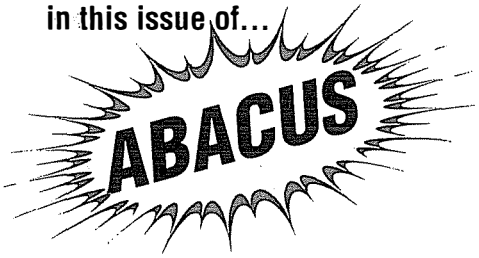
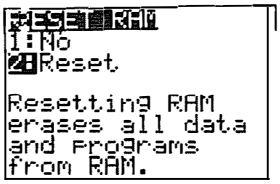
Vol. 40 #4, June 2002

# Ontario Mathematics Gazette

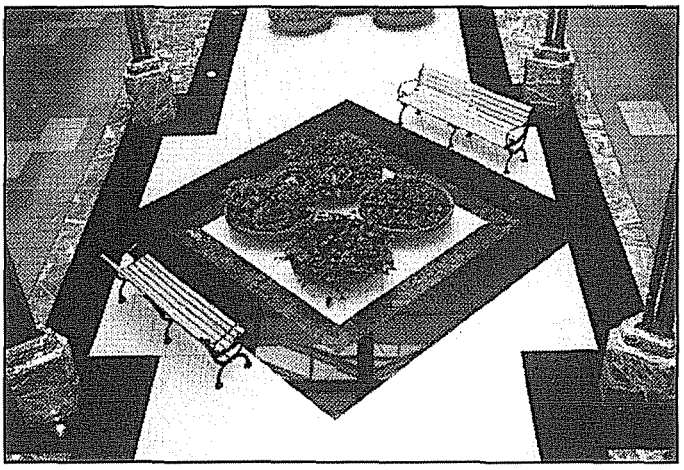
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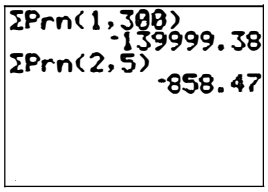

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## Photo Math in New Orleans

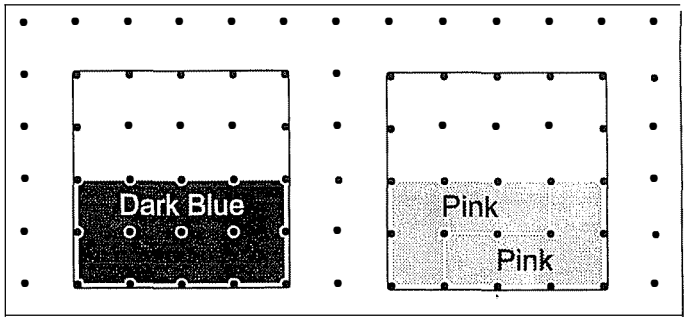


## Amortization Tables




## 2002 Number Fun ...

| NUMBER OF ZEROS | NUMBER OF ONES: 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|
| 0 | | | | | | | |
| 1 | | | | Q | K | | |
| 2 | G | | | R | R* | S | T |
| 3 | | P | N | F | | B5 | B2 |
| 4 | A | R* | R* | B1, R* | | | L** |
| 5 | J | L | E | R* | V | W | |
| 6 | H | R* | M | B3, R* | X | | L** |
| 7 | | L* | Z | | L** | | |
| 8 | | | Y | | D | B6 | |
| 9 | | C, L* | U | B4 | L** | L** | |




## Equivalent Fractions ...

ONTARIO ASSOCIATION FOR MATHEMATICS EDUCATION
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- ▲ Assessment Corner: Designing Tasks and Test Questions
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- ▲ Parents: The Logical Link for Supporting Children's Mathematical Understanding (Part 1)
- ▲ Millions of Numbers Sighted at Statistics Canada Web Site, www.statcan.ca: A Daily Dose of Data

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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.* Diagrams and figures should be drawn by computer, if possible, or neatly drawn in black ink in camera-ready form. If a student's name, picture, or work is used, the author must obtain permission for its use. The editor reserves the right to edit manuscripts for publication. Once an article is published, the copyright ownership belongs to OAME. You will receive a complementary copy for your files.

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# ▲ Editorial




**LOUIS LIM, EDITOR**
**E-MAIL: Louis_Lim@edu.yorku.ca**


The end of another school year is rapidly approaching! The 2002/03 school year will be no easier: six new grade 12 mathematics courses, the double cohort, refine existing courses, continue with the implementation of reforms in assessment and technology (the recent Ministry-licensed statistical software, *Fathom!*, will be in our schools in September). Hence, a lot of challenges lie ahead. Will your journey be modelled by a sine curve next year? A linear growth curve? A parabolic curve? An exponential growth curve? Time will tell, but we will all be stronger teachers from the experience.

Rest assured that your subject association, the Ontario Association for Mathematics Education (OAME), will continue to play a prominent role in supporting mathematics educators in Ontario. Your OAME board of directors is composed of elementary, secondary, and post-secondary educators who are dynamic leaders. Do not hesitate to contact any of them – they are here to assist and work on your behalf. Local chapters have hosted fall and/or spring conferences focusing on the implementation of the new mathematics curriculum. The annual OAME provincial conference has just occurred. The OAME web site, www.oame.on.ca, continues to be used extensively to download items such as sample final examinations and the CARE packages. The *Gazette* and *Abacus* are quarterly publications sent to every member to provide professional reading and classroom ready (and tested) resources.

As your editor, I strive to provide readers with articles and columns that are of relevance at both the elementary and secondary levels. I have included columns that address effective use of technology (Fred Ferneyhough), assessment and evaluation issues (Chris Suurtamm), and mathematics connections (Ron Lancaster). I am currently looking into other columns that would address important areas. Stay tuned!

In addition to the regular columns that appear in the *Gazette*, our journal consists of refereed articles. There is an urgent need for readers to submit their classroom-tested activities or to write professional articles for the *Gazette*. Manuscripts pertaining to the implementation of the new Ontario Mathematics Curriculum is highly

sought. Each manuscript is sent to several reviewers who provide suggestions that make already good manuscripts even better. Another way to contribute to your journal is to write a *Letter to the Editor*. Furthermore, I am always on the lookout for educators interested in reviewing one to three manuscripts annually for the *Gazette*. If interested, please contact me via e-mail: Louis_Lim@edu.yorku.ca.

There are many people that I would like to acknowledge for their invaluable contributions to the *Gazette*. Their efforts have advanced mathematics education.

ASSOCIATE EDITORS:
John Egsgard
Todd Romiens

COLUMNISTS:
Fred Ferneyhough
Marilyn Hurrell
Ron Lancaster
Frances Schatz
Chris Suurtamm

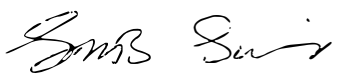
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To every *Gazette* reader: Enjoy a well-deserved and restful summer as you get re-energized for the upcoming new school year. Give yourself a pat on the back for your dedication and commitment to your students.



Louis Lim

Editor, *Ontario Mathematics Gazette* ▲

# ▲ In-Coming President's Message

**MARG WARREN**
**E-MAIL: margaret.warren@peelsb.com**

As I begin my year as OAME president, I reflect upon my career as a mathematics educator. Chalk, overhead projectors, scientific calculators, protractors, examinations, and marking schemes have given way to computers, view screens, graphing calculators, CBRs, dynamic geometry software, performance assessments, and rubrics. Most mathematics classrooms are very different places today than they were when I came into the profession.

Keeping up with the changing demands of new curricula, pedagogy, and assessment techniques have been a challenge for mathematics educators at every level. I have watched teachers engage in this challenge with enthusiasm and with just a little trepidation. I am proud of the support that both OMCA (Ontario Mathematics Coordinators' Association) and OAME have given to teachers at every step along the way. These groups, and the individuals that represent them, have worked with the Ministry of Education and Training and EQAO to achieve the best curriculum, resources, and assessments that are possible within strict political constraints. These individuals, and the boards they work for, have volunteered many hours of time to meetings, reviews, and writing teams in order to meet unreasonable timelines and budgets. They have lobbied financial support from publishers, private sector companies, federations, and other sources. The associations have worked together to produce and share excellent support documents and to collaboratively plan and offer high quality professional development through conferences, summer institutes, and other workshops.

I have viewed education from many perspectives throughout the last fifteen years since I have been a teacher, department head, coordinator, author, freelance consultant, EQAO Education officer, vice principal, and above all, a parent. In each of these roles, I have gained a unique perspective and understanding about the complexity of the education agenda. I also had the rich experience of serving on the Ministry Expert Panel and the Feedback Panel for the most recent secondary curriculum reform. Listening to the opinions, concerns,

and wishes of each of the stakeholder groups was eye and ear opening. For the most part, there was strong agreement among all groups in terms of what results were wanted from the curriculum – committed, well-prepared, and socially responsible young people who have good critical thinking and problem solving skills. The university, college, and workplace representatives all lamented that this description did not match many of the students they were currently working with, and thus the only sensible conclusion was that a very different type of curriculum was needed. Changing the list of content to a slightly different list and squeezing the same amount of content into one less year was not seen as a desirable goal. The discussion quickly changed from one of "how to maintain current standards" to one of describing what standards we were after and then how might we best teach students to guide them towards those standards.

We are about to enter the last official implementation year of the new curriculum. Of course, we all know that full implementation will not be achieved for many years since we strive to continuously improve and learn better ways of delivering this new curriculum. New tools, materials, and resources are being developed with teachers becoming more comfortable with using technology in the classroom, learning through investigation and inquiry, and applying rubrics and exemplars in evaluating student work. Next year, the focus will be on grade 12 and the first group of students to graduate from the four-year program. The new courses offer exciting challenges for teachers as they plan for students who are now much more comfortable with technology, problem solving, and communicating extensively in mathematics. The graduates entering university and college from these new grade 12 courses should demonstrate very different skills and the challenge will then turn to the faculties in those institutions to adapt their courses and teaching methodologies in such a way so to capitalize upon the strengths of their first year students.

The results of the first grade 9 EQAO assessment have verified a couple of things. Although great care must be taken in making any kind of comparisons, the achievement of students across the Province would appear to be considerably better than it was on the previous sample assessment that was given. Generally, students are not yet achieving at the high levels we would like them to be achieving. We still have a lot to learn about how to instruct and assess students in the applied program. After speaking with Principals and Vice Principals about their results, it seems clear that the best results came from those classes in which the teacher was diligently teaching according to both the expectations and the philosophical intent of the new curriculum. This is good news in that it shows there is a strong correlation between the curriculum and the assessment and that we should now know what needs to be done in order to improve the results. We need to analyze, listen, and learn from those who have good results and to create action plans for improvement.

One of the most important and yet often neglected factors to successful reform is the need for strong and extensive professional development for all teachers. Throughout most of my professional career, I have been in the company of friends and family members who work in business environments. When a new piece of software is introduced in their work, they are sent to a full day of training. They are routinely sent to training courses to improve their selling, management, or personnel skills. Over the last ten years, teachers have been asked to implement extensive new curriculum, apply completely new strategies and tools for assessment, integrate numerous pieces of software for instruction, evaluation, and report cards, consider different learning styles and multiple intelligences of students, teach with the brain in mind, adapt programs for special education and ESL students, cope with a changing social infrastructure, act as a teacher advisor for their students, and do all of these in a political environment that is continually demanding more and more public accountability.

I now work as a Vice Principal in a large suburban secondary school. My biggest shock in the role has been the neediness of some students – both the depth and breadth of the challenges that they bring with them everyday to school. My second shock has regretfully been how under-serviced and consequently unable the education system is to help these students. Professional development of all educators should not only be mandatory, but it should be paid for and allowed for as conditions of employment.

The typical model used to train teachers is "train the trainer". The Ministry trains one person from the Board for about three days, that Board person then trains a small team of trainers for 2 days, the team of trainers then trains one person per school for 1 day, and the person from the school is expected to go back and train everybody else in the building with no days. This has always seemed upside down and backwards to me. The

person who probably already understood the best got the most days of training and the people who don't understand at all have to try to fit their training into a staff meeting which lasts 1 hour at the end of a day. Because teachers are dedicated people, they take it upon themselves to attend workshops or institutes on weekends and in the summer. Occasionally, they may get to attend a conference during the school year. We need to creatively look for new models of professional development that allow teachers to learn and grow more while they are engaged in their daily activities. They need time to share and work together with colleagues when they explore new and better ways to engage students in learning.

The mathematics community of educators has worked tirelessly and closely together since the curriculum has been developed and implemented. We have built strong relationships across the different sectors of elementary, secondary, and post secondary education. We have looked to groups like OMCA, OAME, and the Fields Forum to represent our views. We are beginning to see the results of this strong collaboration with our students at all levels since they are performing better on national and international assessments. As we forge into the challenging year ahead, we will remain strong in our goal of ensuring that all students can learn mathematics more successfully.

