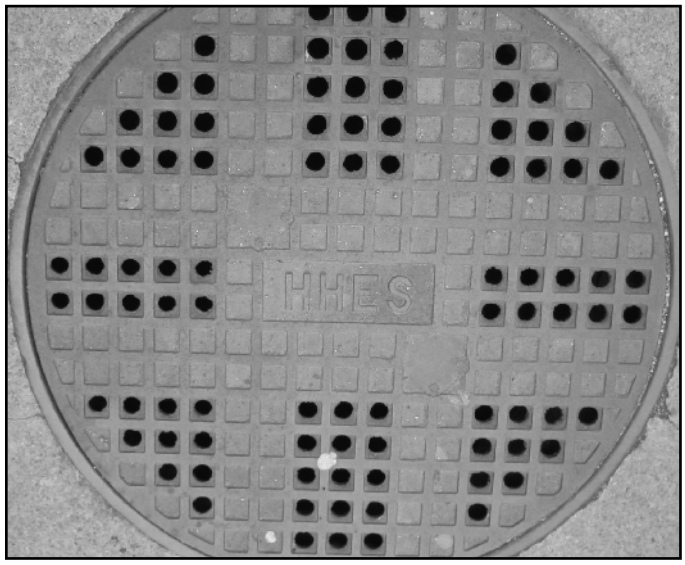


Photo 2

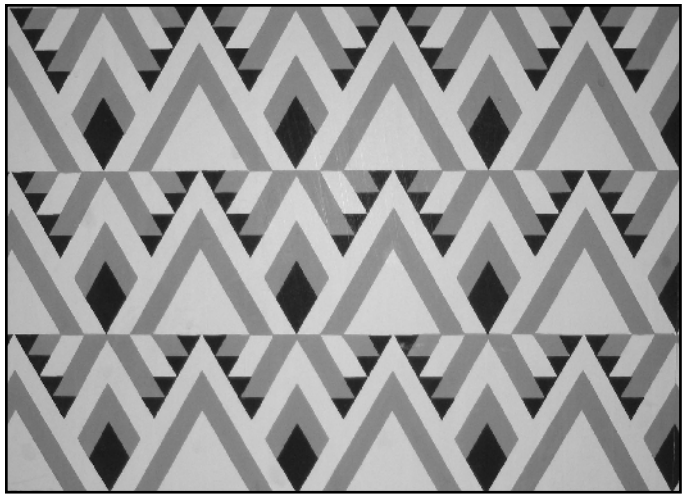
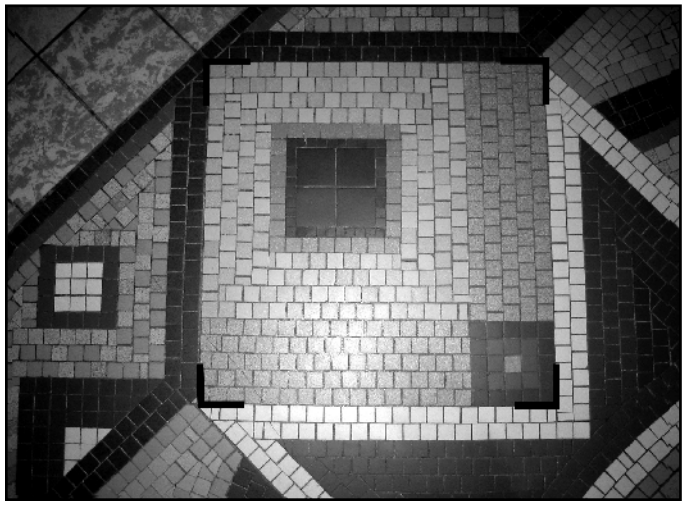


Photo 3



©2004, Ron Lancaster. Any commercial use or any use outside of a teacher's classroom requires permission from the author.

Photo 1

(a) Demonstrate two different strategies for finding the number of holes in the maintenance access cover. Compare solutions with a partner.

(b) Use this photo to investigate these math concepts:

- Congruent figures
- Triangular numbers
- Rectangular numbers
- Line symmetry
- Rotational symmetry

(c) Investigate a math concept of your own.

Photo 2

(a) Work with a partner to identify different polygons in this design.

(b) Choose a polygon. Identify polygons that are congruent and polygons that are similar to the original.

(c) Using your polygon, describe how this photo illustrates slides, reflections and enlargements.

(d) Hold a math talk with your group.

(e) Create your own geometric design to add to a classroom bulletin board display.

Photo 3

This photo shows a section of a ceramic floor at the Basilica of Ste. Anne de Beaupré in Quebec City. The floor was created using 1.5 cm square ceramic tiles of different colours.

(a) Locate the square indicated with corner markings. In this square identify three different sized squares. Find the dimensions and area of each. Compare their areas using ratios.

(b) In the square identify three different sized rectangles. Find the dimensions and area of each. Compare their areas using ratios.

(c) Estimate the length of the diagonal in the designated square.

(d) Use square grid paper to either copy the highlighted design or create a design of your own.

(e) Hold a math talk to review your work.

▲ Math, Camera, Action!

CARRIE ANNABLE



Carrie Annable teaches mathematics and physical education at Hillfield-Strathallan College in Hamilton, ON. She is currently completing her M.Ed. at Nipissing University. She is extremely interested in finding ways to actively engage her students in math.

My goal as a math teacher is to get my students to love math as much as I do. In the pursuit of such a goal, I have tried many activities in my classroom to engage and to excite my students. Despite such efforts I still often hear, "Are we going to do something fun in math class today?" Such comments are a stab in the heart of a dedicated math teacher! Another painful phrase I have heard all too often is, "Why do we have to learn this? I will never use this in real life." In my continuing efforts to make math a subject that makes people cheer instead of scream, I began thinking. I needed to find a mathematical activity that was fun and engaging but that also had an application in the real world.

A colleague suggested that I look into math trails so I began to research them. In my reading on math trails, I came across a paper by Rosenthal and Ampadu (1999) in which they state:

> *A math trail can provide an excellent opportunity for students to appreciate and understand mathematics in a stimulating manner. This type of learning allows for the application of concepts originally taught within the classroom setting. In a proper math trail, the students become active learners, working cooperatively at solving problems. They are exposed to the abundance of mathematics that exists in the real world.* (p. 144)

I thought, "Yes! This is the kind of activity that my class needs!" The trails I found online were fun and had some great math, but were not active for my students. I wanted my students to travel their own trail, so I decided to make a math trail at my school.

To make my math trail I wandered around the school community and took various pictures of buildings and places that caught my eye. I then looked at each picture and created a few math questions about each place. Because I created my math trail at the end of the school year, I used the activity as a review of all the concepts and skills I taught over the year. However, the possibilities are endless! This activity is a great way to integrate all math strands and could be used for any topic at any grade level. The process of making the math trail was surprisingly easy. All it took was a camera and some creativity. I would suggest that you get your colleagues involved. They may see something in a picture spot that you can't. After all, two minds are better than one. Next year, I am also going to have my students make their own trail. I think that they may come up with better spots and questions than I could even imagine. This year at the end of the trail they made suggestions for where I could have sent them and what they could have done. They had excellent ideas that never occurred to me.

When I first introduced the activity to my students they were more excited than I have ever seen them before. They said that they were going on a math scavenger hunt. I think they were surprised that math class was going to take place outside of the classroom. I placed them in groups of four and gave each group a clipboard with the photo spots and the questions. I placed the photos in a different order for each group so that they weren't all in the same place at one time. Then the kids were off! They were excited to find the places in the photos and begin working on their questions. As the students worked on their math trails, I wandered from place to place. I would offer guidance to the students or hints to get them started but I would not offer the answers. I repeatedly told my students that the point of the exercise was not to get the correct answers; the point was to think about and explore the math around them. I purposely made some of the questions difficult so that they would be challenged. Some of the questions did not have obvious answers and some did not even have a single correct solution. The National Council of Teachers of Mathematics (NCTM) states that "students should have frequent opportunities to formulate, grapple with, and solve complex problems that require a significant amount of effort and should then be required to reflect on their thinking" (NCTM, 2000, p. 52). I wanted this activity to not only be an opportunity for my students to explore the mathematics in their school community but also to be an opportunity for the students to be challenged, to use all the strategies that were in their "math toolbox", to discuss mathematics, and to collaborate to find the solution.

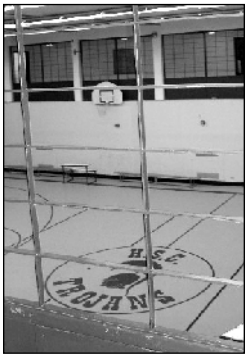
The student feedback to this activity was

overwhelmingly positive! When I asked my students what they liked best about the math trails, the top answers I received were getting out of the classroom and getting to explore the school, getting to go to different places, working in groups, and having fun. Over half of my students were surprised at the amount of math that actually existed in the real world. Many of my students commented that they were having so much fun that they didn't even realize they were doing math. Finally, I found an activity that made students cheer rather than groan!

So, grab a camera and start looking at your school through a mathematical lens. You'll be surprised with what you and your students will discover as you explore your own school's math potential.

SOME SAMPLE QUESTIONS

Photo 1



1. A player on the HSC Trojans basketball team wears jersey #12.
   a) Draw a factor tree for this number. What are its prime factors?
   b) List three multiples of 12.
   c) Two other players have jersey numbers 4 and 5. What would the LCM be of all three jersey numbers?
2. Would you rather have $5 000 or a stack of loonies from the floor of the gym to the ceiling? (hint: one loonie is about 2 mm thick)

   Give reasons to support your answer.

Photo 2



1. The chart below describes the reading preferences of grade six English students.

Favourite Type of Book	Fraction of Students
Mystery	1/6
Comedy	1/9
Adventure	1/5
Romance	1/10
Drama	1/10
Science Fiction	2/9
Other	?

   a) Order the types of books from most popular to least popular.
   b) Which is larger: the fraction of students who read mystery, science fiction, and romance or the fraction of students who read comedy, adventure, and drama?
   c) What fraction of students has a favourite type of book that is not listed in the chart?
2. Choose any book in the library. Describe how you would calculate the number of words in the book without actually counting all the words.

   Show all your work.

Photo 3



1. You desperately want a pop but you have no money. Your friend has decided to lend you some money if you can tell her how many of each type of coin she has. She tells you that she has 9 coins consisting of nickels, dimes, and quarters. All together she has $1.05. How many of each type of coin does she have?

   Show your work and explain your answer.
2. Since you are in charge of the pop machine you also have to determine what kinds of pop to put in the machine. Survey at least 20 different people and ask them what their favourite type of pop is. Determine the percent of people who like each type of pop. Based on your results, what types of pop would you put in the machine?

   Provide a chart of your survey results and fully explain your choices of pop to put in the machine.

Photo 4



1. Determine the total volume of the garbage can seen in the photo. Once you have calculated the volume convert this measurement to litres to find the total capacity of the can. *Show your work.*

These formulas may help you:

$V = \pi r^2 h$ 1 mL = 1 cm^3 1000 mL = 1 L

SOME SAMPLE ANSWERS FOR THE MATH TRAIL

Photo 1

1. a) 

The prime factors of 12 are 2 x 2 x 3.

b) Three multiples of 12 are 24, 36, 48.

c) Multiples of 4: 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60

Multiples of 5: 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60

Multiples of 12: 12, 24, 36, 48, 60

The lowest common multiple of 4, 5, and 12 is 60.

2. Using a metre stick, we estimate the height of the gym to be 6 m. If each loonie is 2 mm thick, then there are 5 loonies in 1 cm, and 500 in 1 m (there are 100 cm in a metre, so 5 x 100 = 500). So, in 1 m there is about $500. Therefore, in 6 m there is about $3000 (6 x 500 = 3000). We would rather have $5000.

Photo 2

1.