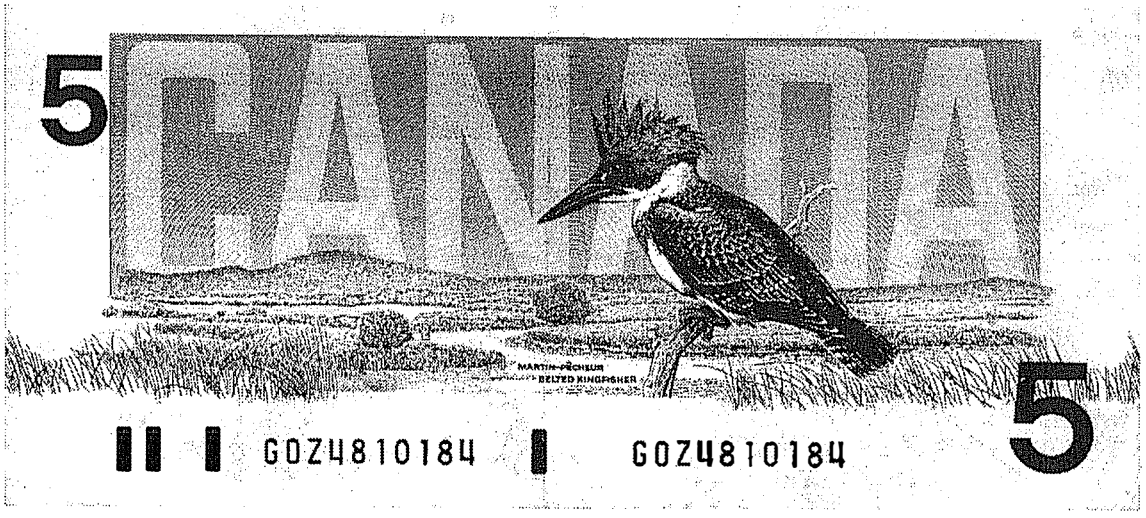
I look forward to supporting, serving, and representing mathematics educators across Ontario in my role as president of OAME. ▲

# ▲ From the Editor's Desk... Palindrome Alert!

Since 2002 is a palindromic year, it is ideal to search for RADAR BANK NOTES (note that "radar" is also a palindrome!). Radar notes are highly sought after by paper money collectors. For instance, in crisp uncirculated condition, a $20 bill from the current Birds series would be worth $400 for a solid numbered note (i.e., entire serial number is made up of a single digit); $50 for a two-digit numbered note (e.g., 7757577); $35 for either a three-digit or four-digit numbered note, and $250 for an ascending/descending ladder radar note (e.g., 3456543 and 6543456). A very fine note (with some circulation and folds) is worth 40% of the crisp uncirculated value. Before spending your bills next time, have a quick check to see if it is worth more than face value.

Please read my *The Palindromic Treasure Hunt* article in the March 1999 issue of the *Ontario Mathematics Gazette* for some probability and number sense problems. Although originally intended for my grade 9 students, I stuck the published article on my classroom door. One of my grade 12 students read the article and then spent 30 minutes after work at the Bingo Hall searching through the numerous stacks of bills for a radar note. He found one (see below) and that made me a very happy mathematics teacher! Although initially unwilling, he eventually decided to exchange it with me: "You need it more than I do. And, I'll probably spend it."

So, for the upcoming summer, be on the alert for Radar Bank Notes! Share the experience with your students. Louis Lim, Editor. ▲



# 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.

## MONA MACGREGOR AWARD

In recognition of the contributions made by Mona MacGregor, former OAME/AOEM Co-Secretary-Treasurer, OAME/AOEM established the Mona MacGregor Award. 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.

## MORLEY MACGREGOR AWARD

In Memory of the late Morley MacGregor, former OAME/AOEM Secretary-Treasurer, OAME/AOEM established the Morley MacGregor Award. The award is to be given annually to recognize an elementary teacher who has demonstrated excellence in mathematics education, as well as contributing to the overall development of students beyond classroom activities.

## DON ATTRIDGE AWARD

In recognition of the contributions made by Don Attridge, a founding member, former president, and the previous Executive Director of OAME/AOEM, OAME/AOEM established the Don Attridge Award in the spring of 1995. The award is presented annually to recognize an exceptional and creative secondary school mathematics teacher who enhances the teaching of mathematics in Ontario.

## AWARD NOMINATION COVER PAGE

**Send to: Stewart Craven**

**Intended Award (please check one)**

❑ Life Membership ❑ Mona MacGregor ❑ Morley MacGregor ❑ Kenneth D. Fryer ❑ Don Attridge

### 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 ( ) _____

# ▲ Out-Going President's Message

**SHIRLEY DALRYMPLE**



As I reflect on the past year as OAME president, I think of the many interesting people I have met, along with the amount of talent in our organization and in mathematics education across Ontario. The Leadership Conference, "Looking Forward, Reflecting Back", was very successful because of the dedicated, competent, and energetic workshop leaders and the 130 participants who spent almost two days focusing on their area of interest from JK to Grade 12. Sessions were built around topics like reporting and assessment, investigations using manipulatives and technology, touring the new Grade 12 mathematics courses, and the unique challenges of the Essentials and Workplace courses. The OAME Annual conference in Barrie offered a wide range of topics and speakers to stimulate many interests and needs. It also reiterated that there are many students having wonderful experiences in mathematics classrooms all across the province.

It has been a pleasure to serve OAME during such exciting and difficult times in education. I have had the opportunity to teach one of the new grade 11 courses. I experienced first hand some of the positive changes that are occurring because of the new curriculum and also dealt with some of the frustrations of delivering new courses in a very rushed implementation. I have noticed that we are collaborating more, no doubt, because there are not enough hours in the day. Sharing ideas and resources make us all stronger. Many teachers are now looking to OAME and OMCA for help with additional resources. Once again, we have formed a partnership in order to prepare resources for the new Grade 12 courses. These will be available on the OAME web site (www.oame.on.ca) sometime in July, and will also be shared at summer institutes across Ontario. The implementation of the new Grade 12 courses promises to be challenging and OAME is committed in playing a prominent role. Please check our web site regularly because we will be posting resources from JK to Grade 12 as soon as we have them ready.

At OAME, we have worked for many years towards having the Ministry of Education and Training, the federations, and other agencies work with us on various projects. It is rewarding that OAME is now regularly consulted for input on new initiatives. It has been an honour to participate and contribute in some small way to the many ongoing projects currently running, many designed to help with the implementation of the new curriculum. I will continue to attend meetings when the executive requests; it is important that OAME participates whenever we have the opportunity.

In spite of some of the negative media press, I truly enjoy being a teacher, especially a mathematics teacher. In the seventeenth century, Galileo Galilei said, "The great book of nature can be read only by those who know the language in which it is written. And this language is mathematics." More recently, Graciela Chilchilnisky, a world economist stated, "Mathematics is at the core of the most exciting applications today. Mathematics works for today's society like fossil fuels worked for industrial society." Mathematics is important and mathematics teachers play a vital role in the education of our young people. I am proud that I am a part of this group. I will continue to work for mathematics education in my school and in the province. I look forward, with a little trepidation, to the final implementation year. Perhaps when it is over, we can reflect back on all the new courses and spend the time needed to fine-tune and make them better. There will still be much to do.

In closing, I extend best wishes and support to the incoming President, Marg Warren, the Executive, and the Board of Directors of OAME. Thanks very much to Dave and Sue Hessey, the Executive Directors, who are the lifeblood of our organization. It has been a very busy but truly enjoyable year.

Shirley Dalrymple ▲

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Mathtype™ was used to create formulas in this issue of the OAME/AOEM *Gazette*.
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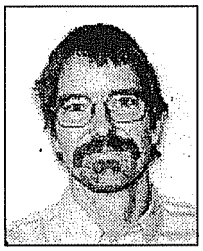
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Do not send cash or cheque. ▪ You will be invoiced with shipping and handling costs added.

# ▲ 2002 Number Fun

**TIM SIBBALD**



*Tim Sibbald teaches mathematics and physics at Clarke Road SS in London, ON.*

The annual quest for special number properties of the year 2002 is here. What makes 2002 special?

- The number 2002 is a palindrome. If you reverse the digits, you get the same number.
- When was the last time that happened? (Answer: 1991)
- When will it happen again? (Answer: 2112)
- The number 2002 has four prime factors. What are they? (Answer: 2 x 7 x 11 x 13)
- When will we see the next year with four prime factors? (Answer: 2366)
- Which year from this century will possess the most prime factors? (Answer: 2048)
- What is the closest number to 2002 that can be written as a sum of two squares? Hint: Use only the digits 2, 4, and 8. (Answer: $2000 = 44^2 + 8^2$)
- Show that 2002 cannot be written as a sum of two squares. Hint: The answer above can be used.

One way of expressing the number 2002 as a sum of three squares is $43^2 + 12^2 + 3^2$. Aside from simply switching the order of the numbers, are there other ways of writing the number 2002 as a sum of three squares? Can the number 2002 be written as a sum of cubes or fourth powers? (Answer: $6^4 + 5^4 + 3^4$)

The number 2002 has only two different digits: "0" and "2". This can be turned into a fun activity where students are challenged to use their number sense skills to write statements using only certain digits. For example, writing the number 6 using only the digits "2" and "3", there are different solutions: $6 = 2 \times 3 = 2^3 - 2 = 2 \times 2 \times 2 - 2 = 3^2 - 3 = 3 \times 3 - 3$.

A particular version of this problem is to use the number 2002 and the digits "0" and "1". For example, 2002 = 1001 + 1001. Note that simply adding zeros, such as "2002 = 1001 + 1001 + 0", is not allowed. Adding a value and then subtracting the same value, such as "2002 = 1001 + 1001 + 101 010 – 101 010", is also not allowed. To make this even more intriguing, make a table of the number of zero digits and the number of one digits in your formulae and see how many spots you can fill.

Answer: This is such a broad question that it is difficult to determine the full answer. In some respects, the answer will depend on the skill set your students apply to the task. Here is a partial list of answers:

| NUMBER OF ZEROS \ NUMBER OF ONES | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|
| 0 | | | | | | | |
| 1 | | | | Q | K | | |
| 2 | G | | | R | R* | S | T |
| 3 | | P | N | F | | B5 | B2 |
| 4 | A | R* | R* | B1, R* | | | L** |
| 5 | J | L | E | R* | V | W | |
| 6 | H | R* | M | B3, R* | X | | L** |
| 7 | | L* | Z | | L** | | |
| 8 | | | Y | | D | B6 | |
| 9 | | C, L* | U | B4 | L** | L** | |

A = 1001 + 1001

B1, B2, ... = Reserved for Binary solutions listed on next page.

$C = (\sqrt{10\ 000} + \sqrt{10\ 000})(10) + 1 + 1$

D = 1100 + 1100 - 100 - 100 + 1 + 1

$E = (\sqrt{10\ 000})(10)(1 + 1) + 1 + 1$

F = 10 x 10 x 10 x (1 + 1) + 1 + 1

G = 1001 x (1 + 1)

H = 1000 + 1000 + 1 + 1

J = 1000 + 1001 + 1

$K = 10^{(1+1+1)}(1 + 1) + 1 + 1$

L = (100 + 100)(10) + 1 + 1
or $[(\sqrt{10\ 000})(10) + 1](1 + 1)$

This points to the use of rules to generate new solutions from old solutions. For example, every time the number 100 appears, it can be replaced with $\sqrt{10\ 000}$ to generate a new solution, which has two more zeros. Some of these are listed in the table as L*. A second, more complicated rule, is to replace 100 with $10\ 000^{(1/(1+1))}$, which increases the number of ones by 3 and the number of zeros by 2. The relationship in the table is right 3 and down 2. Some of these solutions are listed as L**.

M = 100(10) + 100(10) + 1 + 1 or 1000 + 1101 – 100 + 1

N = 100(10)(1 + 1) + 1 + 1 or [10(10)(10) + 1](1 + 1)

P = [100(10) + 1](1 + 1)

Q = $(10^{(1+1+1)} + 1)(1 + 1)$

R = $[(\sqrt{100})^{(1+1+1)} + 1](1 + 1)$

It is clear that 10 can always be replaced with $\sqrt{100}$ to generate a solution with an extra zero. In some cases, 10 appears more than once and each 10 can be replaced to get more than one extra zero. Solutions made this way are labelled as R*.

S = $(100^{[(1+1+1)/(1+1)]} + 1)(1 + 1)$

T = $100^{[(1+1+1)/(1+1)]}(1 + 1) + 1 + 1$

U = 11 000 + 1001 + 1 – 10 000

V = $(10\,000^{[1/(1+1)]}(10) + 1)(1 + 1)$

W = $10\,000^{[1/(1+1)]}(10)(1 + 1) + 1 + 1$

X = 1000 + 1100 – 110 + 11 + 1

Y = 11 001 + 1001 – 10 000

Z = 1000 + 1100 – 100 + 1 + 1

Binary Answers:

B1 = 11111010010

B2 = 10 x 111 x 1011 x 1101

B3 = 11111010000 + 10

B4 = 11111000010 + 10000 or 11111000000 + 10010

B5 = 1110 x 1011 x 1101 or 111 x 10110 x 1101

B6 = $(110)^{100} + (101)^{100} + (11)^{100}$

Other answers not in the table:

2002 = 1 + 1 + 1 + ... + 1 has 2002 values of 1 and no zeros

2002 = 10 + 10 + 10 + ... + 10 (200 times) + 1 + 1 has 202 values of 1 and 200 zeros

2002 = 100 + 100 + ... + 100 (20 times) + 1 + 1 has 22 values of 1 and 40 zeros

Solutions with no zeros!

$(1+1)^{11} – (1+1)[(1+1)(11)+1]$

$(1+1)[(1+1)^{(1+1+1)}-1](11)(11+1+1)$

And finally, if you notice that the 11th Fibonacci number is 89, then you can find the solution:

$(F_{11} + 1 + 1)(1 + 1)(11)$ ▲

# ▲ Mathematics Challenge at the University of Western Ontario:

## A Programme of Mathematics Enrichment for Students from Grades 5 to School Leaving

**TOM GRIFFITHS**



*Tom Griffiths is a retired high school mathematics teacher who has also taught elementary-aged students, University mathematics courses, and Faculty of Education courses. In addition to being a past OAME president and serving on OAME Council for 21 years, Tom was involved in provincial curriculum development from 1969 to the late 1980's. He has been involved in writing the United States and Canadian Olympiads as well as the Descartes and served as Chair of the Invitational for 9 years. He is an OAME life member and a recipient of a Descartes medal.*

I was a high school mathematics teacher for 34 years and retired in 1995. During my career, I had considerable involvement with mathematics contests, both in preparing students, setting the papers, and marking the solutions. I have been involved in various roles in the United States Olympiad, the Canadian Olympiad, the Canadian Mathematics Competitions Descartes and Euclid contests, and the Canadian Invitational Challenge as Chair from its inception in 1988. When I retired, it seemed a shame not to make use of this experience for the benefit of excellent mathematics students. I also wanted to give local students the opportunity to receive the appropriate coaching to work towards becoming members of the Canadian International Mathematics Olympiad (IMO) Team. I had been coach of the team to Finland in 1985, and had one student on the team to Australia in 1988.

In January of 1996, I started visiting local schools on a weekly basis to help those students who were interested in taking a challenge to excel in mathematics. For the rest of that academic year, I visited several local high schools weekly, for the sake of the few in each school who were interested. However, this turned out to be a very tiring experience, requiring much more effort than benefit warranted. Hence, I reconsidered my strategy and decided that it would be to everyone's benefit, especially mine, if all the students came to me. As it happened, the staff of the local university, the University of Western Ontario (UWO), decided at the same time that they needed to establish an outreach programme for high ability mathematics students. Fortunately, we managed to discover our mutual goals and agreed to combine our efforts. The university was pleased to find someone with experience, and I was delighted that they were willing to provide space to hold classes and provide me with free use of their photocopiers. It has been a win-win situation. Shortly thereafter, the University also provided me with an expense account through which I pay for travel, conferences, and equipment for classes.

In October of 1996, I started with a two-hour class every Tuesday night, and had six or seven regular participants for the full year, growing in numbers nearer the competitions since the students brought along friends and siblings. At the same time, a colleague in a nearby county asked if I would offer classes in her area. In October 1997, I continued the weekly senior classes at the UWO and offered weekly classes at a school in the nearby county. The class at Western continued to grow to a regular 12 to 15 students. I was also asked to help a young, and obviously talented, grade 6 student. I decided to coach him individually, and saw him weekly at his school. He has gradually developed into a possible member of the Canadian IMO team.

In the fall of 1998, the Tuesday senior class at the UWO continued, and due to the University and the local school board giving the class some publicity, it grew even larger. The classes in the nearby county had not flourished. After a period of alternating Mondays with that class and one at Western for grades 9 and 10 students, I changed to a cycle of two-hour, weekly classes for these students at Western. I also had an offer from a retiring Mathematics Department Head, Walker Schofield, to join me, and we split the Tuesday night class between us, one hour each.

Also in 1998, I started a two-hour session, one Saturday morning a month, October through April, for grades 7 and 8 students, and had a most encouraging first attendance of over 40 students. In the first hour, I cover academic work and Gauss contest preparation. In the second hour, Margaret Kemp specializes in more hands-on work such as studies using pentominoes, tangrams, tetraflexagons, and Escher-type art. Kemp is a grade four teacher who coaches and also directs the selection process for the local area Ontario Mathematics Olympiad (OMO) team for grades seven and eight.

Through 1999, we expanded in numbers and improved our communication with the mathematics community, letting more students know of our existence. The UWO appointed a mathematics and science liaison officer, who has assisted us in publicizing our programme to all the schools within an hour's journey of the university. However, the best communication is by word of mouth. I also picked up another two students to coach individually, and arranged for two other mathematics teachers to coach other promising students.

In 2000, we added a two-hour session for grades 5 and 6 on the Saturday afternoon. As with the morning sessions, I share the time, one hour each, with David McMillan, a local elementary teacher. We use the same structure as the morning. The first hour is academic and contest preparation, and the second is hands-on activities. Two other retiring Mathematics Department heads, Charles Scollard and Carl Silke, have joined me in teaching the Monday sessions. I have an hour every week and they share the other hour between them.

Over the last two years, the only change in the programme has been the addition of an extra hour, making three, on Tuesday nights. This enables me to concentrate on preparing students for the Olympiad level material and the American Regional Mathematics League (ARML) Competition, held at Penn State in State College Pennsylvania, an eight-hour drive from us. With Peter O'Hara, a local high school teacher, my wife, and I have taken students to this for the past three years. Last year, we took a complete team of 15 participants.

This school year, 2001/2002, we have a total of 128 students registered in the grades 5/6 sessions, with an average attendance of 90 students. Of these 128 registrants, seven are in grade 4 and one is in grade 2. I think that this offers an opportunity for students to meet peers regardless of age, and provides an atmosphere that encourages having fun with mathematics. Many of these students have no mathematical peers in their own classrooms, some even in their own schools. Forming a peer group for these talented young people is possibly the most important role of the programme. The students

involved are allowed to feel that they are not the only people in their world who love Mathematics. For these students' regular teachers, there is a very useful spin-off in that the books we offer on behalf of the Waterloo Competition Group give these students something useful and productive to do when they have finished their regular schoolwork. With a total registration of 76 students in the grades 7/8 sessions, we are enjoying an average attendance of 60 students per session. There are a regular 40 students at the Monday sessions and 30 at the Tuesday sessions. Not all students attend every session due to other commitments. There are actually about two hundred eighty students registered in all.

The material that we use in the sessions is mainly the Canadian Mathematics Competitions for the various grades as well as the MATH Contest book from the United States Mathematics League. Both organizations have kindly given us permission to copy their materials. As we study the questions in these papers, we often digress into interesting areas. We also teach students the basic concepts needed for the material. Frequently, we have some of the students who are ready for concepts years before they would usually study them in school. We attempt to enable them to continue mathematically at their natural pace. Where appropriate, we also have students share ideas they have recently learned in their own studies.

This year, for the first time, I have started charging the students $20 for the year. This money is to pay for sending them to Mathematics Competitions, since last year I had to raise a total of $7000 to send the students to the OMO and ARML. The students who went did pay some of this, as did the Provincial Mathematics Association, and a very supportive local company, Trojan Technologies, which has sponsored the junior Olympiad team for several years. We also offer a snack to the younger students at the mid-time break on Saturdays.

The reward for our efforts has been in the excellent and improving results that our students have been achieving on contests. Last year, some students wrote contests through our Mathematics Challenge programme, while others wrote in their own schools. The ones who wrote with us scored among the top ten teams in Canada in three of the five high school mathematics contests. We are regularly having students invited to write the higher level contests, and achieving excellent results. A personal reward has been that I have been given an honorary position in the Mathematics Department, with the title of "Mathematics Coordinator". Another very important benefit for me is that my wife, Marlene, has become progressively more interested and involved in the programme, and now takes care of all the business and attendance. This means that we work as a team, with Marlene at many of the sessions taking attendance and collecting money. For a retired couple, this is a great opportunity to spend time together while sharing a common interest.

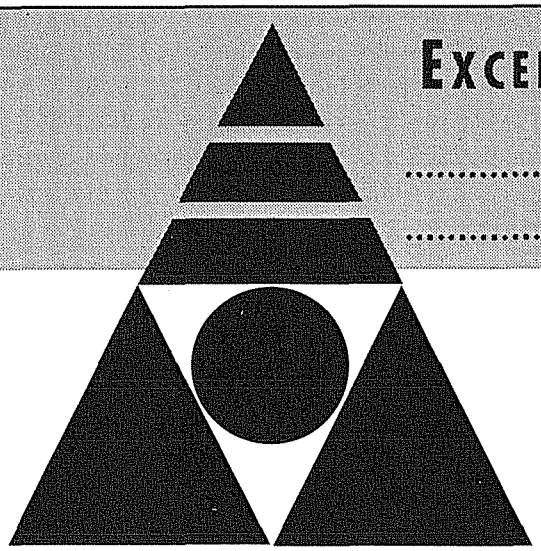
For the University of Western Ontario, the benefit is that the top mathematics students in the area become regular visitors to the campus from a very young age. The University is also given the students' names and addresses, and they send copies of relevant information and newsletters to them personally. As a mark of their gratitude last year, the Dean hosted an appreciation dinner for the team.

I believe that a programme like this could be started in other places. First, you need a university that is willing to give its support to such a programme through accommodation and photocopying. Second, the university needs to help finance materials and equipment, especially for the junior students, and to publicize the programme. You need a retired mathematics teacher or teachers who are interested in passing on their expertise and experience. I have been delighted to find that once we got under way the offers for assistance came in steadily, and the assistance is much appreciated. We also have three other high school and University staff who are willing to take classes for us when necessary. Peter O'Hara now also leads the ARML team, as well as assisting with covering classes when required. One benefit is, as a team, no individual is indispensable, and as retirees, we can take time off for vacations and have the others cover for us. I am hoping when I am no longer able to run this programme, there will be others willing to carry it on.

One of the most appreciated comments we heard is that some of the younger students have gone straight from the class to McDonald's, where they and their friends are engrossed in mathematics, and they stay that way for the rest of the weekend.

I hope that this may encourage others to start a similar programme. I will be pleased to assist with advice and moral support.

I would like to take this opportunity to thank the University of Western Ontario and my colleagues for their assistance and support in this programme. Without your support, the programme would not be possible. I should also emphasize that all participants are unpaid volunteers. ▲



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# ▲ NOMINATIONS FOR OAME/AOEM BOARD OF DIRECTORS 2003-2004

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. Nominations for these positions are to be submitted by 4:00 p.m., January 24, 2003, to:

**Shirley Dalrymple, Past President**

Include the nominee's qualifications with the Nominations Form. A nominee must be a member of OAME. By March 2003, 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 Oshawa, May 2003.

**NOMINATION FORM**

I nominate: _____

For the position(s) of: ☐ President-Elect ☐ Vice-President Director ☐

Nominee's Address: _____

_____

Telephone: H (  ) _____ W (  ) _____

Nominator's Name : _____

Nominator's Address: _____

Telephone: H (  ) _____ W (  ) _____

# ▲ Amortization Tables

DUNCAN LEBLANC

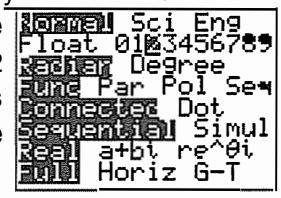


*Duncan LeBlanc is Head of Mathematics at Sir Robert L. Borden BTI. Duncan is an avid supporter of the use of technology in the classroom and incorporates the use of manipulatives. Duncan has consulted and contributed to the Addison-Wesley resources for the new mathematics curriculum.*

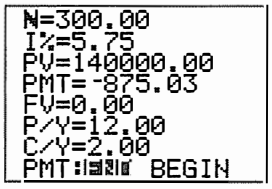
You can construct amortization tables in various ways. Here is one method:

*You purchase a house for $150 000, pay $10 000 down, and mortgage the balance. You amortize your debt with monthly payments for 25 years. What is your monthly payment if your interest rate is 5.75% per annum, compounded semi-annually?*

Since we are dealing with currency, the calculator should be set to round answers to 2 decimal places for dollars and cents. To do this, you access the Mode menu by pressing MODE. Use the arrow keys to select 2 decimal places and press ENTER. The screen should be similar to the one on the right.




1. To access the TVM Solver on a TI-83Plus, press APPS **1: FINANCE...** and select **1:TVM Solver...** .
2. First set-up the TVM-Solver as shown on the right. For **PV**, enter the value of $140 000 (The price – down payment).



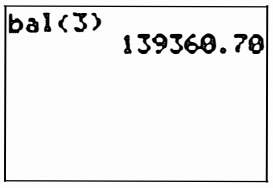

3. Move the cursor to **PMT** and press ALPHA [SOLVE].

   The monthly payment is $875.03.

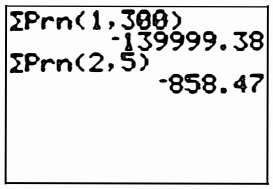
## Notes

There are several key features in the Finance application that work with the TVM-Solver.

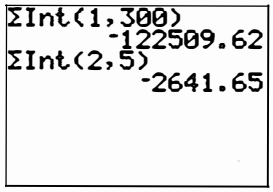
- Press 2ND [QUIT] to return to the home screen.
- Press APPS **1: FINANCE...** to get back into the finance menu.
- Select **9:bal(** which calculates the amortization schedule balance.




- By entering the payment number and pressing ) ENTER, the balance owing is displayed.

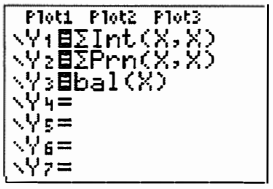



- Press CLEAR.
- Press APPS **1: FINANCE...** to get back into the finance menu.
- Select **0:ΣPrn(** which computes the amortization schedule principle sum.
- Enter the first payment number and last payment number ) press ) ENTER.
- Press CLEAR.
- Press APPS **1: FINANCE...** to get back into the finance menu.
- Select **A:ΣInt(** which computes the amortization schedule interest sum.
- Enter the first payment number and last payment number ) press ) ENTER.




## To Create the Tables

- Select the y-editor by pressing Y=.
- ensure the cursor is beside Y1. Select APPS **1:Finance...** and select **A:ΣInt(**.
- Press X,T,Θ,n , X,T,Θ,n ) ENTER .
- Input the equations in a similar fashion as shown.
- You need to set up the table to show that data for each month. To do this, select the [TBLSET] menu by pressing 2ND WINDOW. The window on the right will appear.




- Change the values to those shown in the window:
  TblStart = 0
  ΔTbl =1




- Press 2ND [TABLE] to view the amortization table.
- Use the arrow keys to scroll through the table. ▲

# ▲ Teaching Fraction Concepts with an Area Model Manipulative

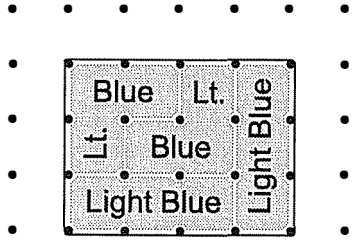
ALICE I. ROBOLD, PROFESSOR EMERITA
MATHEMATICAL SCIENCES
BALL STATE UNIVERSITY, MUNCIE, INDIANA

## Rationale

The National Council of Teachers of Mathematics, in its *Principles and Standards for School Mathematics,* describes the need for students of all levels to understand and represent fraction and rational number concepts, recommends that students use a variety of concrete models to support their thinking about abstract ideas and to assist them in problem solving.

This area model can be used in a wide range of grade levels for a variety of concepts including introducing fractions, equivalence, comparison of fractions, improper fractions, mixed notation, operations, complex fractions, decimals, and percent. Fractions with any denominator from 1 to 100 can be modelled.

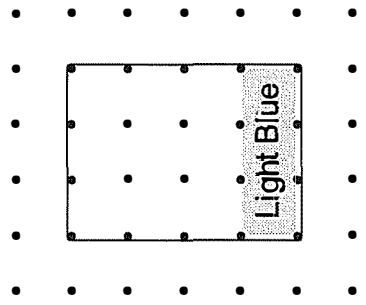
## Using the Area Model




The *Fraction Islands*® model uses ten colours of "islands" that are placed on an 11-pin by 11-pin geoboard. All islands of a given colour model the same unique area, even though they may have different shapes. Islands cover from one to ten geoboard squares.