Favourite Type of Book	Fraction of Students	Equivalent Fraction
Mystery	1/6	15/90
Comedy	1/9	10/90
Adventure	1/5	18/90
Romance	1/10	9/90
Drama	1/10	9/90
Science Fiction	2/9	20/90
Other	?	?

a) The books ordered from most popular to least popular are: Science Fiction, Adventure, Mystery, Comedy, Romance and Drama (tied).

Mystery + Science Fiction + Romance = 15/90 + 20/90 + 9/90 = 44/90

Comedy + Adventure + Drama = 10/90 + 18/90 + 9/90 = 37/90

Thus, the fraction of students who read mystery, science fiction, and romance is larger than the fraction who read comedy, adventure, and drama.

When you add all the fractions that are listed in the chart, you get 81/90 (15/90 + 10/90 + 18/90 + 9/90 + 9/90+ 20/90 = 81/90). That means 9/90 are needed to make 1. When this is simplified, you get 1/10. Therefore, 1/10 of the students have a favourite that is not listed.

2. We picked a book that had 205 pages. We then randomly picked one of the pages and counted the number of words on the page which was 52 words. We then assumed that there would be about the same number of words on each page so we multiplied 205 by 52 and we got 10 660. So, we think that there are about 10 660 words in the book.

Photo 3

1.

Nickels	Dimes	Quarters	Total Number	Total Amount
3	3	3	9	$1.20
4	3	2	9	$1.00
3	4	2	9	$1.05

Using the guess and check method, I figured out that my friend has 3 nickels, 4 dimes, and 2 quarters. Our first guess was too high so we lowered the number of quarters. Then, our guess was too low so we increased the number of dimes. Then, we got the right answer.

2.

Type of Pop	Frequency	Fraction of People	Percent of People
Coke	IIIIIIII	8/24	33%
Diet Coke	IIII	4/24	17%
Nestea	II	2/24	8%
Sprite	IIII	4/24	17%
Dr. Pepper	II	2/24	8%
Crush	I	1/24	4%
Pepsi	II	2/24	8%
Mountain Dew	I	1/24	4%

Based on our survey results, the majority of students at our school seem to like Coke. We would definitely fill our machine to about 40% of its capacity with Coke. Diet Coke and Sprite are the next most popular choices, 20% of the cans in the machine should be Diet Coke and 20% should be Sprite. That leaves us with 20% of the machine to fill. We would split this evenly among Nestea and Dr. Pepper. We think that Pepsi and Coke are similar so people wanting Pepsi would probably just choose Coke if they did not have a choice. Crush and Mountain Dew were so low that we don't think many people would want them so we are not going to put them in our machine.

Photo 4

1. We measured the height of the can to be 70 cm and the radius to be 30 cm. The volume of the can is 197 820 cm^3 ($V = \pi r^2 h$ = 3.14 x 30 x 30 x 70 = 197 820). This is the same as 197 820 mL which is 197.82 L (1 cm^3 = 1 mL; 1000 mL = 1 L; 197 820 ÷ 1000 = 197.82). Therefore, the capacity of the can is about 198 L.

Some Ministry Expectations Addressed in the Samples

Grade 7 Expectations

7m7: explain, in writing, the process of problem solving using appropriate mathematical language

7m14: perform three-step problem solving that involves whole numbers and decimals related to real-life experiences, using calculators

7m24: explain the process used and any conclusions reached in problem solving and investigations

7m25: reflect on learning experiences and describe their understanding using appropriate mathematical language

7m81: systematically collect, organize, and analyse data

7m92: understand how tally charts and frequency tables can be used to record data

7m103: make inferences and convincing arguments that are based on data analysis

References

National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics.* Reston, VA: Author.

Rosenthal, M. M., & Ampadu, C. K. (1999). Making mathematics real: The Boston math trail. *Mathematics Teaching in the Middle School, 5*(3), 140-147. ▲

Bhaskara 1 (c. 114 - c. 1185)

This Hindu mathematician who wrote mostly on astronomy, arithmetic and algebra, posed this problem: Find natural numbers which, when divided by 2, 3, 4, 5 6 have a remainder of 1 and are also divisible by 7.

Abdul Weta (940 - 998)

This Persian mathematician, acknowledged for his studies in trigonometry, posed the following problem: Two of three congruent squares are to be cut into eight pieces so that, together with the third square, they can be arranged into one larger square.

Leonardo da Pisa (c. 1175 - c. 1250)

This Italian mathematician who became famous using the name of Fibonacci, posed the following problem in his book Liber Abaci: Determine five weights to be used to weigh objects ranging from 1 kg to 30 kg with the weight of the objects being whole numbers. A balance scale is used. What must the weight of each of the five different weights be?



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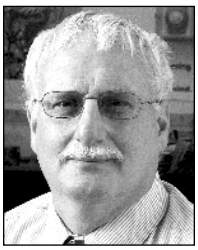
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▲ OAME/NCTM December 2004 Report



JOHN KERSLEY

Theme for 2004-2005
www.nctm.org/focus

The professional development focus of the year for NCTM during the 2004-2005 school year is algebra and is entitled, "Developing Algebraic Thinking: a Journey from Preschool to High School".

In support of this focus NCTM is suggesting the following publications:

- ***Algebra for Everyone*** #030
- ***Computer Algebra Systems in Secondary School Mathematics*** #12339
- ***Navigating through Algebra Series*** prekindergarten-grade 2 (#752), grades 3 -5 (#753), grades 6 – 8 (#754) and grades 9 -12 (#755)

NCTM Resources www.nctm.org/catalog

NCTM is placing much emphasis on mathematical learning in the elementary grades. The latest publications include:

- ***Exploring Mathematics through Literature: Articles and Lessons for Prekindergarten through Grade 8*** #12581;
- ***Mathematics in the Early Years*** #699;
- ***The Young Child and Mathematics*** #757.

NCTM offers an extensive set of resource and reading materials for the mathematics educator at all levels—elementary, intermediate, senior and college/university.

▲ Nominations for OAME/AOEM Board of Directors 2005-2006

Each year, elections are held for a President-Elect, a Vice President (3 year term), and 6 to 9 Directors (3 year term) of OAME/AOEM. OAME/AOEM members running for Director will declare their intent to work on either grade JK-6 or grade 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 21, 2005, to:

Stewart Craven, Past President

Include the nominee's qualifications with the Nominations Form. A nominee must be a member of OAME. By March 2005, the Nomination Committee will publish a slate of candidates, including qualifications, for consideration by the membership. Voting will be by mail, and is open to all OAME/AOEM members. The election results will be released at the Annual General Meeting of the OAME/AOEM in Toronto, May 2005.

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 ☐ grades 7-12

Nominee's Address: _____

_____

Telephone: H ( ) _____ W ( )_____

Nominator's Name : _____

Nominator's Address: _____

Telephone: H ( ) _____ W ( )_____

These publications and a host of other excellent publications can be viewed on line at the NCTM web site or to narrow the focus of your research: for elementary grades, **www.nctm.org/elementary**; for middle grades, **www.nctm.org/middle**; and for secondary grades, **www.nctm.org/high**. Contact me for the best prices and avoid the full exchange rate if ordering online and using credit/debit card payment option.

Membership Information and Benefits www.nctm.org

Membership benefits include information on the NCTM Standards, events, conferences, publications, journal articles, five years of article archives, products for lessons and the classroom, and job postings. In addition there is a members only site, **www.nctm.org/members** which contains further resources. Membership dues contribute to the development of resources and materials, the many various conferences and the delivery of NCTM services. Contact me for a current Canadian individual membership form. The Canadian price is $90 which includes choice of one journal plus $22.50 for postage to Canada. Discounts are available for 2 and 3 year memberships. If you apply online with a credit/debit card, you will pay the full exchange rate. It will cost more. At the current rates it is around $130 Canadian.

NCTM Conferences www.nctm.org/meetings

The annual NCTM Conference will be held in Anaheim, California, April 6 – 9, 2005. It is entitled, "Embracing Mathematical Diversity". NCTM members should have already received a preview brochure. The conference will offer over 1000 presentations. Truly, something for everybody. In addition, regional conferences will be held in the fall of 2005. Members get a very sizable discount on advance registration rates.

Interesting web sites for you to visit as suggested by NCTM:

- **www.edHelper.com** – standardized test prep materials, puzzles, challenging problems
- **www.hotmath.com** – homework help
- **www.shillermath.com** – home school Montessori mathematics programs
- **www.exambot.com/math.htm** – database of mathematics (lots of calculus) and physics exam questions.
- **www.senteacher.org** – resources, freeware downloads, links and documents for those involved in the education of pupils with learning difficulties, autism and other special educational needs; materials may also be of use to teachers and parents of primary-aged children. ▲

▲ GET INTERACTIVE

KEVIN MAGUIRE



Kevin Maguire is an Instructional Leader in Mathematics/Numeracy for the Toronto District School Board. Kevin is also an OAME Director. His particular interests include teaching with technology and elearning.

In this space, web sites of interest to teachers of mathematics will be shared. In this issue, the spotlight will be on Stories from the Classroom. Recently, teachers' sharing of detailed classroom narratives has been found to have great impact on other teachers' learning. Consequently, more professional development initiatives now include these narratives.

Sketchmad

http://hydra.educ.queensu.ca/sketchmad

Many teachers in Ontario and elsewhere have found great geometry resources on the *Sketchmad* site. There are also a number of detailed stories from the classroom to be found here. Teachers describe their challenges and triumphs when implementing *The Geometer's Sketchpad* in their classrooms.

ENC – Case Studies for Teachers

http://www.enc.org/professional/learn/change/practice/cases - follow the link to Excerpts from *Fractions, Decimals, Ratios and Percents and Facilitator's Discussion Guide.*

This web page contains an excerpt from a book on using case studies for professional development. A lesson on fractions is integrated with a teacher's narrative about his challenges and successes in the classroom.

ENC - The Challenge of Change in High School Mathematics

http://www.enc.org/professional/learn/change/practice/cases - follow the link to the bottom of the page and click on *The Challenge of Change in High School Mathematics.*

This narrative entails a teacher's attempts to change her teaching techniques. What is interesting about this

(Continued on page 38)

▲ The First Use of π

GENE H. POTTER, O'FALLON, MISSOURI



Gene is a regular newsletter columnist for the Missouri Council of Teachers of Mathematics, editor of the St. Louis Confluence, and now retired after thirty-six years of teaching mathematics at Hazelwood West High School, Hazelwood, Missouri.

(Excerpts first printed in the Mathematics Educators of Greater St. Louis *Newsletter, January 2002)*

Did you ever have a student ask, "Where did π come from?" I often answered with a little history of the early Babylonians. But another spin to that question might be, "Who first used the symbol π for the all-familiar value of pi?"

Asking mathematics students to do a little historical research can easily result in more than a few moans. You can motivate their interest by examining *The Pi Trivia Game* by Eve Anderson at **http://eveander.com/trivia/** to create a competitive classroom challenge. Knowing the history and mathematics surrounding pi is a helpful edge in this trivia game. High school students find that this web site challenges their knowledge of pi. You will certainly want to add this web site to your activities on March 14, Pi Day.

William Jones

The sixteenth letter of the Greek alphabet, π, was first used for the familiar value 3.1415… in the publication, "Synopsis Palmariorium Mathesios", authored by William Jones in 1706. "Synopsis Palmariorium Mathesios" was a text that included some lessons related to Newton's fluxions among several other mathematical topics. Jones associated the word 'periphery' with the value pi and in parentheses shows the Greek letter π. He provides no explanation for the selection or use. It is believed by many that the Greek word 'perimetron, perimetron' derived from 'peri' (around) and 'metrein' (to measure) is the desired reference with π being the first letter of the Greek spelling. However, the popularization of the symbol π is often credited to the prolific writings of Leonard Euler (1707-1783).

William Jones was born on a small farm in Wales in 1675. Little is known of his formal education. However, it is known that he taught mathematics on a British ship in the Indies, and later tutored the future President of the Royal Society, Thomas Parker.