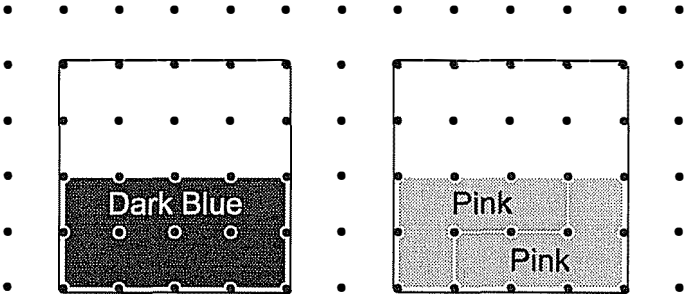
To model a fraction, a *unit region* is chosen and bounded by a rubber band. This *unit* represents *one.* The student uses islands of one colour to fill the unit, as shown in the above figure. *How many fill the unit* determines the *denominator.*

As shown in the next figure, three of the islands have been removed so that only one island is seen in the unit. *How many are seen* determines the *numerator.* Thus, this models $\frac{1}{4}$.



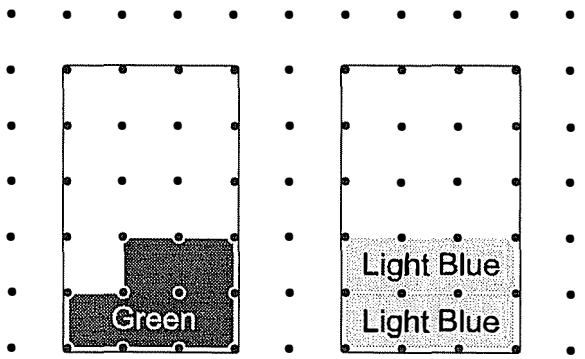

## Equivalent Fractions

In this example, the student finds that two dark blue islands fill a chosen unit, then shows only one of the islands in the unit, modelling one-half. In another model of the same unit, the student finds that four pink islands fill the unit. Two of the pink islands, modelling two-fourths, exactly cover the dark blue island, showing that $\frac{1}{2}$ is equivalent to $\frac{2}{4}$.



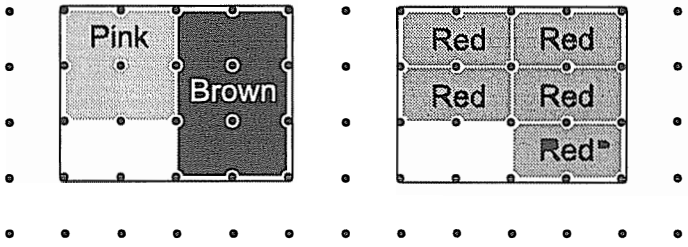

## Comparing Fractions

To find which is greater, $\frac{1}{3}$ or $\frac{2}{5}$, the student models each number in the same size unit, as in this example, then makes a direct comparison by placing the green island that represents $\frac{1}{3}$ over the two light blue islands that represent $\frac{2}{5}$, to find that the light blue islands occupy more area; thus $\frac{2}{5}$ is greater than $\frac{1}{3}$.



## Addition of Fractions

To find the sum of $\frac{1}{3}$ and $\frac{1}{2}$, the student models both in the same unit, then covers the islands with other islands of a single colour that could be used to fill the unit. In this model, a pink island represents $\frac{1}{3}$, and a brown island represents $\frac{1}{2}$. Red islands may be used to cover both of the islands. The five red islands represent the sum $\frac{5}{6}$ in this unit. Another student may cover both islands with yellow islands, each of which covers one geoboard square, showing the sum as $\frac{10}{12}$; but $\frac{5}{6}$ and $\frac{10}{12}$ are equivalent, so represent the same fraction.

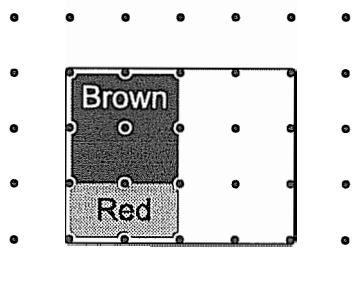



## Subtraction of Fractions

To find the difference of two fractions, the direct comparison method is used, as described. Then the student can find "$\frac{2}{5}$ is how much greater than $\frac{1}{3}$" by covering the light blue that "sticks out" when the green island is placed over the two blue islands. This can be covered by a yellow island that models $\frac{1}{15}$ in this unit.

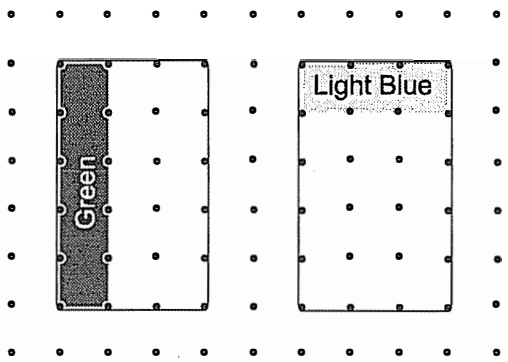
## Multiplication of Fractions

Finding the product of $\frac{1}{3}$ and $\frac{1}{2}$ is modelled as "$\frac{1}{3}$ of $\frac{1}{2}$". $\frac{1}{2}$ is modelled with one brown island in this unit. Since three red islands cover the brown island, then one red island models one-third of the brown area. The one red island represents $\frac{1}{6}$ in this unit; thus the product is $\frac{1}{6}$.



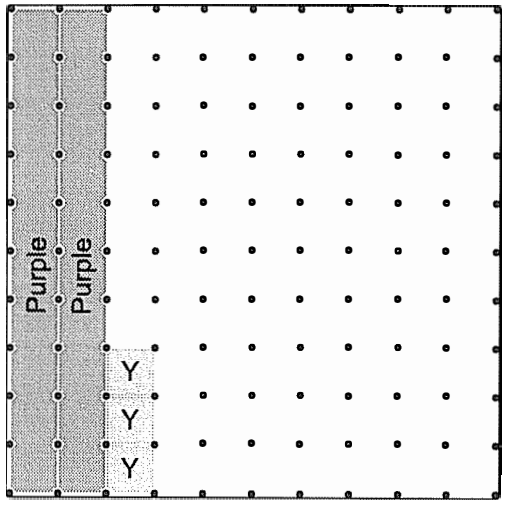

## Division of Fractions

For cardinal numbers, "6 divided by 2" can be interpreted as "how many sets of two are the same size as 6". Similarly, in this area model, "$\frac{1}{3}$ divided by $\frac{1}{5}$" is interpreted as "how many sets of $\frac{1}{5}$ cover the same area as $\frac{1}{3}$"? The student models both numbers in the same size unit, then compares to find that more than one set of $\frac{1}{5}$, but less than two sets of $\frac{1}{5}$ would cover the $\frac{1}{3}$. It takes one set and two-thirds of another set of $\frac{1}{3}$; so $\frac{1}{3}$ divided by $\frac{1}{5}$ is $1\frac{2}{3}$.



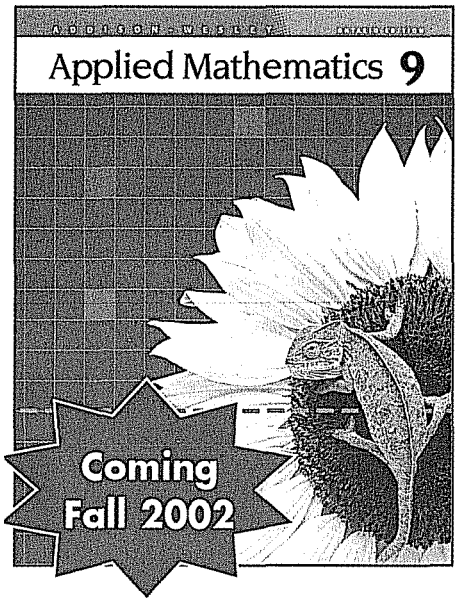

## Decimal Notation

The entire geoboard containing 10 rows of 10 squares is used as the unit. Two purple islands model $\frac{2}{10}$. Three yellow islands model $\frac{3}{100}$. The numeral, 0.23, shows 2 in tenths place and 3 in hundredths place. Using the equivalence concept, the two purple islands may be covered with 20 yellow islands to show 23 yellow islands altogether; thus we name 0.23 "twenty-three hundredths".




## Percent

The area model relates percent to both the common fraction notation and the decimal notation. For example, with the entire geoboard as the unit, one green island represents $\frac{1}{20}$. The green island can be covered with five yellow islands to model the equivalent fraction, $\frac{5}{100}$ or 0.05. We could interpret $\frac{5}{100}$ as "5 of 100" or "5 per 100" or "5 percent".




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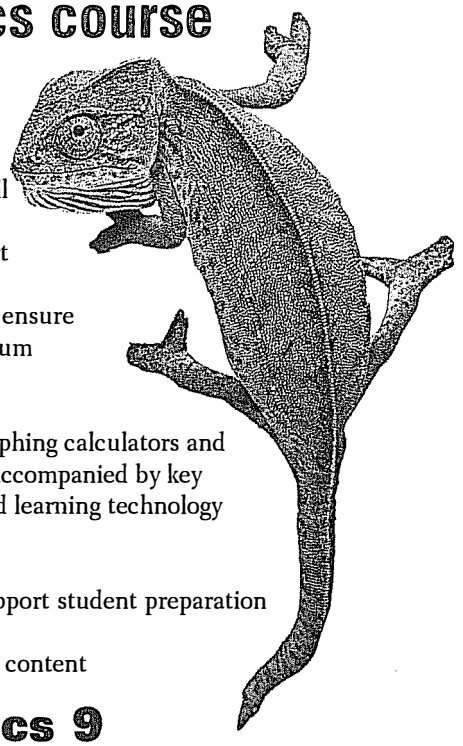
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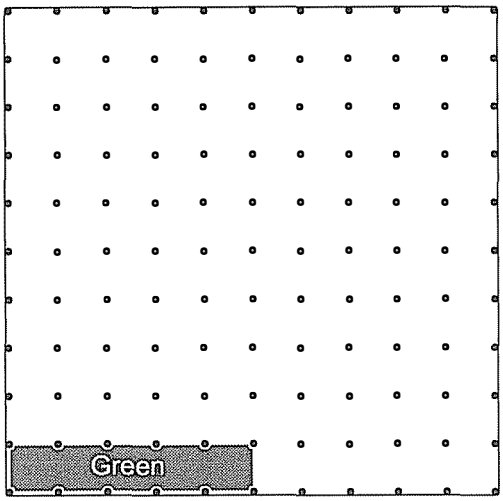
Chapter 1 Relationships
Chapter 2 Slope
Chapter 3 The Line
Chapter 4 Powers and Roots
Chapter 5 Algebraic Operations and Equations
Chapter 6 Polynomials
Chapter 7 Line of Best Fit
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Addison Wesley




## References

National Council of Teachers of Mathematics. (2000). *Principles and Standards for School Mathematics.* Reston, VA.: NCTM.

Robold, A. I., Canter, S. L., & Kitt, N. A. (2001). *Teaching with Fraction Islands®.* Huntington, IN: Pathfinder Services, Inc.

*Fraction Islands® is a registered trademark of Pathfinder Services, Inc., a not-for-profit human service organization that serves and employs persons with developmental disabilities. The organization can be reached via telephone at (219) 356-1583 or toll-free (within the U.S.) at (888) 888-1150. Their web site is at www.fractionislands.org.*

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# ▲ Photo Math - A New Way of Picturing Math

**RON LANCASTER**



*Ron Lancaster is a middle and high school mathematics teacher, currently working throughout North America and Asia as an Independent Mathematics Consultant.*

"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 purpose of this column is to go beyond this notion and to promote the idea that in fact, "A picture is worth a thousand numbers." Readers can expect photos with math in every *Photo Math* column, and the emphasis will be on seeing and doing mathematics everywhere. Teachers may want to assign these questions with their students as part of an overall effort to make connections between the mathematics 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 submit these problems, along with photographs, to the Editor for possible publication in future columns. The Editor of this column does not have a cable modem, and in order to avoid long periods of downloading items, submissions to this column should be sent via Canada Post to the address given above.

## Introductory Comments

These photos were taken during a business trip to New Orleans, Louisiana in 2001. During my trip, I created a Math Trail at the Hyatt Hotel, the Superdome, and in a nearby mall for teachers attending a conference.

For photograph #2, part (a): An alternative to this question is to file it away and find a similar scene where you can use this question (or a modification of it).

## Photograph #1




(a) The above sign lists the rates for Valet Parking at the Hyatt Hotel. For each of the following times, find the cost of Valet Parking.

| time | cost |
|---|---|
| 30 minutes | |
| 58 minutes | |
| 1 hour | |

| time | cost |
|---|---|
| 62 minutes | |
| 3 hours | |
| 3 hours and 1 minute | |

(b) Find the rate for Valet Parking (in dollars per hour) for each of the following cases. How does the rate change from one case to the next?

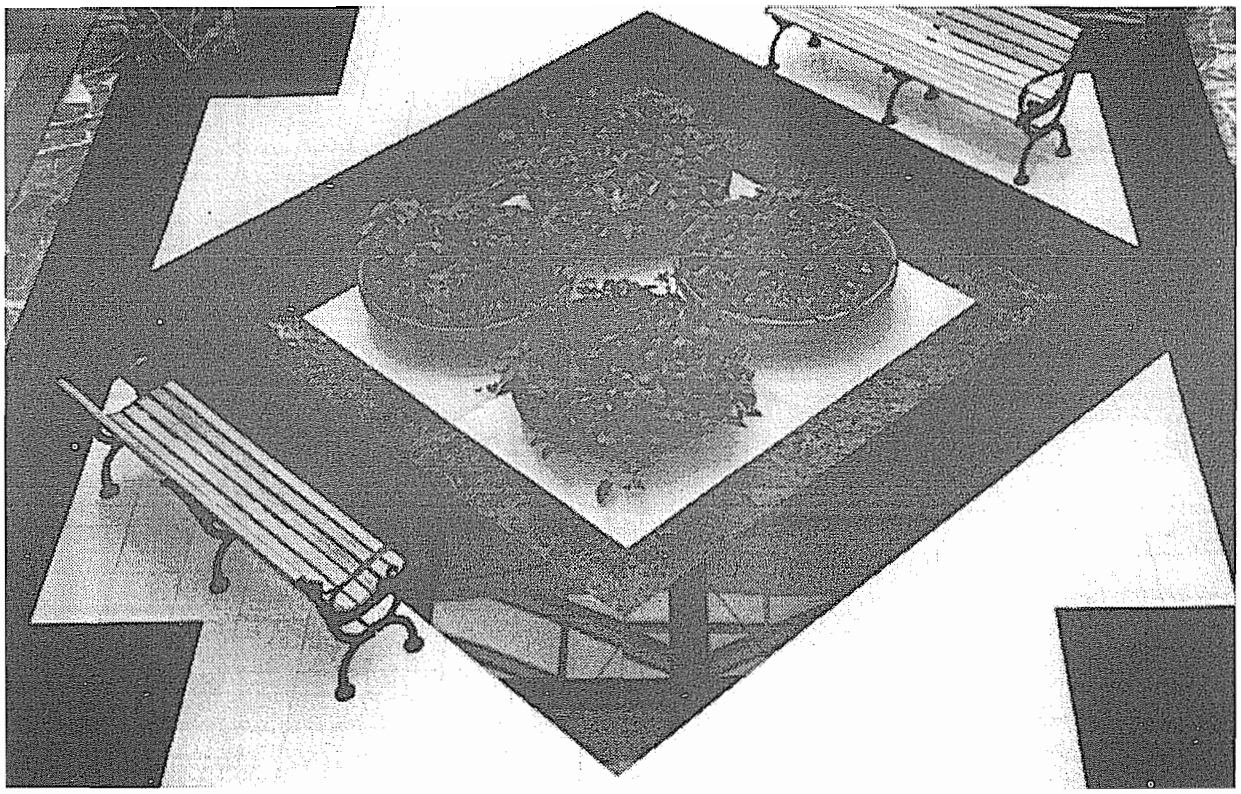
| time | rate |
|---|---|
| 1 hour | |
| 2 hours | |
| 3 hours | |
| 4 hours | |
| 5 hours | |
| 6 hours | |

| time | rate |
|---|---|
| 7 hours | |
| 8 hours | |
| 9 hours | |
| 10 hours | |
| 11 hours | |
| 12 hours | |



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## Photograph #2



Study the arrangement of the four flowerpots in the photo.

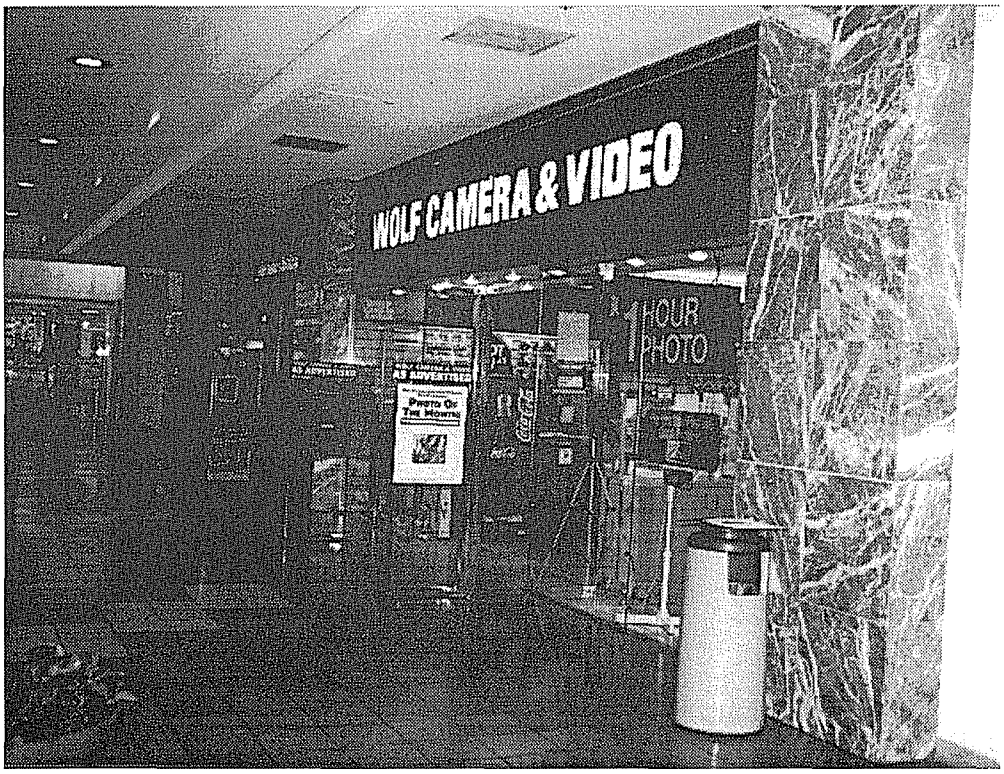
(a) Each pot is situated on a large white square. Using the photo above, estimate the ratio of the perimeter of the square to the circumference of the pot (at the top). Then measure the perimeter and circumference using the photo. Find the ratio. Was your estimate accurate?

(b) Assume that each pot is filled to the top with earth. Suppose that you were to evenly spread the earth from all four pots on top of the four white squares. Estimate the height of this pile. What information would allow you to accurately find this height? What measurements would you need to make in order to determine this information?

(c) In 1967, the group *The Flower Pot Men* recorded a song that involved the name of a large American city. What is the name of this city? (You may need to carry out some research, possibly using the Internet.)

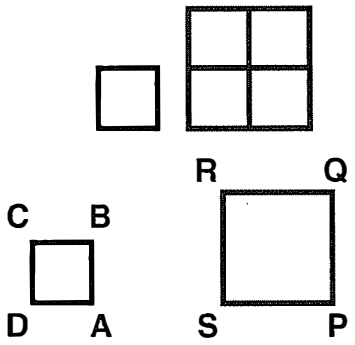
*©2002, Ron Lancaster. Any commercial use or any use outside of a teacher's classroom requires permission from the author.*

## Photograph #3




(a) Some students believe that if the length of each side of a square is doubled, then the area of the new square that is formed is twice as large as the original square. If these students are presented with a diagram like the one given at the right, then they usually realize that this belief is not correct. The area of the new square is clearly four times the area of the original square.

This suggests an intriguing question. What multiplier would lead to a doubling of the area? Suppose that square PQRS is the result of multiplying each side of square ABCD by r. Find the value of r for which the area of square PQRS is twice the area of square ABCD.




(b) The value of r that you have found in part (a) plays an important role in the sequence of numbers (commonly called f-numbers) that appears on the lens of a 35-mm camera. The first ten terms of this sequence are given below. Study these numbers and try to establish a connection to the value of r from part (a).

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.4 | 2 | 2.8 | 5.6 | 8 | 11 | 16 | 22 | 32 |

**The following web sites provide more information about this topic:**

The meaning of f-stop, depth-of-field: acecam.com/message/3694.html

Some Basic Elements of Photography by Chuck Doswell: webchat.chatsystems.com/~doswell/Outdoor_Images/Photo_Basics.html

A Glossary of Photographic Terms: F: www.mir.com.my/rb/photography/glossary/terms_f.htm ▲



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# ▲ Assessment Corner: Designing Tasks and Test Questions

CHRIS SUURTAMM



*Chris Suurtamm is currently teaching in the Faculty of Education at York University. She is an experienced mathematics teacher who is committed to helping teachers with the implementation of new curriculum and assessment practices. Her involvement includes Course Profile writing, EQAO reviewing, research in assessment, workshop leader, and author with Nelson Thomson Learning.*

Often with the implementation of new curriculum, teachers feel as though they need to throw away everything they did before and start anew. Old tests don't seem to match, favourite projects are set aside, and long-standing texts are put on the shelf when an overwhelming number of new resources, textbooks, course profiles, teacher resource books, and web sites come into the schools. New resources have valuable ideas but previous resources and activities also have sound suggestions. Whether old or new, resources often need some adaptation to be useful. How do teachers choose or create good instructional or assessment tasks? How do teachers find or make good test questions?

## What do Teachers Need to Think About When Finding Good Assessment Tasks?

- Poor tasks waste class time, frustrate students, and give teachers misleading information about student understanding. In choosing or designing good tasks or questions, it is important to: Determine what you are trying to find out. Are you searching for understanding or for the performance of an algorithm? Are you looking at problem solving ability or communication skills? Be sure that you are using a task that will focus on what you are looking for.
- Focus on what is important. Is this concept a "big idea"? Is it important to learning a new concept? Is this a skill that will frequently be used? Use a task that concentrates on what is important.
- Determine the criteria for success. Is a correct answer enough? Do you want students to justify their response? Provide an example? Explain their process? Make your criteria explicit in the question or task.
- Decide how the evidence of learning will be used. Is this for diagnostic purposes to find out what they already know? Is it for formative purposes to provide them with feedback about their learning and your teaching? Or is this a summative assessment? Use the evidence of student learning appropriately.

## Finding and Modifying Good Assessment Tasks

There are many excellent sources for sound instructional and assessment tasks, from published sources to teachers' course binders. The following offers resources and tasks as well as a discussion of how these tasks can be adapted to better suit a teacher's or class' needs. Some suggestions:

- A good task can be adapted to many different grade levels:

  The "T-shirt design task" (Schoenfeld, et al., 1999) asks students to imagine that they are describing a t-shirt design to another student over the telephone. The design has many different geometric shapes and is placed on a grid. The task is designed for middle school students but can be used in a variety of ways with other grade levels and offers a great opportunity for students to demonstrate mathematical communication. For instance, a grade 9 student could bring out concepts of slope or identify points using coordinate geometry. Or after experimenting with the *Geometer's Sketchpad,* students could be asked to give the *Geometer's Sketchpad* instructions to complete the design.
- Expand on a closed question to make it more open:

  Teachers may find that many typical test questions do not allow students with the opportunity to explore and solve problems. These questions can often be modified to create more open-ended tasks. For instance, to respond to the following true/false statements:

1. The median of a trapezoid is parallel to the base.
2. Every rectangle is a square.
3. Two parallel lines are equidistant at all points.
4. If a parallelogram has two adjacent sides congruent, then it is a rectangle.
5. The segment that joins the midpoints of two sides of a triangle is parallel to the third side" (NCTM, 1999, p. 48).

could instead be used in the following way:

You will determine which of the following statements are true and which are false using the *Geometer's Sketchpad*. In your exploration, construct a figure that fits the requirements of the statement. Be sure every given condition is expressed in the figure. Once the construction is done, attempt to modify the figure by changing the lengths of sides and angle measures and by removing seemingly parallel or perpendicular lines. Make a conclusion and include a sketch and explanation to support your conclusion (Adapted from NCTM, 1999, p. 48).

- Listen to students talk and use the questions they ask or their responses as a starting point. The following question is built upon a student's response:

  "A student writes, 'The inverse of $y = \sqrt{x-4}$ is $y = x^2 + 4$'. Is this statement true? Explain why or why not" (Suurtamm, et al., 2001).

  The question concerns finding an inverse but in a way that may give some insight into more than just an algorithmic process.

  Adapt an open-ended task to make it more accessible to students. Some open-ended questions may be excellent but may not elicit a response from students who are uncomfortable with exploring a problem on their own. The following is an example of a test question that teachers grappled with when they saw that many students had left the solution blank:

  "Jill wishes to fasten two wooden pieces together, at right angles to one another, to form the rise and run for a ramp. She has wooden planks 7, 8, 11, and 3 metres in length. Find the smallest angle of elevation that she can make using any two of these planks." (MFM 2P test, anonymous source)

To make the question more reachable to students, a teacher could add parts to the question such as:

(a) Draw several scale diagrams of possible solutions to this problem.

(b) Which diagram would have the smallest angle of elevation? Explain how you know.

In this way, the students might start to explore the question through answering part (a) and therefore would have some sense of what the question is asking. Ideally, as the course progresses, students would become more comfortable exploring without such prompts.

Build on old test questions to assess more than just


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knowledge and understanding:

"Use graphing technology to determine the values that make the following statement true. Verify your answer. $\cos^2 x - \sin^2 x = 2\cos^2 x - 1$" (Suurtamm, et al., 2001).

Although this question points to using graphing technology as a method to explore the problem, students need to determine what values make the statement true. Graphing technology can help students determine whether this is true for certain values of x or for all values of x. In other words, is this an identity to be proven or an equation to be solved? Once this is determined, students follow through with either solving or proving. Thus, students are making a plan and selecting and sequencing a wide variety of tools to solve the problem.

## Concluding Comments

A good task allows students to show what they know and can do and assesses a wide range of mathematical understanding. A sound mathematics program should include both closed and open tasks with the expectation that when students progress through the program the number of open tasks should be increased as students learn problem solving strategies. There are many sources for such tasks, both old and new, but teachers should know which tasks they want to use and how they should be adapted to suit the curriculum, the purpose of the instruction or assessment, and the needs of the students.

## Resources for Assessment Tasks


Dawson, R., Onslow, B., & Sauer, R. (Eds.). (2001). *Linking Assessment and Instruction in Mathematics: Middle Years.* OAME.

National Council of Teachers of Mathematics. (1999). *Mathematics Assessment: A Practical Handbook.* Reston, VA: NCTM.

National Council of Teachers of Mathematics. (2000). *Principles and Standards for School Mathematics.* Reston, VA: NCTM. (see http://standards.nctm.org/ for electronic version)

Schoenfeld, A., Burkhardt, H., Daro, P., Ridgway, J., Schwartz, J., & Wilcox, S. (1999). *Elementary School Assessment.* NY: Dale Seymour Publications. (see http://www.educ.msu.edu/MARS/tasks/ for samples, including the "T-shirt design")

Schoenfeld, A., Burkhardt, H., Daro, P., Ridgway, J., Schwartz, J., & Wilcox, S. (1999). *High School Assessment.* NY: Dale Seymour Publications.