Jones also published "Newton's De Analysis" (an analysis of Newton's work), "A New Compendium of the Whole Art of Navigation", and "Introduction to the Mathematics." He was a friend of Newton, and it is believed that he reviewed and edited some of Newton's manuscripts. After being elected Vice-president of the Royal Society, he was instrumental in settling the dispute between Sir Isaac Newton and Baron Gottfried von Leibnitz regarding the propriety claims to the authorship of calculus.

Pi Day

Today, many schools around the globe celebrate Pi Day. For the past three years, the governor of Missouri has proclaimed March 14 as Pi Day, a day to celebrate mathematics education. We should move beyond the formal curriculum with our joy of mathematics in as many different pedagogical venues as possible. Activities on Pi Day have allowed me to see my students in a rich light. Please plan on celebrating Pi Day this school year, and perhaps asking your state or province to recognize Pi Day as a day to celebrate mathematics education. Let's not forget that 2006 will be the 300th Anniversary of the introduction of the mathematical symbol π.

Ideas and activities regarding Pi Day can be found by visiting the web site of Mathematics Educators of Greater St. Louis, **www.mobot.org/education/megsl/**.

References

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▲ Book Review: Teaching Mathematics Through Problem Solving, Prekindergarten – Grade Six

REVIEWED BY: LYN VAUSE



Lyn Vause is presently seconded to the Ministry of Education as an Education Officer working on early and junior math projects. She is seconded from the Simcoe Muskoka Catholic District School Board where she was a curriculum consultant. She is also working part-time on doctoral studies at OISE.

Some years ago I engaged in an action research project on teaching mathematics through problem solving. I was teaching Grade Six and thought this would be a wonderful opportunity for the students and for myself. With great optimism I embarked on this adventure into new teaching territory. It ended up being a somewhat terrifying terrain. Students who had complacently attended to math assignments from their traditional textbooks were horrified to discover they were now expected to actually understand and learn the math through problem solving. Because the action research project was part of a course I was taking at the time, I couldn't capitulate to the demands of the students that we return to the peaceful and mindless tranquility of our old mathematics program. By the end of October, I was filled with self-doubt about the merits of what I was doing as I watched students struggle and, in turn, struggled myself. But by the end of November, this dubiousness was replaced with conversion as I recognized that my students had become thinking problem solvers and that I had begun to develop the skills to cope with such high level learning on their part. A resource such as *Teaching Mathematics through Problem Solving: Prekindergarten – Grade 6* by NCTM would have made the journey much less lonely and labourious.

Developing confidence and competence in problem solving is the cornerstone for all other mathematics learning. Without a strong foundation in problem solving, the rest of our mathematics instruction is built on an unstable footing. The action research project taught me that teaching through problem solving provides students with a foundational understanding and capacity for growth that is long term and self-generating. In the past decade there has been a shift in emphasis from teaching problem strategies in isolation to teaching through problem solving. The National Council of Teachers of Mathematics (2000, p. 52) states that:

> *"Solving problems … is not only a goal of learning mathematics but also a major means of doing so … . By learning problem solving in mathematics, student acquire ways of thinking, habits of persistence and curiosity, and confidence in unfamiliar situations… ."*

Although there is general consensus in the mathematics community that problem solving is a critical component of effective mathematics instruction, there is less consistency in how such problem solving instruction is enacted in practice. *Teaching Mathematics through Problem Solving: Prekindergarten – Grade 6* is a book that seeks to furnish the 'coherence and direction' that teachers need to use problem solving to teach mathematics. In particular, it provides a comprehensive, yet practical, overview of the issues in teaching through problem solving, the how-to's of teaching through problem solving and the larger issues around research in this area.

Teachers who are interested in developing a community of problem solvers in their classroom will find this book an excellent resource. Of particular interest to teachers will be the stories from the classroom that accompany each chapter. Teacher Story 3, *Reassembling the Hundred Chart*, helps teachers see the simplicity and elegance of teaching through problem solving. The story leads the reader through the very real experiences of one classroom teacher as she guides the students and in turn is guided by their mathematical insights.

Curriculum leaders will also find the book a useful companion as they guide teachers through the process of learning how to teach through problem solving. The writers do not shirk away from some of the difficult topics in problem solving such as how do students with special needs fit into such an instructional framework. They also tackle the challenge of how to make teaching through problem solving developmentally appropriate for young children. This book presents a roadmap for teaching through problem solving, from how to establish norms for problem solving, how to select tasks, how to guide and assess students' learning and how to incorporate technology. Because of the variety of well-known and widely respected mathematics leaders who have contributed to this text, together with the practical and personal stories of teachers in the field, this book is a must read for anyone who wants to provoke thoughtful discussion about this issue.

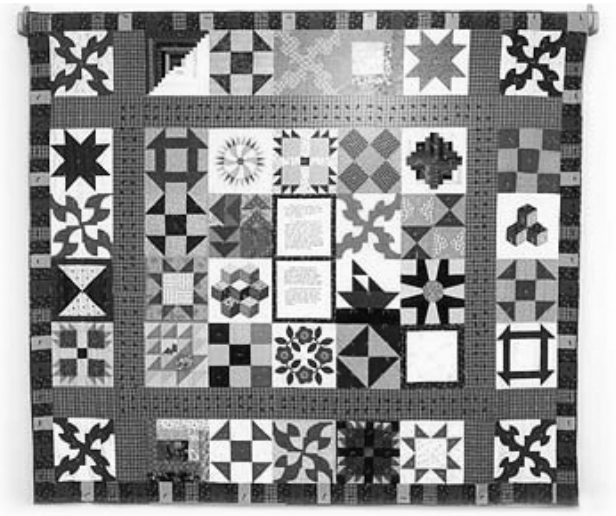
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▲ Black History Cairn: Owen Sound, Ontario



LYNDA COLGAN
ASSOCIATE PROFESSOR
FACULTY OF EDUCATION
QUEEN'S UNIVERSITY

Honouring the Black Slaves who travelled the Underground Railroad by creating Story Quilts based on the Original Quilt Codes and their Mathematics.



A Freedom Quilt illustrates many of the quilt block codes that were used to communicate with the slaves who were attempting to escape into Canada.

The Emancipation Picnic – A 142 Year Old Canadian Tradition

Each year since 1862, an Emancipation Picnic has been celebrated at Harrison Park, Ontario by the descendants of Black slaves to celebrate the freedom their ancestors found on arriving at the last terminal of the Underground Railroad–the Village of Sydenham, now known as Owen Sound, a small city on the shore of Lake Huron.



Figure 1. A map showing the major entry points for slaves who escaped to freedom in Canada

The Emancipation Picnic commemorates the British Commonwealth Emancipation Act of August 1, 1834, and the United States Emancipation Proclamation of January 1, 1863 by honouring the famous Underground Railroad, its brave agents and conductors[1] as well as the secret codes used in songs, phrases and quilt patterns that led fleeing slaves to freedom.

This year, at the Emancipation Picnic on July 31, 2004 Owen Sound dedicated a memorial called The Cairn to commemorate the contributions made by these early Black settlers.

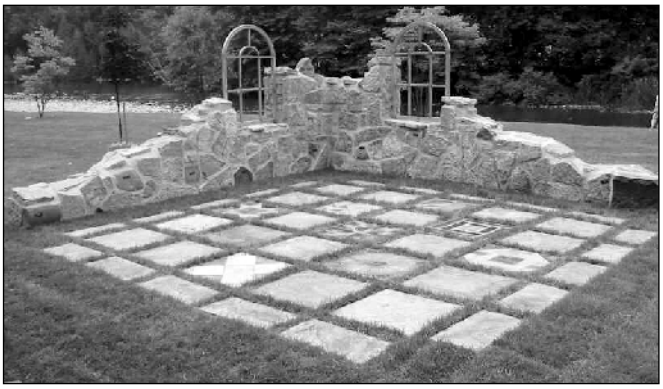


Figure 2. The Cairn is a monument to honour the Black slaves who travelled the Underground Railroad to its northernmost terminus at Owen Sound. The Cairn, situated on the Freedom Path faces north and overlooks the Sydenham River — appropriate because the escaping slaves viewed crossing a river and heading north as the road to freedom. It was designed by Bonita Johnson-de-Matheis. Photograph of the Cairn courtesy of Allana Gillam-Wright, Coordinator, Black History Cairn Project. Photographer, Mike Doig.

[1] *The Underground Railroad had no trains and was not located underground. The exact source of the name is unknown. However, one oft-repeated tale recalls an incident in which Tice Davids, an escaping slave, was being chased as he swam across the Ohio river in 1831. When his pursuer looked away for a moment, and then looked back, the escapee was nowhere in sight. The man stated that the fugitive seemed to have just "disappeared on an underground railroad". The term "Underground Railroad" came to mean the escape route and the network of people who aided slaves along their path to freedom. "Conductors" were the brave souls who put themselves at great risk by escorting slaves to places known as "stations". A station could be a house, a barn, a cave, a haystack, or any other place that could provide shelter. Various religious and fraternal groups that were sympathetic to the abolitionist cause, as well as freed blacks, would assist the fugitives by being conductors.*

The Cairn was designed to give visitors a feeling of shelter and protection — which is what escaped slaves found in Owen Sound. The windows used in the monument are shaped from the original window frames of the 'Little Zion' church that was the first Black church in Owen Sound. The stones that comprise the Cairn were donated by many of the former American slave and border crossing states, and also include black granite from South Africa and limestone from the Owen Sound quarry. Apple trees line the site since slaves were told that if they followed the apple blossoms, they would be going north. The blossoming season is later as one moves north. The quilt patterns found in the stepping stones represent the secret messages that are purported to have been relayed to slaves in the form codes, symbols and designs within quilts.

It is the topic of quilt codes that is the inspiration for this late Junior division mathematical activity, appropriate as one component of an integrated unit on The Underground Railroad, and timely for the annual celebration of Black History Month in February. While these specific activities are most appropriate for students in Grades 5 and 6, they could be adapted for other grades or they could be the catalyst for related activities in other grades and divisions.

Quilt Codes

Ozella McDaniel Williams was a descendant of slaves and claimed that her ancestors passed down the secret of the quilt code from one generation to the next. According to Ozella, a Black plantation seamstress would sew a sampler quilt containing different quilt blocks. Slaves would use the sampler to memorize the code (See Figure 3). The seamstress then sewed ten quilts, each composed of one of the code's patterns.

The seamstress would hang the quilts in full view one at a time. Since it was common for quilts to be aired out frequently, the master or mistress would not be suspicious when seeing quilts displayed in this fashion. In this way, the slaves could nonverbally alert those who were escaping. Only one quilt would appear at any one time. Each quilt signaled a specific action for a slave to take at the particular time that the quilt was on view. The code had dual meaning: first, to signal slaves to prepare to escape, and, second to give clues and indicate directions on the journey.

Ever since Jacqueline Tobin and Raymond Dobard interviewed Ozella and wrote about her understanding of the quilt code in their 1998 book, *Hidden in Plain View: A Secret Story of Quilts and the Underground Railroad*, the quilt-code theory has been controversial.

The Underground Railroad Quilt Code Patterns


Monkey Wrench Prepare the tools you'll need for the long journey, including the mental and spiritual tools. Or (as a Ship's Wheel), the pilot is prepared to begin the transport.


Wagon Wheel Load the wagon or prepare to board the wagon to begin the escape.


Bear's Paw Take a mountain trail, out of view. Follow the path made by bear tracks; they can lead you to water and food.


Crossroads Refers to Cleveland, Ohio, a destination offering several routes to freedom. It also signifies reaching a point where a person's life will change, so one must be willing to go on.


Log Cabin A secret symbol that could be drawn on the ground indicating that a person is safe to talk to. It also advises seeking shelter


Shoofly Possibly identifies a friendly guide who is nearby and can help.


Bowtie Dress in a disguise, or put on a change of clothes.


Flying Geese Points to a direction to follow, such as where geese would fly during spring migration.


Drunkard's Path Create a zig-zag path, do not walk in a straight line, to avoid pursuers in this area.


Star Follow the North Star. Worked in conjunction with the popular song, "Follow the Drinking Gourd," a reference to the Big Dipper constellation.

Figure 3. Adapted from Ozella McDaniel Williams' understanding of quilt code blocks, as reported in Hidden in Plain View: A Secret Story of Quilts and the Underground Railroad *by Jacqueline L. Tobin and Raymond G. Dobard. Published by Doubleday in 1999. Softcover edition by First Anchor Books, 2000.)*

Quilt historians and Underground Railroad experts have questioned both the study's methodology and the accuracy of its findings. One expert, Giles R. Wright, a New Jersey-based historian, points to a lack of corroborating evidence, noting that quilt codes are not mentioned in the 19th century slave narratives or the 1930s oral testimonies of former slaves. Other historians claim that quilt patterns named in the code did not exist prior to the Civil War.

As academics debate whether Ozella's quilt code theory is fact or folklore, it remains an engaging view of the past, and a credible extension to the well-documented use of dance, song and oral traditions that allowed the slaves to communicate with one another. Though maybe not documentable in any scholarly way, the idea of a quilt code provides a vehicle through which

many people believe we can begin to better understand this period in our history.

Furthermore, quilts are universally accepted symbols of comfort. If the romantic and fanciful stories of escapes on the Underground Railroad have somehow lessened the painful memory of that time, then these tales will have served a very useful purpose. It is on this premise that the following activities are proposed.

Day 1: Introducing the Unit using Literature Connections

Two books will be read to or by the class; ***Sweet Clara and the Freedom Quilt*** and ***The Secret to Freedom*** in order to introduce the ten patterns that gave messages to the escaping slaves. Tell the students that they will hear little stories describing the patterns and and telling what information the patterns communicated. After reading the books, the teacher will lead a discussion about the significance of the coded quilts and the way in which different designs were used to relay important messages to slaves preparing to escape. The children will then be asked to brainstorm the ways in which we communicate by symbols nowadays, for example by using universal signs such as a stop sign or handicapped sign; hand gestures such as a wave. Next children will be asked if people today develop secretive symbols or signs.

Explain that the culminating task for this unit is the creation of a class quilt. Students will assume the roles of a group of slaves who have successfully escaped by completing their journey along the Underground Railroad and arriving in Owen Sound, or other points of landing, such as Dresden and Kingston. From their new, safe home in Canada, they have decided to make a quilt telling other people about the dangers they faced, and the people and things that helped them out. Either in groups, pairs, or individually, students will design and create story quilts that contain at least six quilt blocks by building upon the mathematical techniques they will learn. The finished product can be made from coloured paper or fabric with glue, by drawing on a computer, or by sewing, and will be accompanied by both a mathematical description of the process for creating the quilt and a fictional account of the life history the quilt represents.



Sweet Clara and the Freedom Quilt *by Deborah Hopkinson with illustrations by James Ransome (Alfred A. Knopf, New York, NY, 1993) This fictional story is about Clara, a seamstress in the Big House who knows that she is better off than the slaves who work the fields. But slavery has separated Clara from her mother, and she can never be happy without her. Clara dreams that they will be reunited one day and run away together - north to freedom. Then Clara hears two slaves talking about how they could find the Underground Railroad if only they had a map. In a flash of inspiration, she sees how to use the cloth in her scrap bag to sew a map of the land - a freedom quilt - that no master will ever suspect is a map to freedom.*



The Secret to Freedom *by Marcia K. Vaughan with illustrations by Larry Johnson (Lee & Low Books, New York, NY, 2001). This fictional story is about Lucy. After Lucy's parents are sold off the plantation, her older brother, Albert, tells her about the Underground Railroad. He explains that different patchwork quilt patterns provide secret messages to help escaping slaves and the two of them become involved in helping others find their way to freedom. After a serious beating, Albert runs away and Lucy doesn't know his fate. After the Civil War, she becomes a teacher and marries. Then one day, she receives a scrap of fabric in the mail from her brother in Canada. He is alive and well and bringing his family to visit her.*

Day 2:

For the purposes of this activity, we use the following definition of a quilt block: a quilt block is made of 16 small squares. Each small square consists of two triangles. Each square has four possible configurations as illustrated in Figure 4.

In small groups, students can experiment with multiple copies of each of the possible configurations for individual squares in order to generate their own quilt block designs (Figure 5 can provide a starting point for a discussion of the range of possibilities of quilt block designs and the use of specific mathematical language to describe their characteristics).

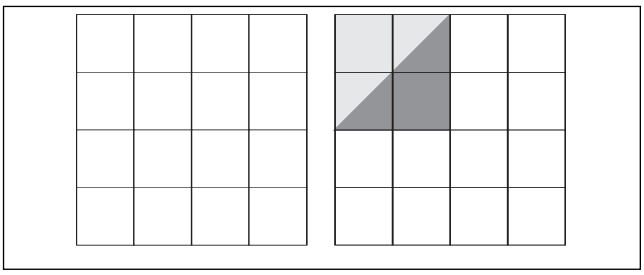
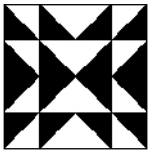


Figure 4. Each quilt block is made of 16 squares, each of which is constructed from 2 triangles. It is often helpful to view the quilt blocks as having 4 square 'cells', each comprised of four of the small squares.

The second part of the Day 2 lesson will focus on looking at traditional 16 square (or four block) quilt patterns in order to learn about their names and the stories that they tell. The purpose of this exercise is to model the expectations of the culminating task for the student. Figure 6 illustrates some traditional quilt blocks with interesting names.



The right side is a mirror image of the left, and the top is a mirror of the bottom.



The right side is a mirror image of the left, but the top is not a mirror of the bottom.



The are no line of mirror symmetry, but the figure is the same if you rotate it 180˚.



The top is a mirror image of the bottom, but the right side is not a mirror of the left.

Figure 5. Mathematical language is used to describe the overall pattern in the 16-square block. The students are asked to generate such descriptions in the culminating task.

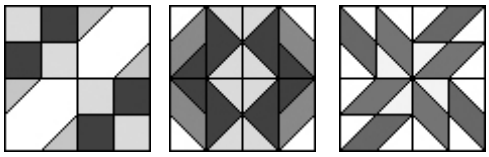


Figure 6. These quilt block patterns are called, Crossroads, Butterfly and Poinsettia. All are made using the 16-square template and different colour configurations for the squares.

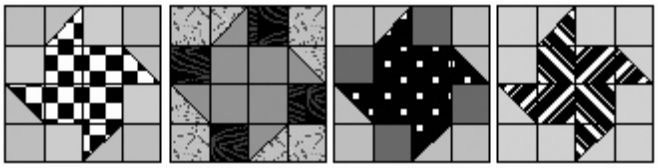
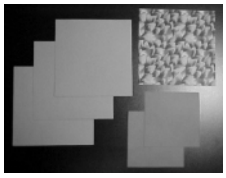


Figure 7. These quilt blocks have a pinwheel design created using a number of different component papers. By using different colours and patterned paper, the same quilt block can dramatically change in appearance. Students can use this example to discuss how the colours and designs within a block can change the message it conveys.

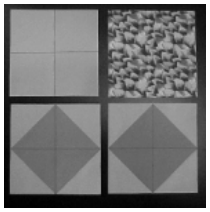
Day 3: De-Constructing and then Constructing the Freedom Quilt Blocks

The purpose of this exercise is to have the students mathematically de-construct selected quilt blocks from the ten patterns that gave messages to the escaping slaves and then create a set of instructions that could be followed in order to produce an exact copy of the 16-square quilt block. Two finished sets of instructions will be provided in a full class lesson conducted by the teacher, so that students can produce their own copies of the North Star Quilt Block and the Drunkard's Path Quilt Block. Assigned Quilt Blocks: Monkey Wrench, Bear's Paw, Crossroads, Log Cabin, Shoofly, Bow Tie, and Flying Geese. Challenge Quilt Blocks: Tumbling Blocks and Wagon Wheel.

How to Make a North Star Quilt Block

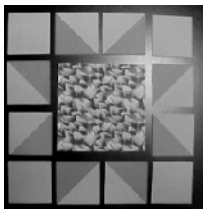


You will need three colours of construction or wrapping paper. You will need 4 large squares the same size – 3 cut out of the first colour and 1 cut out of the second colour. You will also need 2 squares, of a different size, cut out of the third colour – these squares are smaller than the first 4 and the length of each diagonal should be equal to the length of the sides of the larger squares.

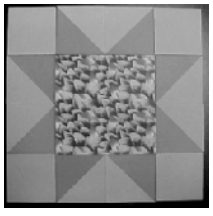


Fold the 3 large squares (of the first colour) in quarters from side to side. Fold the 2 small squares in quarters from corner to corner. Mark all the folds with a pen or pencil. Glue the 2 small squares onto 2 of the larger squares as shown. Use the lines to position the squares.

Cut 3 squares (of the first colour) along the marked fold lines. You will now have 1 large square (of the second colour) and 12 small squares (of two colours).

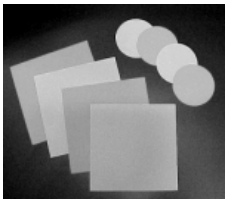


On a blank piece of paper, place the large square in the middle and arrange the smaller square around it as shown.Glue your pieces onto a piece of blank paper starting with the square in the top left corner and building the border first.

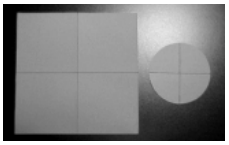


Your completed North Star quilt block should look like this.

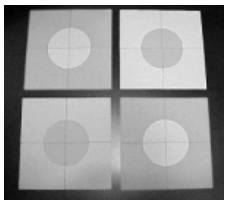
How to make a Drunkard's Path Quilt Block



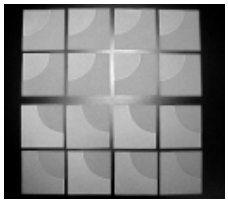
You will need two colours of construction or wrapping paper. Cut 2 squares and 2 circles out of each colour. The length of the sides of the squares should be 1.5 times the length of the diameter of the circles.



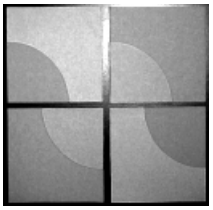
Fold the squares in quarters from side to side and fold the circles in quarters. Mark the fold lines with a pen or pencil.



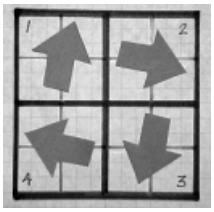
Glue each circle onto the center of a square of the opposite colour. Use the lines to position the circles.



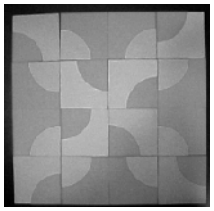
Cut each square into quarters along the marked fold lines. You will now have 16 small squares.



Each Drunkard's Path block is made up of 4 smaller identical blocks. Glue the 4 small squares onto a larger square to assemble the first small block.



Assemble 3 identical small blocks (using 4 squares each). Form the Drunkard's Path block, by placing the first small block in the upper left corner. Place each new block clockwise (CW) around the quilt square by rotating the first one once through a quarter CW turn and gluing it down. Rotate the third block through two quarter CW turns and glue it down. Finally rotate the fourth block through three quarter CW turns and glue it down.



Your finished Drunkard's Path quilt block should look like this.

The students should be evaluated on the success of their own patterns, quilt blocks and story quilts as well as their mathematical growth in terms of knowledge obtained throughout the lessons. The success of the individual quilt blocks and the completed 6-block quilt and overall performance may be assessed on how well the blocks and story quilts follow the use of pattern, design, and symbolism. Include criteria such as: the technical skill demonstrated; the use of color; the difficulty of the patterns; the originality of the patterns or subject matter; the meaning or message of the quilt; and the authenticity of the quilt.