Suurtamm, C., Dilena, S., McEvoy, I., & Pignat, D. (2001). *Grade 11 U/C Summative Unit.* Toronto: OAME/OMCA. (see www.oame.on.ca for this and other resources) ▲


# ▲ OAME/NCTM June 2002 Report




FRANCES SCHATZ


My report of the annual NCTM meeting, held this year in Las Vegas from April 21–24, 2002, will appear in the September issue of the *Ontario Mathematics Gazette*. I was pleased to be chosen as the OAME representative to the Delegate Assembly, and welcomed the two alternates, Irene McEvoy and Joanne Graham, to the Ontario delegation at the Canadian caucus meeting held before the Delegate Assembly.

Currently, NCTM e-resources are available to NCTM members. Individual members are encouraged to take advantage of current journals, student math notes, mathematics education dialogues, archives, search, and contact information. If you are interested in an NCTM membership, please contact me for current price and how to obtain the 25% cap on the exchange rate. When your membership is processed, you will receive an NCTM member login and password.

Plan to attend the NCTM Canadian Regional Conference in Montreal, Quebec from August 15-17, 2002. The Quebec Association of Mathematics Teachers will host, "The Joy of Learning Mathematics". Enjoy some refreshing, new perspectives on teaching mathematics from well-known Canadian and American speakers. A number of Ontario educators, including your *Gazette* and *Abacus* editors, will present at this conference. Ontario's hilarious Don Fraser is a keynote speaker and will present, "Jest for Math". Workshops will take place at two of Montreal's most modern downtown hotels, the Delta Montreal and the adjoining Holiday Inn. Participants in the computer lab sessions will have a unique experience using the facilities at nearby McGill University. For more information and registration, please visit the NCTM web site, www.nctm.org/meetings/montreal/.

## NCTM Products and Publications

During the last four years as your NCTM representative, I have ensured that the OAME-NCTM book display at Ontario conferences, workshops, and meetings

has included at least one copy of the popular publications and favourite products. Starting this month, though, special products will no longer be available for affiliate displays, and on June 1, 2002, major changes will be announced about the consignment/purchase of NCTM materials by affiliates. It is opportune for OAME to clear most of the NCTM inventory that has been purchased for display during the past four years. At the time of this writing, I do not know what sales will be like at the annual conference held this year in Barrie. After that conference, I will print a list of products/publications on hand with the Canadian price (at the time of purchase). That price will include a 12.5% fee that NCTM charges Canadian affiliates for GST and handling. I will have to add a percentage to the price for shipping costs; however, the 20% NCTM member discount will also apply. If you would like to receive a copy of this sales list in June, please write or e-mail me and I will reply with a copy. This will be a great opportunity for teachers, schools, and boards to obtain these resources at old U.S. exchange rates.

## Why the Changes?

The high exchange rate on the dollar, increased shipping costs, NCTM's price increases, and the availability of ordering products directly from NCTM on-line have all contributed to the changes being announced on June 1, 2002. OAME also pays a very high affiliation fee due to the exchange rate; this takes money away from the rebate OAME receives for books/products purchased through the Ontario representative. I am very pleased to participate in the dialogue about the planned changes (as I write this at the end of March). I will continue to negotiate the best possible arrangement for OAME. NCTM is phasing out many of the existing NCTM special products to prepare for the new NCTM logo to be unveiled in the fall.

## Web Bytes

Celebrate Metric Week by visiting www.nctm.org/meetings/metric-week.htm for great ideas to use during the week of October 6-12, 2002 (the 10th month of the year and the week containing the 10th day).

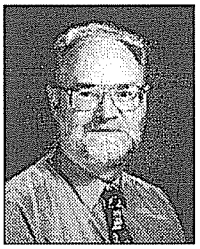
## An Important Date to Mark on Your Calendar:

The Regional Meeting in Regina, Saskatchewan, from October 17–19, 2002 is "Making Mathematical Connections: 2002 and Beyond" to be held at the Delta Regina and Regina Inn. Visit www.nctm.org for more information.

Frances Schatz, NCTM Representative to OAME ▲

# ▲ Technology Corner - Avoiding Nasty Surprises With Your TI-83 Plus

**FRED FERNEYHOUGH**
**E-MAIL: dybydx@rogers.com**



*Fred Ferneyhough is Head of Mathematics at Central Peel SS in Brampton and is technology consultant for the McGraw-Hill Ryerson texts in Ontario. He is an avid user of, and advocate for, the use of technology in the mathematics classroom.*

How often has this happened to you? Your class picks up their TI-83 Plus graphing calculators and you start your lesson. As soon as you do something on the overhead panel, a number of your students are upset because their calculator screen does not look like yours: "I know I did everything that you told me to." Even if the student(s) did follow all of the instructions, the problem lies in the fact that the calculator will show all of the settings used by the student in a previous class. It would be helpful if we could run a program that resets all of the calculators to some standard settings.

We use the graphing calculators a lot in our school and this soon became an ongoing problem for us. For the first year, we taught all students to manually reset the calculators when they were finished and when they started, just to be sure. Even if you do nothing else, this is worth knowing about and showing your students. The big disadvantage is that it wipes out all of the programs that you may want to have students use on a regular basis.

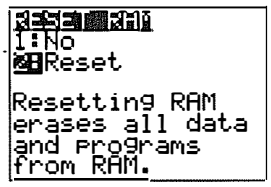



Start this by pressing MEM (2nd and the Plus sign). Choose option 7, "Reset".




From the next screen, choose option 1, "All RAM".

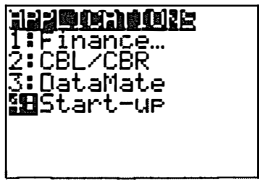
Finally, Choose option 2 "Reset". You should now get a message that indicates that the RAM has been cleared. This means that the all of the lists have been cleared out, programs stored in memory have been erased, and the standard viewing window has been put in place.



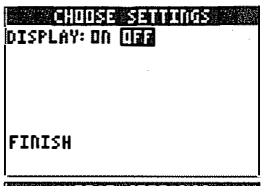

There may be individuals who want to experiment with writing their own RESET program. We did this for the second year and found that it worked well except that some students still performed the manual reset operation just described and erased our program. It was a nuisance to keep transferring the program back into the calculators. Then, Kevin Spry from Shelburne, told me about the Start Up application. This is a free application that you can download from the web. Go to Texas Instruments' page of application programs at http://education.ti.com/product/tech/83pse/apps/ apps.html. Click on the link for the on-line store and follow the directions on the screen. However, if you do not want to be bothered, e-mail me at dybydx@rogers.com and I will send you the application program, an accompanying pdf file to explain how to set it up on your calculators, a grouped file of programs that you need to set up properly, and a "Start-Up Readme" file in MS-Word or WordPerfect format that has instructions for downloading the software from your computer to your graphing calculator.

Let's assume that you have downloaded all of the software that you need, remember where you have stored it, and have transferred it into your own calculator. You will need to use software such as graph link or TI-Connect to transfer the program into one calculator. You can then transfer it to all of your other calculators through the unit-to-unit link cable.

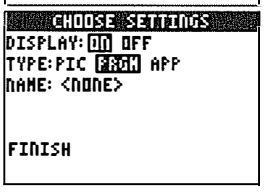
Now, you need to set up the application. Begin by pressing the blue APPS key. Choose option 4.



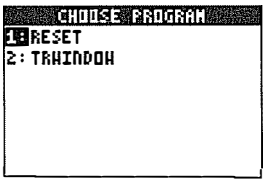

After the Texas Instruments copyright screen, you will get the screen to the right. Move to the word "ON" and press ENTER.



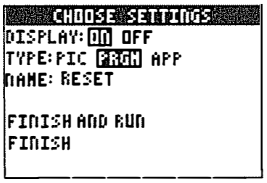

The screen will now change. Move down to the next row and highlight the word option "PRGM", an abbreviation for program.




Move down to the next row and press ENTER. The screen will change to show you all of the programs that you have in memory. Move to the program called "RESET" and press ENTER.




Finally, move to the option that reads "FINISH AND RUN" and press ENTER. The program should then be executed on your calculator. In the case of the program written for our school, it offers the students a choice of either Degrees or Radians for angle measure.




Of course, you may still have at least one student who will inadvertently erase the program. Rather than continually re-loading the program, Vince DeLisi at Texas Instruments, showed us how to archive the programs in a group and this has been very beneficia. To do this, decide on the programs that you might like to group together. We have the RESET program and another called TRWINDOW that sets up a Trig Window for graphing trigonometric functions. You are allowed to group together any items that you might like; including lists, graph data bases, matrices, y-vars, and application variables such as *CellSheet* spreadsheets or *Geomaster* dynamic geometry drawings.




To set up your own group, start by pressing MEM, 2nd and +. Scroll down to choice 8, "Group".

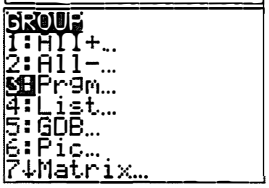



Highlight the first choice, 1: "Create New" and press ENTER.

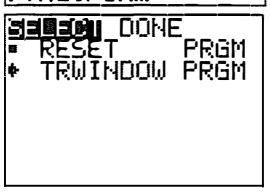
Give your new Group a name. The Alpha lock is automatically turned on, so you can access the green letters indicated above the keys.



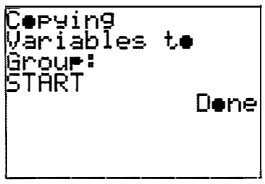

Our group only has programs, so we scroll down to that choice and press ENTER.




All of the programs in memory will be displayed. Press ENTER beside the name of each program that you want to include in your group. When you are finished, move over to DONE and press ENTER.



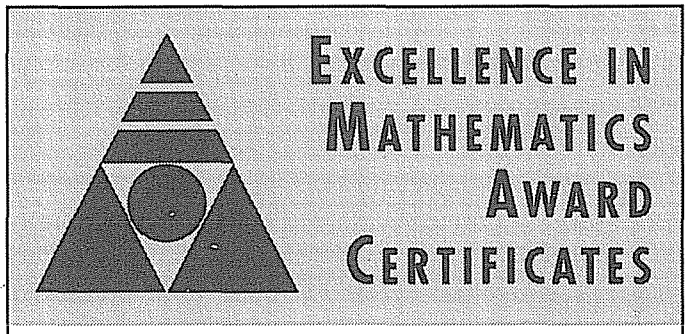
You should get a message that the "Variables", in this case, programs have been copied to the new group.




Now, whenever a student accidentally erases the programs, you can restore it quickly without a link cable. Press MEM (2nd and +), select option 8: Group and move over to UNGROUP. Highlight the group named "START" and press ENTER. The programs will be restored to memory. If necessary, set up the Start Up application again and the things will be back to normal.




Even in an age when our students have grown up with technology around them, many feel uncomfortable if their calculator is somehow different from what you have on the overhead panel. If you can alleviate some of that discomfort, kids will adapt to the use of the graphing calculator more readily and work with you. ▲


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# ▲ PARENTS: THE LOGICAL LINK FOR SUPPORTING CHILDREN'S MATHEMATICAL UNDERSTANDING *(PART 1)*


**BARRY ONSLOW, GAIL EDMUNDS, NANCY CHAPPLE, JOHN FORSYTHE, ROSETTE BURAKARI-ADERA, JUDI WATERS**
**ESSO FAMILY MATH CENTRE**
**FACULTY OF EDUCATION**
**THE UNIVERSITY OF WESTERN ONTARIO**




*Barry Onslow is the Maurice Price Foundation Director of the Esso Family Math Centre. He teaches pre-service, in-service and graduate courses at the Faculty of Education, UWO, and is a former president of OAME.*



*Gail Edmunds is the Researcher for the Esso Family Math Centre. She also works as an independent consultant primarily in the areas of program evaluation and curriculum development.*



*Nancy Chapple is co-author of the Grades 2 - 5 Family Math Resource book, and Resource Specialist with the Esso Family Math Centre. She is a part-time instructor at the Faculty of Education, UWO.*



*Judi Waters is an Early Years Coordinator at the Esso Family Math Centre, and one of the authors of the Early Years Resource book. She has presented many Family Math sessions to a variety of communities.*



*As the Family Math Facilitator, Rosette Burakari-Adera manages the Centre, and connects the team at Family Math with resource people in the community. Rosette's appreciation of community development has helped build constructive partnerships.*



*John Forsythe, with more than 20 years of computer related experience, is web-master for the Esso Family Math Centre. He is also the research assistant for The Centre of Communicative and Cognitive Disabilities at The University of Western Ontario.*

*"Wouldn't it be lovely if we could just teach our students and not have to deal with their parents?!"*

*(Litton, 1998, p. 2)*

How many of us have heard similar comments in our staff rooms? Are these simply the comments of uncaring, disgruntled teachers? In some cases, perhaps they are, but more likely they are the cries of frustration from dedicated educators. It is clear that while parents can be one of the best sources of support for teachers, they can also create stress and anxiety for all involved (Seefeldt, 1985). Most parents, like most teachers, only seek the best in terms of learning experiences for their children; however, parents and teachers sometimes have opposing views regarding what these experiences should be and how they should be carried out. The challenge for educators is to find positive ways to inform and involve parents in all aspects of education. This article will explore some factors that appear to be constructive in gaining parents' support, and it will offer suggestions for increasing parents' confidence in, and understanding of, a subject that many of them disliked and failed to grasp during their own schooling.

Research from the past twenty years has provided ample evidence that it is important for parents to be involved in their children's education (Chavkin, 1993; Epstein, 1994; Ford, Follmer & Litz, 1998; Henderson, 1988; Onslow, 1992; Sattes, 1985). This is especially true of mathematics, since there are many family-oriented activities that increase both parents' and children's understanding of the many patterns and relationships that are the foundation of mathematical knowledge. Some examples include: math games and activities that can be played at home, on the way to school, or during a trip in the car; bed-time stories that foster enjoyment for both literature and mathematics; and, puzzles and mental math challenges that can be discussed during supper time. These types of activities demonstrate that mathematics can be shared and enjoyed by the whole family rather than being viewed as a subject that has to be completed painfully and in isolation.