Since these quilts are highly symbolic from their subject matter to their patterns, fabrics, and colours, the students should also create a title for their quilt that is indicative of symbolic meaning, and include notes to describe both the mathematics behind the quilt blocks as well as the quilters' explanations of their symbolism.

Ideally these math lessons would occur as a special part of an in-depth unit to explore Black History Month by focusing on different aspects of the Underground Railroad. Clearly, there are many rich opportunities for overlap during literacy, social studies, and art instructional periods.

In closing, I'd like to say I hope that you will consider such a unit with your students, adapting and revising the lessons to better suit your individual classroom context and teaching style. The experts encourage you also. Here is but one endorsement: quilts should "find their way into our classrooms to illustrate mathematical concepts. Theorems can often be cold and empty but a quilt may bring comfort and evoke curiosity"[2].

References

Related web sites:

http://educ.queensu.ca/connectme/ The February 2004 Family Math (authored by Queen's Faculty of Education graduate, Amy Baker) on-line calendar focuses on Codes and Ciphers. The first week-end project features the Underground Railroad quilt code activities reproduced in this article.

http://www.learner.org/teacherslab/math/geometry/shape/quilts/index.html The Annenberg Foundation, is dedicated to advancing excellent teaching in all disciplines throughout American K-12 schools. This web site includes some background and interactive on-line lessons on quilt design.

http://quilt.com/Blocks/FourPatchBlocks.html A rich collection of 16 square quilt blocks with interesting names that include Canadian Garden and Symmetry in Motion. This site could provide inspiration for original

[2] *Daniel F. Daniel in Quilted Symmetry at http://www.mi.sanu.ac.yu/vismath/daniel/#f6.*

student designs.

http://city.owen-sound.on.ca/cairnproject.htm The City of Owen Sound has much rich information about Black History in the area, including the Cairn Project.

http://news.nationalgeographic.com/news/2004/02/0205_040205_slavequilts.html#main This National Geographic article provides a good overview of the debate on the authenticity of the quilt code theory.

Recommended books:

Designing Tessellations: The Secrets of Interlocking Patterns by Jinny Beyer

Hidden In Plain View. A Secret Story of Quilts and the Underground Railway by Raymond Dobard and Jacqueline L.Tobin.

Mathematical Quilts: No Sewing Required by Diana Venters and Elaine Krajenke Ellison

Patchwork Patterns : For All Crafts That Use Geometric Design, Quilting, Stained Glass, Mosaics, Graphics, Needlepoint, Jewelry, Weaving, and Woodwork by Jinny Beyer. ▲

Johannes Buteo (c. 1525)

This French mathematician wrote this in his book Logistica*: If the price of five apples, reduced by the price of one pear is 13 dinar, and the price of 15 pears, reduced by the price of one apple is 6 dinar, what is the price of an apple and a pear?*

Isaac Newton (1642 - 1727)

This British mathematician wrote in his book Arithmetica Universialis the following: "In my studies I discovered that the actual problems are often of more value than the rules." He posed this problem: Three pastures have an area of 3 HA, 10 HA and 24 HA. The growth condiditons are exactly the sam ein all three pastures. The grass density and yield per area unit are the same. On the first pasture, 12 oxen graze for 4 weeks and on the second pasture 21 oxen graze for 9 weeks, at which time these pastures have been completely grazed. How many oxen could graze on the third pasture for 18 weeks?

Christian Goldbach (1690 - 1764)

This mathematician was born in Prussia and lived in many countries before settling in Russia. The Goldbach Conjecture claims that every even number (except 2) is the sum of two prime numbers. This conjecture has been verified up to 2 x 10^{10}. Check this yourself for numbers up to 40.
In 1742 Goldbach sent this conjecture to the Swiss mathematician Leonard Euler. This conjecture remains unsolved today.)

▲ Computer Algebra Systems and the Ontario Curriculum

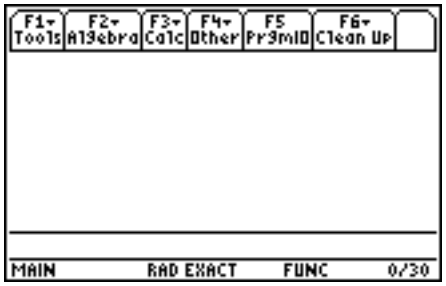
TOM STEINKE, KEVIN SPRY, FRED FERNEYHOUGH

Kevin Spry is on leave from the Upper Grand District School Board and currently serving as a consultant with Texas Instruments. Kevin was an author and tech consultant for Pearson. Tom Steinke is Coordinator of Mathematics for the Ottawa Carlton Catholic District School Board and an author for Nelson. Fred Ferneyhough is a mathematics department head at Harold M. Brathwaite SS in Peel and an author and tech consultant for several books.

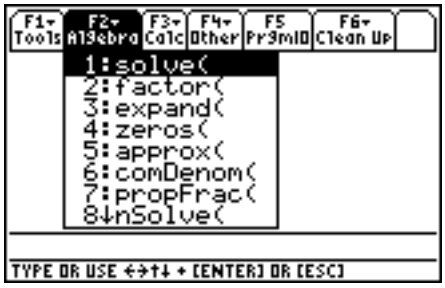
Several years ago, *Texas Instruments* developed a new product called the *TI-92*. This was before the orginal *TI-83* had become popular and was targeted to a completely different audience. This handheld looked vastly different than its predecessors. It was much wider and the screen was in a completely different ratio. The device had a full QWERTY keyboard and a cursor wheel that could be directed in eight different directions rather than just four. The *92* also contained two features that previous models were missing – a dynamic geometry package and a computer algebra system. The geometry program was *Cabri Geometry* packaged specifically for this product. The computer algebra system was a subset of DERIVE, long considered one of the easier symbolic manipulators. Over the eight years since its introduction, the *92* has gone through three changes. First, a "Plus" chip was created to allow for upgrades and downloads over the internet. Later, it was declared that the product could not be used on the AP calculus examination due to the QWERTY keyboard, so *Texas Instruments* developed the *TI-89*. This product has a case similar to the *TI83/84* family, but has all of the functionality of the *TI92 Plus*. Finally, a new product, the Voyage 200 was introduced two years ago to replace the *TI92* altogether. For all intents and purposes, the products are functionally equivalent.

Computer algebra systems have been around for a long time. Maple, Mathematica and DERIVE were the main products on the market. Each has its own niche in the research and educational markets. The *92* marked the first time that a hand-held product had been developed with an algebra system as opposed to a computer. A number of teachers were sceptical of its use and fears were expressed (and continue to be

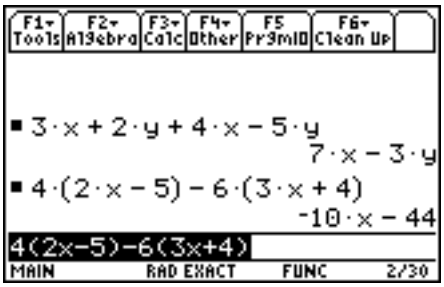
expressed) concerning the erosion of algebraic manipulative skills if these products were used by secondary school students. Let's look at some of the operations that these products will do and address some of the advantages and disadvantages. For this article, screen shots have been taken from the *TI89 Titanium* model.)



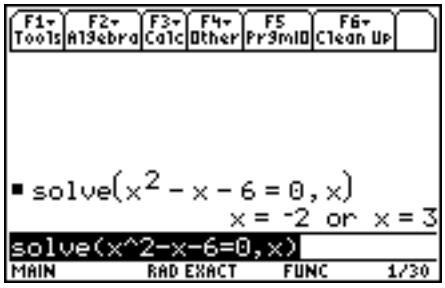
In the home screen, you see that the product presents a completely different appearance than the *TI83/84*. The menu has two items which are capable of striking fear into some math teachers and hope into the hearts of students.



Pressing F2 brings up the Algebra menu. Most of the features here are self-explanatory. The device can solve an equation, factor an expression, expand brackets and perform a large number of manipulations that we historically have required students to perform by hand.



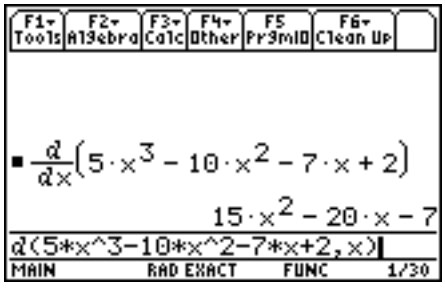
In the screen to the right, the expressions to the right of the square marker were typed on the entry line at the bottom of the screen. When ENTER is pressed, the expression is displayed on one line of the history screen and the results are shown to the right if there is enough room or on the next line if necessary.



In the next screen, the symbolic manipulator has been used to solve a quadratic equation. In this screen and the previous one, it is obvious that the device has more power than some teachers would like students to have. These devices though have been accepted for use on the SAT in the United States and elsewhere in Canada and overseas. Their appearance in the market engenders a similar debate among mathematics educators to that which precipitated the introduction of graphing calculators and even the introduction of calculators themselves. How these devices are integrated into a classroom will form the basis for this discussion and a question will be how this will impact the curriculum in years to come. This could be felt to be similar to how the introduction of the square root key impacted the teaching of Newton's Method for calculating square roots! We hope that this article will help kick start some of the discussion as this technology becomes affordable and accessible for students.



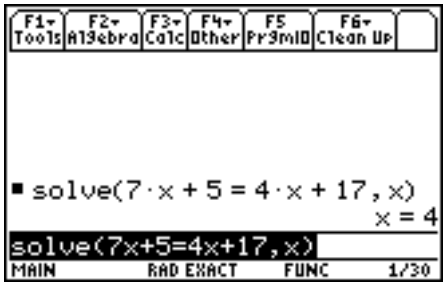
In addition to the algebra menu, the device has a very powerful Calculus menu, capable of finding derivatives, limits, integrals, sums of series, as well as other features that we may not use much in the secondary school curriculum.



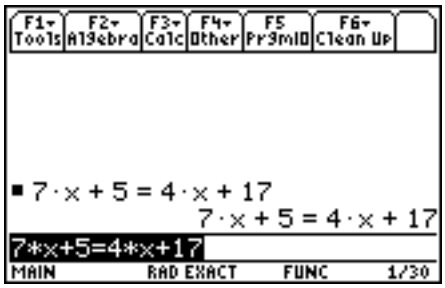
If a student has access to one of these devices, what becomes of expectations that require us to teach these skills? Obviously, a few keystrokes will accomplish a great deal. The derivative shown is a very simple power rule problem, but any expression can be used as the argument for the derivative feature.

Part of the issue is how our students will respond to the use of these devices and another fear is how some teachers will use them in class. Each year, we find students in our classes who pick up a calculator to add subtract, multiply or divide with simple values. Many use their scientific calculator as a crutch and the fear is that they will do the same here is a valid concern. To us, it would be inappropriate to teach any skill using only a piece of technology. One example that shows this is the derivative shown above. We would deem teaching derivatives solely by using a hand held device to be a poor use of technology. In most classrooms, the idea of a derivative is developed from what we call "first principles" where a limit of the slope of a secant is used to find the slope of a tangent line at a particular point. The goal, of course, is to instill an understanding of what a derivative means and not simply the mechanics of how to calculate it. At the end of this approach, the teacher frequently then does several examples involving the derivatives of powers of x in the hope that some will develop a sense of the pattern involved in the power rule. We would call this developing "symbol sense". Technology does not replace the need to understand the concept but can be a positive tool in developing this symbol sense and investigating patterns, much like elementary students may use a simple calculator to investigate numeric patterns.

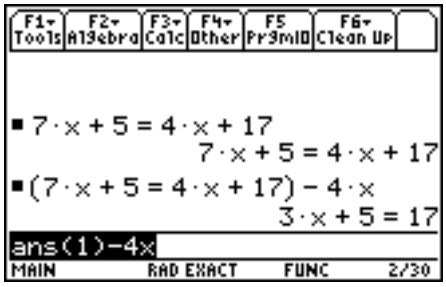
What happens to the students in your class who get so bogged down in the algebraic manipulation that they never stop to try and understand or develop the pattern or symbol sense? How often have we all seen students who, due to a simple arithmetic error, completely miss the pattern due to the error and never correct this problem? Do we continue penalizing those students for the remainder of the course on topics such as related rates or optimization problems if they have very little ability to perform a simple derivative or even worse, they can't solve a simple equation or factor a simple trinomial? In the past, often students who fail the first test on derivatives were doomed to fail every successive assessment due to their lack of manipulative skill. After several years of working with these devices, we recommend an approach where a skill is taught and evaluated by hand first and then a technology is taught to assist students in getting past the lack of skills. In our experience, many of the students who failed a derivative test did so, not because they didn't understand what a derivative was, but because they can't add two terms together any better in grade twelve than they could in grade nine. We suggest that it is an appropriate use of technology to teach the skill, test it and then work with the technology in the future.



The use of a computer algebra system also lends itself to discovery of a set of steps that kids can follow. Consider the example above. We would never recommend that a student only be taught to solve a linear equation in this manner in grade eight or nine. That would be a disservice to the students. Instead, consider the following approach as an alternative.

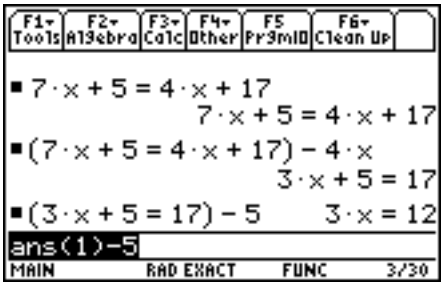


First, type in the equation and press ENTER. At first, it appears that absolutely nothing has been accomplished. In this type of equation, we would normally show our students how to balance this equation using either pencil and paper methods or perhaps algebra tiles to bring like terms together on opposite sides of the equal sign.

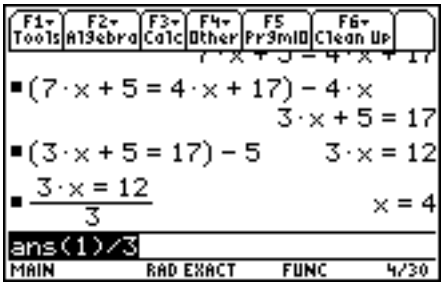


However, when the equation was entered, it is retained in memory as an expression. On the next line

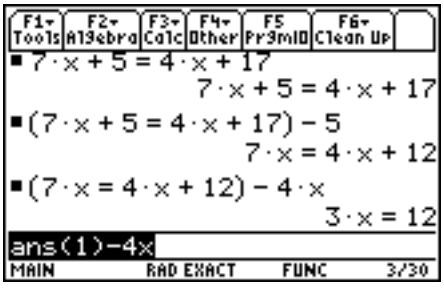
the user has entered the algebraic phrase "–4x". This is interpreted as an operation to be performed on the last result stored in memory, which was the original equation. On the entry line, "ans(1)" refers to the original equation. The result shown is exactly what we hope our students would get after subtracting 4x from each side.



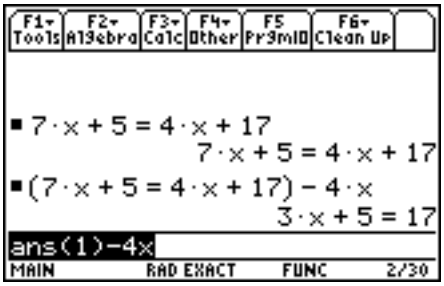
Let's continue this approach a bit further. The next operation that we would have kids perform is to move the constant 5 to the right by subtracting 5 from each side. On the entry line, we accomplish this by entering the instruction "–5" as shown on the screen capture. The result is shown after the device executes the instruction.



Finally, we would instruct our students to divide each side by 3 in order to isolate the variable x. On the entry line, we type in "/3" and this action is performed on the result of the previous operation. The result is shown. What this approach accomplishes is almost identical to what we have kids do with paper and pencil. Basically, the hand held device acts as a number cruncher for the steps that the student must come up with.



Another aspect to this approach comes about when we discuss with students whether it mattered if we moved the 4x or the 5 first. Most of us would state this without showing it because it is a lot of writing for something that we know works – the students should just take our word for it. With the technology, it is a simple matter to clear out the steps performed and go through them again in a slightly different order. In this screen, the two steps have been reversed to get to the same point as before with the variable terms on the left side of the equal sign and the constant terms together on the right side of the equal sign.



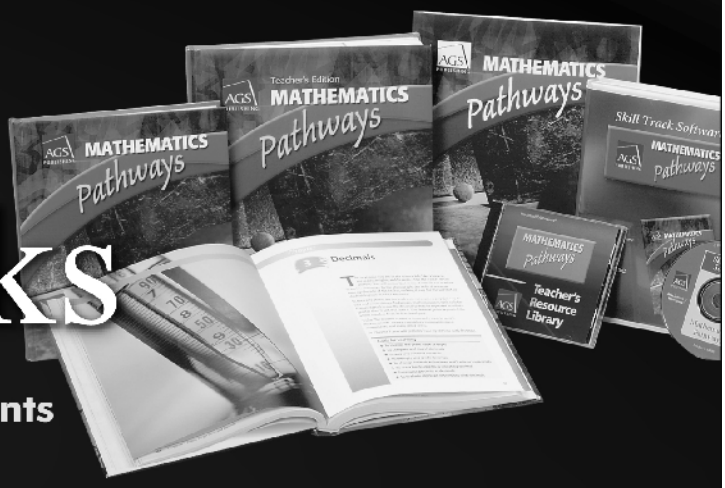
Finally, we offer one more advantage to this approach. Many students think that the steps involved in solving an equation are some kind of magic and it really doesn't matter what we do. For example, many kids think that, since I want to get the variable terms together, all we need to do is to combine the 7x and 4x, so let's add them. The result shows that we still have the same number of terms as we started with, so nothing has been accomplished. The technology represents the result of this operation correctly according to the instruction that the student has entered and the student can clearly see that his/her guess was not right. If they do the same operation on paper the result is something like "I don't know what went wrong sir. I did all the right steps, didn't I?" With technology, it is an easy matter to clear the last line, or even to proceed correctly from this point forward.

Properly used, a computer algebra system can help our students to understand algebraic manipulations and more importantly, build symbol sense better than they did in the past and allow them to get over the hump of mistakes in manipulations that prevent them from doing anything constructive with the problems that we ask them to consider as applications and/or TIPS questions. If the entire focus is on manipulations, maybe all that is being accomplished is evaluating their knowledge and allowing the lack thereof to prevent them from taking mathematics a bit further! CAS has the opportunity to be a further equalizer for students as we encourage them to go beyond "mindless manipulation" into applications and problem solving!

We look forward to further discussion on this topic! ▲

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▲ The Wheels On The Bus Go Round and Round

BOB McROBERTS
DR. G.W. WILLIAMS S.S., AURORA



Bob McRoberts has been a mathematics teacher for 29 years and currently is Head of Mathematics at Dr. G.W. Williams S.S. in Aurora. He is a member of GVMA and has been involved in writing and coordinating the Gauss Contest in York Region.

Have you ever noticed the more things change, the more they stay the same? Recently, I came across a couple of documents that I found to be an interesting read, at least for a math teacher. They made me think about how some of the ideas about the teaching of mathematics in Ontario seem to "reappear" as new thinking, given enough time.

The following is a list of quotations from these two documents:

1. Many drop out at the age of 16, but others remain and the standard has been adjusted to graduate them.
2. During the last thirty years psychology has played an ever increasing part in shaping our ideas on education.
3. From some source a theory adverse to drill has arisen. The failure to drill sufficiently the addition and multiplication tables and the fundamental operations has contributed largely to inaccuracy in mathematical calculations.
4. This course, to be taught in five periods, actually requires eight periods to do justice to it, with the poorly prepared students with whom we have to deal today. The time allotment for Mathematics in the Elementary Schools has been reduced considerably, and the course has been 'watered down' until the Grades 7 and 8 Mathematics texts resemble a book on Social Studies with a few fractions thrown in to separate the topics.
5. The primary and secondary education systems of this province are in the process of being re-adjusted in order to provide a type of education more suited to the conditions of today. One of the dangers which must be guarded against in our adjustments is not to swing too far to either extreme or to follow blindly, experiments which have not been tested sufficiently.
6. May I suggest as the first objective – accuracy in our calculations and modes of thinking. This must begin with a thorough memorization of addition and multiplication tables, and drill in basic arithmetical operations.
7. We must develop in the students the habit of checking their work and of appraising their results in the light of common sense.
8. I would suggest that one cause of error in our reasoning is the introduction of topics of study before the student is sufficiently mature to understand them. Nothing is gained by the introduction of a topic before it can be understood by the student. A thorough grasp of a narrower field of essentials is preferable to a smattering of facts, many of which could be learned incidentally when needed.
9. As a second objective, may I suggest the development of the student's reasoning ability and his ability to express his ideas clearly and concisely.
10. The third objective is the application of facts learned and techniques acquired to the problems of everyday life.
11. Irrespective of whatever type of education is developed, or curriculum evolved, little can be accomplished unless we develop in our students a healthy attitude towards work.
12. I have attended the meetings of this section for twenty-two consecutive years and each year I have gone away refreshed and wound up for another year. The meetings have been varied, but always interesting.
13. There have been addresses from some of the outstanding Mathematicians of United States and of Canada, but my admiration has been more particularly for addresses given by members of the teaching profession of Ontario.
14. More especially did I admire those young teachers who have given papers before this section. If you want real inspiration and enthusiasm you will find that it usually comes from the younger teachers. They are anxious to learn new ways of dealing with certain topics.
15. Sometimes, you find that those of us who are older do not like to be disturbed or roused out of our old way of doing things.
16. A Mathematics Department Head must promote enthusiasm among the other members of his department.
17. It is not enough just to know your work. You must live

and breathe it, show animation over it and enjoy it so that you may radiate interest and enthusiasm in your work. Enthusiasm is infectious.

18. Our teaching should be bolstered by new ideas.
19. Our profession is only what we make it. Sad to relate too often when teachers meet, their talks centre around superannuation and salary increase. These are important, but only incidental to teaching. If salary is your chief interest, then be a wide awake teacher and then you can demand salary. Prove that you are not being paid enough.
20. I would say that those who attend these meetings are among the most energetic of the Math. teachers. By our associations we become like our associates.
21. The more of us who come to these meetings, the more inspiration we are to one another. If you want to kill a section, just start staying away. The meeting needs you and you need the meeting. Therefore, if we are to keep alive mathematically, we must take every opportunity of mixing with our Math. teachers, sharing our ideas and growing richer in thought and accomplishment. Then, we shall be more efficient. Teachers are strengthened by the sense of fellowship, the feeling that we are partners in a great service. To strengthen this fellowship, I believe that regional conferences might be held.
22. It seems that high school teachers are divided against themselves with respect to what should be taught in Math. We are too prone to criticize those who try to improve courses for us. Criticism is good, but be sure that you have something better to offer.
23. It is the task of the teachers of Ontario to aim high, to refuse to be contented with even a good average. The future beckons us. We must never be content with present achievement.