A recent international study of 32 countries by the Organization for Economic Cooperation and Development (OECD) found that parents play a significant role in their children's education (OECD, 2000). The study confirmed the results of earlier research, finding that parents, who talk with their children and provide environments that stimulate thinking, are likely to positively influence the outcome of the children's education in reading, mathematics, and science. While some families already engage in the types of activities advocated in the report, there are many parents who are unaware of the strategies that help facilitate children's mathematics development, and therefore they look to the school system for support. Unfortunately, a recent report from the Education Quality and Accountability Office (EQAO) indicates that fewer than twenty percent of elementary schools in Ontario offer family sessions for mathematics, and that over the past four years these numbers are declining (EQAO, 2000/2001, p. 102).

The notion of involving families in their children's mathematics education is not new. Family Math originated at the University of California, Berkeley, in the early 1980's and has spread worldwide. During the late 1980's and 1990's, there have been several Family Math programs in Ontario. The evidence suggests, however, that most teachers and principals have failed to capitalize on the resources that became available (e.g., *Family Math* by Stenmark, Thompson & Cossey, 1986). Perhaps now is an ideal opportunity to re-examine how we might involve parents in their children's mathematics education. Parents we have encountered want to help their children, but do not know how. Not only are topics like probability, statistics, and patterning new for many parents, but also the way we now teach mathematics is also foreign to them. If we want parents to be our partners in their children's education, then we have to be prepared to reveal why it is a disservice for their children to complete twelve years of schooling to be little better than a $5 calculator. Basic skills are important, and we encourage parents to play many games with their children to advance the learning of these skills. However, children do not fail mathematics in high school because they do

not know their basic skills. Students fail high school mathematics because they do not *understand* the structures of arithmetic, and consequently fail to understand generalized arithmetic (basic algebra). Otherwise, why doesn't the use of calculators on high school tests lead to greater success?

For the past two years, members of the Esso Family Math Centre[1], at the University of Western Ontario, have been creating resources, and building on established ideas from other institutions. Staff from the Centre train volunteers to work in community settings with at-risk parents and their children in an effort to improve attitudes toward mathematics, and increase parents' involvement in their children's mathematics education. Several local schools, particularly those schools situated in high-needs areas, are now using these same resources. It is our belief that more important than the materials we use is the environment that is established by the Family Math facilitators in these communities. Many of the factors we have found to be beneficial in helping parents and their children work together can likely be duplicated in school settings so as to foster a community of sharing, understanding, and cooperation. Once parents understand why we are now teaching mathematics the way we do, and they begin to make sense of it for themselves (often for the first time), then they generally become enthusiastic partners in the education of their children. It is our responsibility to help parents understand and appreciate why we use games and manipulatives rather than the worksheets so many of them remember as *real math*. Parents also have to become convinced that talking with (rather than to) their children is important, and why listening to their children will often tell them a great deal about their children's understanding of mathematics. Next, some of the strategies that we have found useful when working with parents are provided[2]. In the September 2002 issue of the *Ontario Mathematics Gazette*, we will discuss and share some of our resources.

## The Importance of Community Building

Many parents, and some of the children, feel uncomfortable when they enter an educational setting in the evening. Some parents remember negative experiences from their own school days, and several recall having had difficulty understanding mathematics. It is important for parents and their children to feel that they are in a safe and relaxed environment where they can make errors, learn from these errors, make sense of the mathematics they are learning, and grow as a family by having fun and gaining knowledge together. Building a community is a crucial part of the Esso Family Math Project. We want parents and their children to feel comfortable and to ask questions when they do not understand.

We have found that having dinner together at the beginning of each evening facilitates this community building. One of our initial concerns was keeping families with young children too late in the evening, and because many parents work outside the home, it is difficult for them to get home, cook dinner, and be at Family Math by 6:00 pm. We overcame this problem by having an inexpensive, but nutritious meal (approximately $2.50 - $3.00 per person), at 5:30 pm. Since we work in community centres, volunteers at the centres sometimes prepare the meals. However, another very satisfactory route for us has been to have a local high school cooking class prepare soup and sandwiches. A serendipitous result of having these dinners together is the community building that has occurred. Parents, children, and Family Math facilitators eat together and chat with one another in an informal setting prior to starting the Family Math activities. We always have an introductory math activity (usually concerning estimation) for parents and children to complete on their arrival at the site, as well as a discussion regarding home challenges from the previous week. While math talk is initiated by these activities, the discussions are often non-mathematical with parents and children discussing their personal lives with the Family Math facilitators. We believe that it is these discussions that have enabled the community building to occur over a short span of time. As well, the informal discussions have allowed parents to feel relaxed and confident enough to ask questions before, during, and after Family Math sessions.

## The Importance of Developing Good Parenting Skills

Helping parents expand their parenting skills is an important component of the Esso Family Math Project. Parents may lack the knowledge to assist their children's development or understand their mathematical thinking. It is important for Family Math facilitators to model

*[1] The Esso Family Math Centre is supported by the Imperial Oil Charitable Foundation, and the Maurice Price Foundation. The Centre also has productive partnerships with Investing in Children (London), Texas Instruments, and Fanshawe College.*

*[2] The Esso Family Math Project has two programs - one for families who have children in JK, SK, and Grade 1, and one for families who have children in Grades 2-5. The strategies discussed in this article were found to be worthwhile in both programs.*

positive parenting skills, demonstrating worthwhile strategies to help parents relate to their children. Facilitators must model these skills without acting in a prescriptive manner, or appearing to be judgmental of a parent's present behaviour. We have found that playing the Family Math games with the families to be the best form of modelling. Parents must learn how to invite their children to share their thinking, encouraging them to communicate their understanding (or lack of it) in a secure and stress-free environment. Becoming a good listener is hard, and takes time and patience. Parents need to practice waiting for their child to think through a problem, and they should not be critical of an incorrect answer, or excessive in their praise of a correct one. Incorrect answers, however, need to be corrected in a positive fashion. When a family enjoys learning a challenging topic together, while respecting each other's thought processes, everyone benefits.

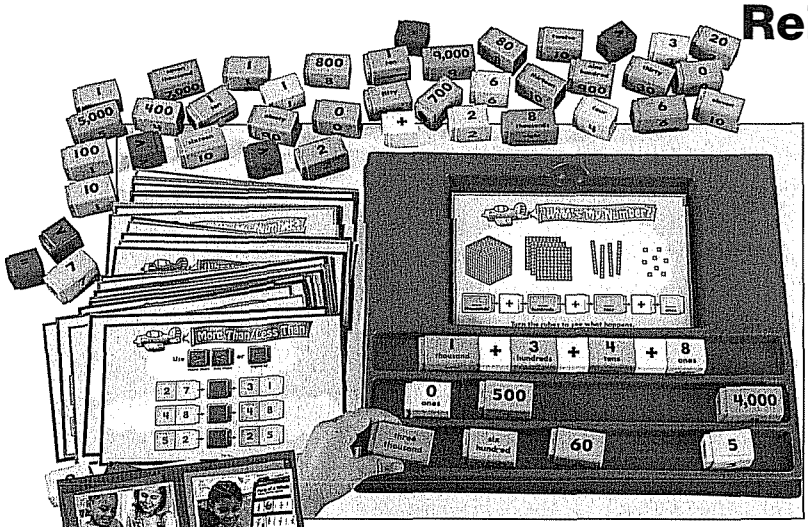
## Finding and Training Enough Volunteers

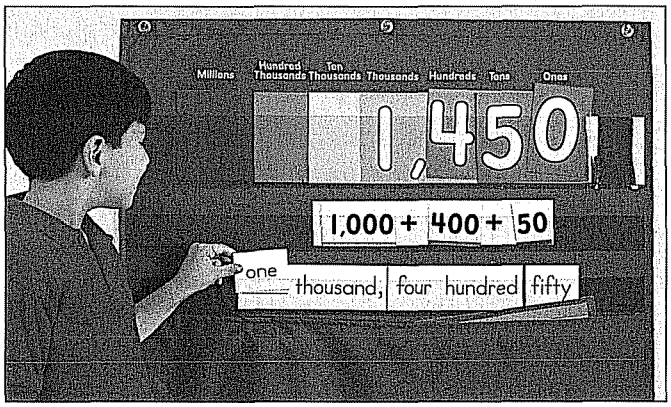
A viable Family Math group consists of approximately ten families. A family unit has an average of three members, e.g., two parents and a child, or one parent and two children, and thirty is a large enough group to manage. For each group, we like to have one experienced teacher leader and four or five volunteer facilitators. This ratio provides one facilitator for every two families. The teacher leader guides the program at each site, but the volunteer facilitators usually take turns introducing new activities, thereby increasing the pool of knowledgeable leaders for future years.

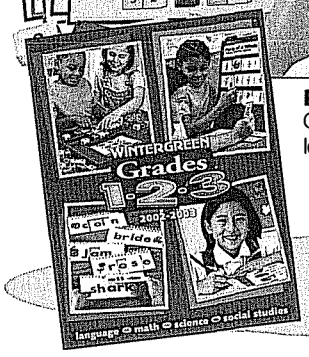
Ten hours of training is provided for everyone working in an instructional capacity at an Esso Family Math site. The training assists volunteers in understanding both the mathematics and the philosophy associated with Family Math. We offer the training to student teachers at the faculty, as well as to students taking early childhood programs at Fanshawe Community College, on the condition that they volunteer time at one of the sites. Not only has this process provided us with a large number of volunteers, the training and experience provides new teachers with the necessary abilities to help organize Family Math sessions in their own schools and early childhood centres upon graduation. Perhaps even more important, it facilitates the development of skills needed


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to work effectively with parents. In the future, especially when moving to sites outside the city, high school students considering a career in education might be utilized in a similar manner (volunteering their forty hours of community service that the Ministry of Education and Training in Ontario demands). Teachers who have recently retired, but want to continue some volunteer work, also find working in Family Math communities rewarding, and are a valuable resource group that understands sound parenting skills.

## Where's the Math?

Many of our parents remember math as the tedious task of completing large numbers of worksheets, with answers that were either right or wrong. Naturally, they often cannot understand the mathematical value of playing a game, going on a math walk, using manipulatives, exploring patterns on a calculator, reading a math related story, or singing a math related song to their child. It is our responsibility to reveal the mathematics to the parents, and not use games and activities that fail to include good mathematical examples.

For each evening's activities, the *Esso Family Math Resource Guide* has a section titled, *Where's the Math?* The mathematical benefits gained from playing each game, doing each activity, or reading each story, is explained, and the teacher leader can use this information when talking to the parents during the last ten minutes of an evening (at this time, the other Family Math facilitators review the *Home Challenges* with the children, or replay a game the children perhaps did not fully understand earlier or simply want to play a second time). We also remind parents that practice at home during the week (replaying some of the activities completed during the Family Math session and completing the *Home Challenges* provided each week) is an important component for improving their children's skills and developing a positive attitude towards mathematics. Some weeks we even ask parents and/or children to complete a questionnaire to inform us of the activities they enjoyed, found challenging, or were difficult to understand. The feedback is used to improve the program.

To provide a link to the Ontario Mathematics Curriculum, we usually list two expectations from the Ontario Ministry's list of overall/specific expectations in the *Resource Guide*. One expectation is taken from the youngest applicable grade level of the program, and the other is from the oldest applicable grade level. We include this information for teacher leaders so that they can demonstrate to parents how the Family Math activities are part of, and not just supplemental to, their children's school program. Once parents understand the benefits of what they are doing, they usually become supporters of the program rather than antagonistic towards what many previously thought of as *play*. We provide examples that illustrate how productive play assists understanding – for parents as well as their children[3]. Some of these activities will be discussed and shared in the second part of this article that will appear in the September 2002 issue of the *Ontario Mathematics Gazette*.


Chavkin, N. F. (Ed.). (1993). *Families and schools in a pluralistic society.* Albany, NY: State University of New York Press.

Education Quality and Accountability Office. (2000/2001). *Ontario Provincial Report on Achievement (English-Language Elementary Schools).* Toronto, ON: Queen's Printer for Ontario.

Epstein, J. L. (1994). Theory to practice: School and family partnerships lead to school improvement. In C. L. Fagnano and B. Z. Werber (Eds.), *School, family and community interaction: A view from the firing lines.* Boulder, CO: Westview Press.

Ford, M. S., Follmer, R., & Litz, K. K. (1998). School-family partnerships: Parents, children, and teachers benefit! *Teaching Children Mathematics, 4*(6), 310-312.

Henderson, A. (1988). Parents are a school's best friends. *Phi Delta Kappan, 70*(2), 148-153.

Litton, N. (1998). *Getting your message out to parents.* Sausalito, CA: Math Solutions Publications.

Onslow, B. (1992). Improving the attitude of students and parents through family involvement in mathematics. *Mathematics Education Research Journal, 4*(3), 24-31.

O.E.C.D. (2000). *Programme for international student assessment.* Council of Ministers of Education, Canada. (Available: www.pisa.gc.ca)

Sattes, B. D. (1985). *Parent involvement in the political principle.* San Francisco, CA: Jossey-Bass.

Seefeldt, C. (1985). Parent involvement: Support or stress? *Childhood Education, 62*(2), 98-102.

Stenmark, J. K., Thompson, V., & Cossey, R. (1986). *Family Math.* Berkeley, CA: Lawrence Hall of Science, University of California Press. ▲


*[3]For further information, go to the Esso Family Math web site at http://www.edu.uwo.ca/essofamilymath.*

# ▲ Millions of Numbers Sighted at Statistics Canada Web Site, www.statcan.ca: A Daily Dose of Data

RON LANCASTER



*Ron Lancaster is a middle and high school mathematics teacher, currently working throughout North America and Asia as an Independent Mathematics Consultant.*

Three Dog Night claimed that "one is a lonely number" in their hit song *One* released in May 1969. While it might be true that one was lonely back in 1969, it is now in good company since it moved to its new home on the Statistics Canada web site, www.statcan.ca. The number one can be found there happily surrounded by hundreds, even millions of other numbers, some small and others quite large. Teachers and students will find a huge collection of numbers, all with their own stories to tell. The stories are mainly about Canada, but a great deal of attention centres on other places around the world.