Do some of these ideas sound familiar to you? Quotations 1 to 11 come from J. Sonley of Glebe Collegiate Institute in Ottawa in his President's Address in 1950. Quotations 12 to 23 are from John Knowles of Aurora High School in his President's Address in 1945. Both gentlemen were presidents of one of OAME's predecessors, Math and Physical Section: O.E.A. John Knowles was my grandfather. He lived from January 1891 to September 1973. While my aunt was recently tidying, she came across a pile of his papers. These two addresses were included. Besides my personal interest in reading my grandfather's words written by him almost 60 years ago, I thought there might be some interest from other mathematics teachers as to how ideas in mathematics education seem to evolve and revolve. I started my mathematics teaching career with my first work term from Waterloo in September 1973. I am now teaching at the school my grandfather spent 35 years at as both principal and mathematics teacher. The wheels on the bus go round and round. ▲

▲ ICMI Study 16

ED BARBEAU

The International Commission on Mathematical Instruction (ICMI) has commissioned a study on **Challenging Mathematics In and Beyond the Classroom**, whose main event will be a Study Conference from June 27 to July 3, 2006 at Trondheim, Norway with invited participants. The scope of this study will be wide. It will look at, for instance, the impact of mathematical challenges both inside and outside of the classroom, the role of mathematical challenges in supporting the curriculum for students of all levels of ability, vehicles for propagating mathematical challenges and assessment of their effectiveness. We would like to emphasize that we are interested in students and activities of all types, and want to go far beyond contests for talented students.

A discussion document has been prepared by an international committee chaired by Ed Barbeau of the University of Toronto: barbeau@math.utoronto.ca and Peter Taylor of the University of Canberra in Australia who is the director of the Australian Mathematical Trust: pjt@olympiad.org. This document defines terms, describes issues, provides sample situations and poses questions for discussion. Finally, it indicates how to become involved in the Study Conference. Would-be participants will be asked to submit a brief curriculum vita and a 6-10 page document addressing matters relevant to the study no later than August 31, 2005. The committee plans to send out invitations by January 31, 2006. The conference will be followed by a publication.

A copy of the discussion document can be obtained by going to the web site www.amt.canberra.edu and clicking on "LINKS" and then on "ICMI Study 16" **www.amt.edu.au/icmis16.html**. ▲

▲ TEAMS presents NEXUS: Building Mathematical Connections ~ A Mathematical Opportunity to "Get Connected"

MARY CARD, MONARCH PARK COLLEGIATE
TORONTO DISTRICT SCHOOL BOARD, TEAMS

The Toronto Educators Association for Mathematics (TEAMS) invites you to **NEXUS: Building Mathematical Connections**, the OAME 2005 conference that will be held at York University on May 12 – 14, 2005.

The theme of this conference, which promises to be the best ever and The Conference of 2005, is building mathematical connections. The "connected" conference provides an excellent opportunity for mathematics educators from across Ontario and North America to renew and make new connections – between each other, with other educators, within the field of mathematics or in other disciplines. The 10 mathematical strands that will connect us together at the conference are: The Art of Teaching Math, Assessment, Connections, Leadership, Patterning & Algebra, Product Presentations, Research, Diverse Learners, Problem Solving and Technology. Workshops in the 10 mathematical strands will be presented at all levels including Primary, Junior, Intermediate and Senior.

The keynote speakers for the OAME 2005 conference are renowned geneticist and host of CBC's *The Nature of Things*, Dr. David Suzuki; *CityPulse* and *CablePulse 24* science specialist, Mr. David Onley; and UCLA Psychology professor, Dr. James Stigler. Our keynote speakers possess a wealth of connections between mathematics and the rest of the world and, along with over 200 workshop presenters, promise to inspire and "connect" everyone who attends this exciting conference!

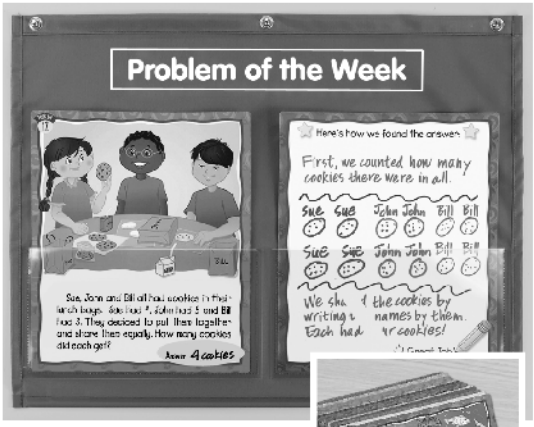
For more information, or to register for this exciting event, please visit our web site **http://www.oame2005.ca**. Remember to register early to get the workshops of your choice. See you at OAME 2005 at York University, May 12 – 24, 2005! ▲

WINTERGREEN
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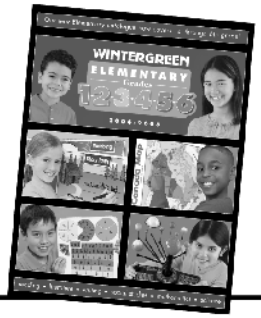
Targets standards in these areas:
• Using problem solving strategies
• Mathematical reasoning





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• Patterning



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www.WINTERGREEN.ca

▲ Friday Special



JACK WEINER

Fridays at the University of Guelph, five minutes before the end of class, I say, "Pens down, books closed, it's "Friday Special" time!" Then I show on screen an article or cartoon or letter or…something that has to do with math, the "real world" and has absolutely nothing to do with class, assignments, or tests. It is math for fun. Often, it is some flagrant example of how the media abuse math. I hope you use some of these. Make them "Monday Morning" specials or "We need a break!" specials. If one falls flat, blame me. If it works, you take the credit.

Look at the accompanying ad. This picture bothers me more than a little. Is that fella supposed to look like a "math prof"? Hmm.

More importantly, look at the stuff on the blackboard. It is absolute and total gibberish. Awful. And yet it contains symbols and terms that will seem familiar to most of us. I imagine a lot of people who found math tough would look at the nonsense on the board, and, not realizing it is garbage, think to themselves, "Oh that brings back such scary memories. I am sooooo glad to be outta there!" Great. The ad reinforces negative attitudes towards math.

Those whose math foundation is solid will recognize the nonsense for what it is and give it no further thought.

The ad agency and its client really messed up. I think the math phobics would be turned off by the ad because of the math and by extension, not consider the company. I believe people who know some math would not be kindly disposed to a company that would get it all so wrong. Given what is on display, would you trust an investment broker that would certify the guy in the picture as a "math genius"?

What a missed opportunity! What a shame! The ad agency could have gone to any competent grade 9 student and said, "Here is fifty bucks! Fill this blackboard with math!" The student would no doubt have come up with glorious results by comparison with, with, arrrgggg, that GARBAGE.

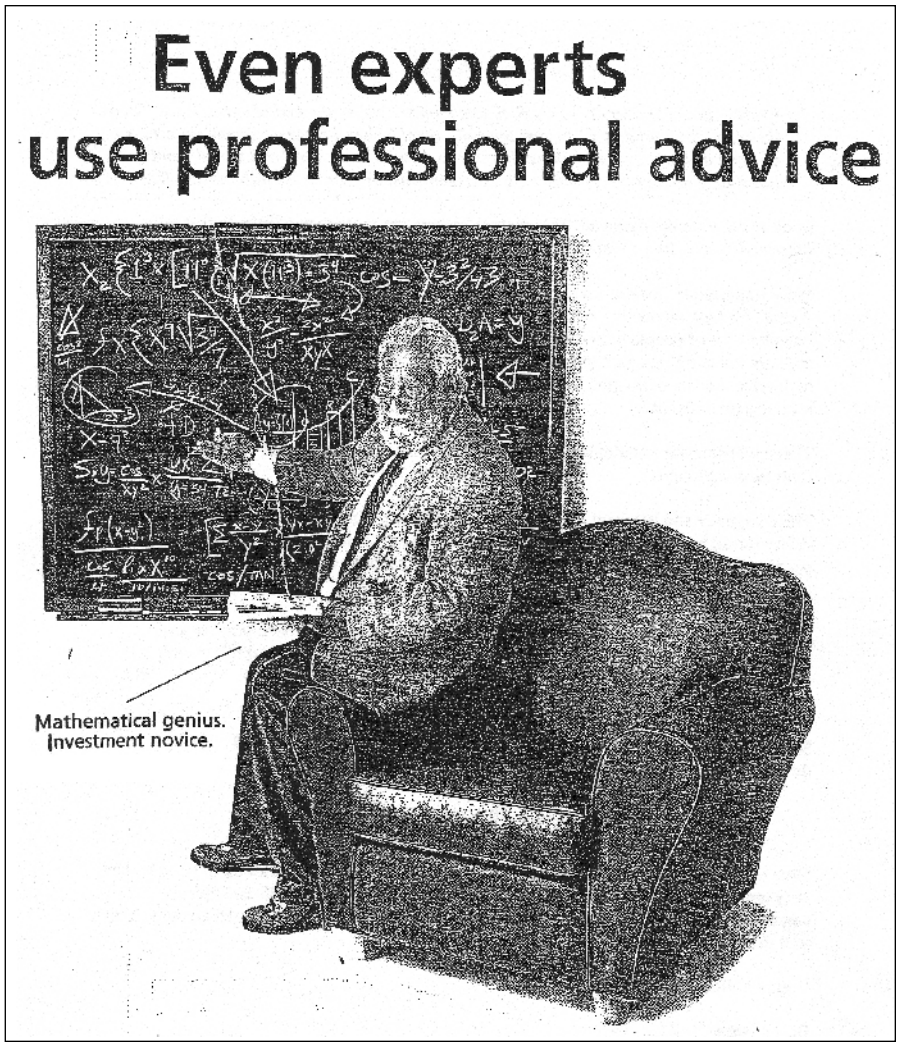
So discuss this with your class as a Friday Special. Maybe, as a pre-holiday activity, devote a class or two to the following project:

"Fill this sheet with math!"

Give each student a sheet of bristol board, provide the markers, and let them go at it. The only instruction: Whatever goes on the sheet has to be related to math and must be correct. They will have fun. They will consolidate and solidify a lot of mathematics. You will get terrific posters to display in your classroom.

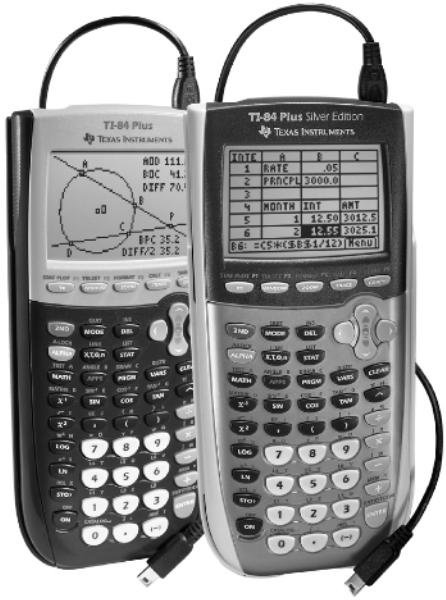
Happy holidays!