Once you are at the Statistics Canada web site, click on the link to the **Daily**. This is one of the very best features of this web site. Almost every day of the year, Statistics Canada releases additional numbers for a wide range of issues important to Canadians. The *Daily* provides this data for media sources and the educational community. When Canadians read or hear about a story that contains the latest data for a certain issue, the source for these numbers was probably the *Daily*. For teachers and students, there is a great source of numbers that can be used as the basis for activities that involve searching for patterns, studying trends, and making predictions based on past data. A very powerful feature is that the data invites visitors to ask questions and think about why certain changes have taken place. For example, look at the numbers (see Table 1) that were posted on June 13, 1995, the day that the *Daily* was launched.

| YEAR | NUMBER OF DIVORCES | YEAR | NUMBER OF DIVORCES |
|---|---|---|---|
| 1981 | 67 671 | 1988 | 83 507 |
| 1982 | 70 430 | 1989 | 80 998 |
| 1983 | 68 565 | 1990 | 78 463 |
| 1984 | 65 170 | 1991 | 77 020 |
| 1985 | 61 976 | 1992 | 79 034 |
| 1986 | 8 304 | 1993 | 78 226 |
| 1987 | 96 200 | | |

*Table 1*

In viewing this data, several questions come to mind:

- Except for 1992, the total number of divorces decreased every year from 1987 to 1993. What was going on in 1992 that was responsible for this total that bucked the trend? Was there anything unusual that happened to the economy?
- Was there less variation from one year to the next in the divorce rate than in the total number of divorces? How would you measure this variation?

One of the beautiful features of the Statistics Canada web site is that the huge amount of posted data allows students and teachers to answer questions such as the above. For example, information about the divorce rate is posted with the total number of divorces and data for the economy in 1992 is available at the Statistics Canada site.

The *Daily* is just one of many outstanding and useful links available to teachers and students. A great deal of the information can be accessed by anyone with an Internet connection, but certain areas of the web site are restricted to users with a password. These restricted areas contain a wealth of resources including lesson plans for teachers and activities for students. Passwords are available to schools at no cost.

Here are some links to non-restricted areas worth visiting:

## Statistical Methods

This is a terrific source of information about statistics. Students and teachers will find information about statistical definitions and methods as well as other topics.

## The Census

The Census data from past years is posted at the Statistics Canada web site. The Community Profiles section is particularly rich in information and offers teachers and students a great deal of data to compare their hometown with other locations in Canada.

## Other Links

By clicking on the link, *Other Links*, a number of excellent sites become available, including links to Government of Canada, Canadian and International statistical organizations, The National Atlas of Canada, and the World Wide Web Virtual Library of Statistics. Teachers and students will find the collection of links to be quite useful and handy to have posted at one site.

Improvements to the Statistics Canada site are constantly being made. The best current feature is the Age Pyramid located at www.statcan.ca/english/kits/animat/pyca.htm. The Pyramid is very cool and the animation offers visitors a chance to view changes in the Canadian population in a very engaging manner. Visit the site now and as you watch the number one mingle with the many other numbers in the pyramid, you will see for yourself that it is *not* a lonely number. ▲

# CALL FOR MANUSCRIPTS

The editor of the *Ontario Mathematics Gazette* seeks manuscripts pertaining with the implementation of the new Ontario mathematics curriculum.

Submissions from elementary and secondary teachers are highly sought.




Please send four double-spaced copies of your manuscript for review to:

Louis Lim
Editor, *Ontario Mathematics Gazette*
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# ▲ DIRECTORS' DIALOGUE



**MARILYN HURRELL, NWOAME**
**THUNDER BAY, ON**

*This edition of* Directors' Dialogue *highlights events at the Friday, February 8 and Saturday, February 9, 2002 OAME Board of Directors' meeting at the Four Points Hotel in Mississauga.*

## CHAPTER REPS MEETING: Friday, February 8, 7:00 - 7:30 pm

- Chapter Representatives were given a complete list of members in their Chapter. They are encouraged to contact those who have not yet renewed. Chapter rebates were also distributed.
- Membership is at 1112, up from 1020 at this time last year.
- **OAME 2002:** Registration at the provincial conference in May 2002, hosted by MAC², is encouraged to promote memberships.
- **OMO 2002:** The provincial Olympics for grades 7 and 8 students will be held June 6 - 8 at York University, hosted by TEAMS, SAME, and Y⁴MA chapters. As well as the competition, a tour of Black Creek Pioneer Village will be included. Note from Stewart Craven's prolific mind: this one is called OMO 2 x 7 x 11 x 13. Go figure!
- Ed Haines was introduced as the new Chapter Representative for the GOLDEN chapter. Also, ISOMA and QSLMA Chapters are back in good standing.

## FORUM: Friday, February 8, 7:30 - 9:00 pm

President Shirley Dalrymple called the Forum Meeting to order. The Focus of this Forum: *Issues Related to Becoming a Service Provider for Teacher Recertification.*

Highlights of discussion:

- OAME has not applied for service provider status;
- OSSTF, OECTA, and ETFO have asked us not to apply–this seems to be a political rather than a professional issue–85% of OSSTF members returned the letter they received;
- unions are not opposed to professional

development, but are opposed to recertification every 5 years – this creates an atmosphere of fear and mistrust;

- the Ontario College of Teachers' plan requires a minimum of 70 hours of 7 core and 7 elective courses, each with an assessment component;
- teachers pay for these themselves;
- we are looking for reasonable alternatives, and suggestions to this mandatory professional development;
- if we resist the government plan, will "teacher testing" take its place?

A subcommittee was formed to explore options and to put together an electronic report.

**I am writing this in March and you will read this in June. However, still feel free to make your opinions and suggestions known to the OAME Executive.

## BRAINSTORMING: Saturday, February 9, 9:10 am

**Topic:** *Changing the Annual Conference Date*

A survey sent out by the Futures Committee indicates that the best months for the provincial conference are April, October, and May; the worst months are August and June.

**Topic:** *Changing the Annual Conference Format*

Board members present were asked to plan a "perfect conference" with regards to time, length, location, and workshops. Ideas that resulted include:

- want lots of opportunities for networking;
- want group activities - participants mix and match in groups;
- three 2-hour blocks, lots of hands-on, one topic in depth;
- follow up with CD;
- video conference 4-6 pm in staff rooms;
- open conference to "non-mathies" for some topics;
- Thursday night arrival with meaningful events, run all day Friday and Saturday.

Marg Warren conducted this session. Please send any further suggestions to her.

## BUSINESS MEETING: 9:30 am

**Financial Report:** Dave Hessey presented the Financial Report. Sales of materials are continuing.

**Recognition of Non-Returning Members:** Shirley Dalrymple recognized the contributions made by the following members who have chosen not to seek re-election as Directors: Myrna Ingalls, Peter Lenczewski, Louis Lim, and Anne Muller. Shirley also recognized the contributions of Mary Howe who has completed her term as Past-President.

**NCTM:** David DeCoste was introduced as our Regional Affiliate NCTM Representative. He is from Nova Scotia. Frances Schatz spoke to a written report; she will be the OAME delegate at the Annual NCTM conference in Las Vegas in April.

**Motions:** Three motions were made and passed: the Chair of any OAME Conference be a member of OAME in good standing; a request to the Ontario College of Teachers that a three part Additional Qualification courses in Mathematics Education at the Intermediate level be offered; and that Ralph Connelly be awarded a Life Membership.

**OAME 2003:** Jacqueline Hill reported that the conference planning is well underway. She is looking for speakers. If you are interested in conducting a workshop at OAME 2003, please contact Jacqueline at thill@durham.net.

**Fields Institute/OMCA:** The Secondary, College, and University Task force met with the Toronto District School Board to discuss issues around prerequisites and the double cohort. More meetings with other boards are planned. The Ontario Mathematics Coordinators' Association (OMCA) is applying for Ministry funds to develop resources for the new grade 12 courses, especially the Workplace and College Technology courses.

**Ministry of Education/President's Report:** Myrna Ingalls and Shirley Dalrymple spoke to a written report. Highlights include:

- **Elementary Curriculum Update:** the ESL Resource is now available on the web site and will be shipped to schools shortly. Phase 1: Elementary Curriculum in Mathematics, Science, Technology, Social Studies, History, and Geography have been sent to schools in CD format. Work has begun on Phase 2: Language, Visual Arts, and Physical Education.
- **Assessment Update:** an Assessment Resource for secondary teachers is being developed by Susan Orchard. This will be useful in the classroom to design effective programs, plan components, and give concrete exemplary practices in assessment.

- **Secondary Curriculum Update:** $15 million has been allocated this year for textbooks in Mathematics, Science, and English. OMCA has partnered with OAME to produce materials for the grade 12 classroom teacher. The Ministry of Education and Training wishes to provide in-service to as many teachers as possible with the implementation of the new curriculum.

## COMMITTEE REPORTS:

### Futures/Promotions:

| | | |
|---|---|---|
| OAME: | 2003 | Pine Ridge |
| | 2004 | possibly GVMA |
| | 2005 | TEAMS |
| OMO: | 2003 | WOMA |
| | 2004 | possibly SWOAME |

Concerns were expressed that Chapters are asked to commit too far in advance. The Committee is confident that it will have hosts beyond 2004/05.

There is concern over the lack of promotion items. A budget for this will be requested next year. Posters sent to schools with Math information on them will be explored. New Teacher packages have been discussed, to welcome new teachers to the profession and to OAME. A suggestion was made that part of the OAME web site be accessible only by members.

### Publications:

Executive brainstorming resulted in the following suggestions for consideration by the Publications Committee: assign specific areas to committee members so that they collect information only in their area; liaison with other committees; make the *Gazette* lighter by sending specific information via mail outs to teachers; have a protocol as to what is published in *Gazette* versus what appears on the OAME web site.

### JK - 8:

This committee is creating a Power Point resource/template to help teachers evaluate a math task. It will be put on the OAME web site to be used by teachers and teacher-leaders. It will also be available in PDF format.

### Secondary:

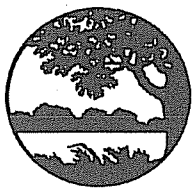
Jacqueline Hill is developing a list to contact 4192 schools across Ontario. John Dallan and Gord Cooke are


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| | | |
|---|---|---|
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developing a monthly newsletter for the web site. The exam committee has a grade 9 examination on the web site. An article about planning and preparing for the grade 9 EQAO assessment appeared in the March 2002 *Ontario Mathematics Gazette.*

## CHAPTER NEWS:

**CHAMP: Rep Irene McEvoy.** CHAMP presented a six point paper on how to increase Chapter membership. Best ideas were flyers advertising their "MATH4U" conference sent to each member and to each school; math contests in grades 7 - 11 for schools with memberships; making the cost of "MATH4U" conference cheaper to attend with an OAME membership than to attend as a non-member.

**COMA: Rep Mary Bourassa.** COMA hosted a Secondary Math forum in May, focusing on the new grade 12 courses. Dr. Neher of the University of Ottawa's mathematics department met with COMA executive to discuss problems around the double cohort. Another meeting is planned in May. COMA's web site can be accessed at www.magma.ca/~comamath .

**GOLDEN: Rep Ed Haines.** Golden Section hosted a series of workshops in April for grades K - 12. Workshops were held Friday after school and Saturday until noon. Anyone wishing to get involved with the newly re-formed Golden Chapter can contact Ed at ed.haines@dsbn.edu.on.ca .

**GVMA: Rep Paul Fennell.** A new grades 9/10 publication should be available at the OAME annual conference. It will consist of 3 examinations for each grade. Other publication ideas include "Holiday Themes" and "First Day Activities". You may submit ideas/manuscripts to Paul at pmfennell@odyssey.on.ca. GVMA plans to increase attendance at their spring and fall conferences by offering a one-time free registration to new teachers and University of Waterloo coop teacher candidates.

**ISOMA: Rep Carly Ziniuk.** ISOMA has re-grouped and hosted a mini-conference in April. The major focus was on preparing summative activities for grade 11. ISOMA hopes to host the OMO when a committee can be struck. The e-group mailing list continues to connect all members of ISOMA across Ontario. We hope to meet with many ISOMA members at OAME 2002 in Barrie.

**MAC$^2$: Rep Jon Rae.** No report since they are busy organizing for OAME 2002.

**NOMA: Rep Heather Boychuk.** No Report.

**NWOAME: Rep Rona Doyle.** Our OMO event occurred during the last weekend in April. This event traditionally draws the maximum allowed 160 students from across North Western Ontario, some driving 400 km or more. We hope to resume the Math Awards Day at Lakehead University in June. We are also planning an evening of mathematics, and possibly a panel discussion concerning the double cohort and the prerequisites at both the College and University in late spring.

**PINE RIDGE: Rep Jacqueline Hill.** Jacqueline Hill and Charles Wyzkowski are co-chairing OAME 2003 at Durham College from May 8, 9, 10, 2003. Regional OMO competitions will be held in May with teams going to OMO 2002. The 19th Annual Math Awards night will be held in June.

**QSLMA: Rep Wendy Gallant.** QSLMA has re-grouped and is back! President is Robert Sherk and the Executive consists of Neil Hopkins, Tom Chapman, and Wendy Gallant. One hundred three people participated in a workshop on December 6, 2001. Future events include a spring mini-conference.

**SAME: Rep Sumintra Koowar.** SAME held a Spring Conference on April 10 with the theme, "Shaping up for Spring with Math Activities". Eighteen sessions were planned. Regional OMO will be held in April.

**SWOAME: Rep Frank Di Pietro.** No Report.

**TEAMS: Rep Pat Margerm.** TEAMS and SAME will organize a regional OMO and will send teams (no pun) to OMO 2002, which is co-chaired by Stewart Craven and Anthony Azzopardi. A successful mini-conference was held in February, with 150 participants.

**WOMA: Rep John Ferguson.** The *Sine Post,* WOMA's Newsletter, has been delivered by e-mail for the first time. Tom Griffiths and Marg Kemp continue to conduct Math Enrichment workshops for students; OMO 2003 should be great! A Spring Conference was held on April 11 titled, "Survivor 2002".

**Y$^4$MA: Rep Rosey Mastrofrancesco.** A spring conference was held on March 21. Recognition plaques for our members who have contributed greatly were presented. The Chapter has purchased a laptop computer for taking Minutes at every meeting; the web site is up and running: www.y4ma.com.

## CLOSING REMARKS:

Enjoy the summer! Have a friend/colleague join OAME. It is the best professional development available.

Marilyn ▲

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