Best wishes, Jack



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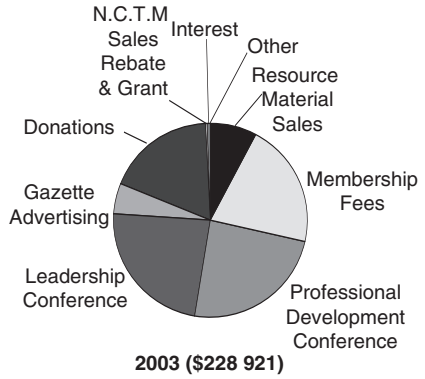
OAME/AOEM Financial Statement

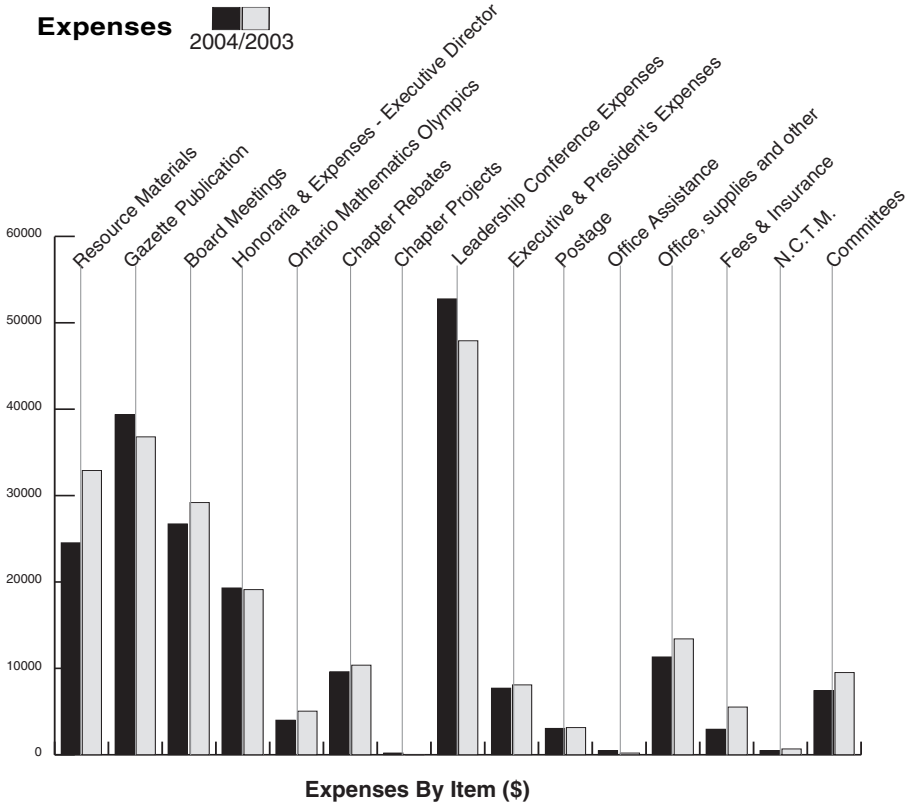
Notice to Readers

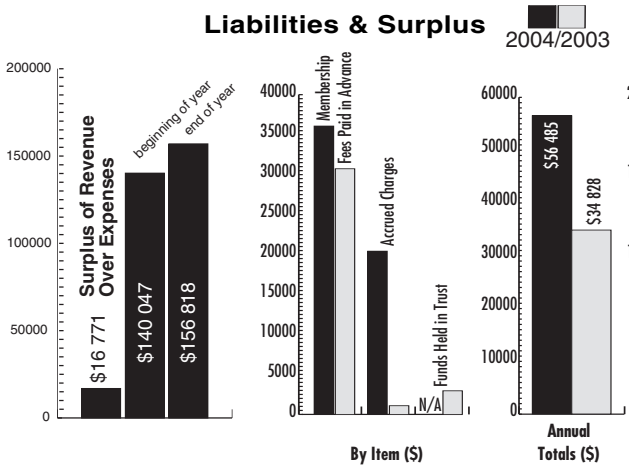
We have compiled the Balance Sheet of Ontario Association for Mathematics Education (Association Ontarienne Pour L'Enseignement Des Mathematiques) as at August 31, 2004 and the Statement of Operations and Operating Fund Balance for the year then ended from information provided by management. We have not audited reviewed or otherwise attempted to verify the accuracy or completeness of such information. Readers are cautioned that these statements may not be appropriate for their purposes.

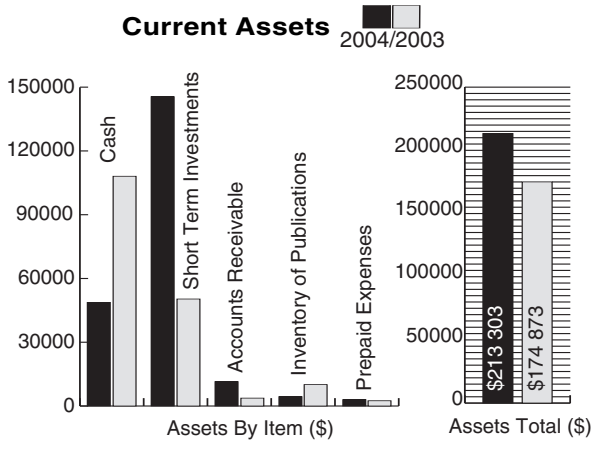
London, Canada September 9, 2004
ANAS, SMITH & GRIFFIN Chartered Accountants











▲ Directors' Dialogue



Jacqueline Hill is a teacher of mathematics at Port Perry High School. Her involvement in the mathematics education community includes Course Profile writing, Workshop Leader, Pine Ridge Math Association President, and writer for Nelson Thomson Learning.

Happy Holiday Season!

I am now truly a Director. A special thanks to all those OAME members who voted for me. This edition of *Directors' Dialogue* highlights events at the Friday and Saturday October 1 and 2, 2004 OAME Board of Directors' meeting at the *Holiday Inn Select*, Toronto Airport.

The Board Meeting was called to order at 7:35 PM. President Gord Cooke welcomed new members Barb Vukets (GVMA), Joanne Anas (COMA), Andrew Morrison (MAC^2) and Tara Tasker (Y^{4}MA for Anne Yeager).

Gord welcomed Myrna Ingalls from the Ministry of Education as our guest speaker. As some may recall, Myrna was a very influential OAME Director. She has had direction and passion for the 12 or so years I have known her. She took this passion for Mathematics to the MoE two years ago. Currently she is in the *Curriculum and Learning Resources Policy Unit*. She introduced the *Learning Math Success* report from the Expert Panel. She highlighted the role of the teacher and priorities for action. It will be implemented over multiple years and will not use the "train the trainer" model. The report is available on the provincial government website. Myra took time at the end of her presentation to compliment OAME on the quality of the *Gazette*.

The rest of Friday night and Saturday were spent in committee meetings.

Other Highlights

Chapter Reps Meeting: The Chapter Reps met Friday afternoon to work on their web pages. We have over half of our Chapters with web pages. They can be accessed on the **oame.on.ca** web site. A special note of interest: the NOMA Chapter came short handed to the meeting, but in the 24 hour time span was able to put together an entire web page and have it live by the end of the weekend and use it to register people for their Fall conference. It gave some of the other Chapters more energy to get those little things done. Thanks Dan.

CoChair OAME 2004 Paul Fennell and CoChair OAME 2003 Jacqueline Hill gave Chapter Reps information on the advance planning required to host an OAME Annual Conference. Contact them for details.

Equity Committee breakfast: John Ferguson chaired the meeting. The committee is considering producing a poster based on the *Learning Math Success* document which relates to equity issues. The Equity Committee along with Publications will pursue the idea of producing such a poster. Joyce Tanner pointed out that funding for the TIPS training was unfair to Northern Boards and some had no money left after travel expenses, to cover training costs.

Sharing: Judy Dussiaume spoke about at-risk kids and "baggie" activities that would work really well with those students. She took us through *The National Library of Virtual Manipulatives for Interactive Math* web site. Greg will add this to the "Quick Links" on our web site.

Web Site: Web master Greg Clarke reported that the revised web site became active in July 2004. Chapters will be able to display their information. A secure link for OAME members only, will include the following: *Gazette* articles and BLM, resources, conference keynote speeches, votes, opinion polls. The *Think Literacy* document created by Judy Dussiaume and Charles Wyszkowski, for Grades 7 - 12, will be posted on the OAME web site soon.

Chapter Reports

CHAMP – Rep: Lynda Fernyhough The focus this year is to get elementary and secondary teachers together. CHAMP is again hosting two math contests: elementary in the fall and secondary in the spring of 2005.

COMA – Rep: Joanne Anas COMA hosted a Fall conference on Sat November 6 2004 at Ottawa University. A Spring Forum will be held in 2005. Check their web site for details. Congratulations to Beata Myhill (Sept 2004 OMG cover photo) on her Union Gas Award.

GOLDEN – Rep Elizabeth Pattison Golden met in October 2004 to plan their 2005 mini conference.

GVMA – Rep: Barb Vukets Their mini-conference was held October 21st 2004. It was a great success. It featured 3 sessions, dinner and speaker.

ISOMA – Rep: Chris Kirkpatrick Visit the ISOMA web site to register for membership and to obtain/share information. A Fall conference was held in November

2004 at St Andrews College In Aurora. **http:/www2.hts.on.ca/middle/isoma/**.

MAC² – Rep: Andrew Morrison MAC² held a successful mini conference on September 30 2004 in Bracebridge with 130 attendees. Trevor Brown and Don Fraser were featured speakers. New Chapter Rep Andrew Morrison is a teacher at Shanty Bay Public School. The Junior Math Challenge will be held April 6 2005 in Midhurst at the Simcoe County DSB Office. A Spring mini conference will be held April 21st at 4 pm in Barrie ON. Location TBA.

NOMA – Rep: Sue Melville NOMA hosted their annual Fall min conference October 15 and 16 in Sudbury. Theme: "Let's Explore in 2004". Keynote speaker was Charles Wyszkowski from Durham Region District School Board..

NWOAME – Rep: Maribeth Williams Several meetings have been held to plan their second annual Math Fest 2005. Dates are February 17 and 18 2005 at the Travelodge Airlane Hotel in Thunder Bay. Theme is "Problem Solved!". Speakers are being contacted.

PRMA – Rep: Sandra Jean Price This year PRMA is hosting Fall and Spring mini-conferences. The Fall mini conference was held on October 28, 2004 in Ajax with the theme: "Math – Make it Happen". PRMA is working with Faculties of Education in their area to raise awareness and membership in PRMA and OAME. PRMA had a logo contest and the winning logo is posted on their web site.

QSLMA – Rep: Robert Sherk The Fall mini conference was held November 9 2004 at Queen's University. Keynote was Stewart Craven. Email newsletters are being used to share QSLMA activities and news. A web site is under construction.

SAME – Rep: Sumintra Koowar A Fall mini conference was held November 4 2004. Preparations to host OMO 2006 are underway. CoChairs are Merilyn Fox and Linda Edwards. Volunteers welcome!

SWOAME – Rep: David Petro SWOAME plans to hold some workshops for presevice teachers. These will focus on the use of technology in secondary math classes. A dinner workshop is also planned.

TEAMS – Rep: Pat Margerm TEAMS is gearing up for the OAME Annual Conference 2005. Keynote speakers are David Suzuki, James Stigler and David Onley. Many featured speakers are in place. The event is May 12 - 14 2005 at York University. Theme: NEXUS: Building Mathematical Connections. Visit the OAME web site and link to the 2005 Annual Conference for more information.

WOMA – Rep: John Ferguson The "Dinner and a Manipulative" series continued on November 10 and 17 2004. A spring conference is in the planning stage. WOMA will host OAME Annual Conference in 2007 in London. Conference CoChairs are Cathy Lynch and Heather Summers. Volunteers welcome!

Y4MA – Rep: Rosey Mastrofrancesco The Fall conference was held October 14 2004 in Unionville, featuring Don Fraser as keynote speaker. The Chapter is continuing its monthly prize for new members and is contacting those members who have not renewed.

Enjoy your holiday beak. Take time for family fun and rest, rest, rest for your return in January.

Yours in Mathematical fun,

Jacqueline ▲

(Get Interactive~ Continued from page 19)

secondary teacher is that she used to teach middle school. When she faced her former students after the transition to high school - hers and theirs - and she found that they didn't know what they were supposed to know, she had to put her own teaching under the microscope.

Article: "People started sharing, letting their guards down"

http://www.catalyst-chicago.org/12-99/129corkery.htm

This article describes a Grade One teacher's approach to standards-based assessment, and the way that she involves her students. The sharing of best practices among the teachers in her school, prompted by a school-wide focus on detailed examination of student work, is described in an honest and clear narrative.

Lesson Study in Bellevue

http://www.bsd405.org/lessonstudy.html

Closely linked to the idea of classroom narrative is the powerful "lesson study" approach. Bellevue District in the U.S. has developed a powerful and pervasive approach to staff development. This site describes their approach, and includes a number of articles and presentations, such as the introduction to Lesson Study by James Stigler **http://www.bsd405.org/ lessonstudy.mov**. ▲

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