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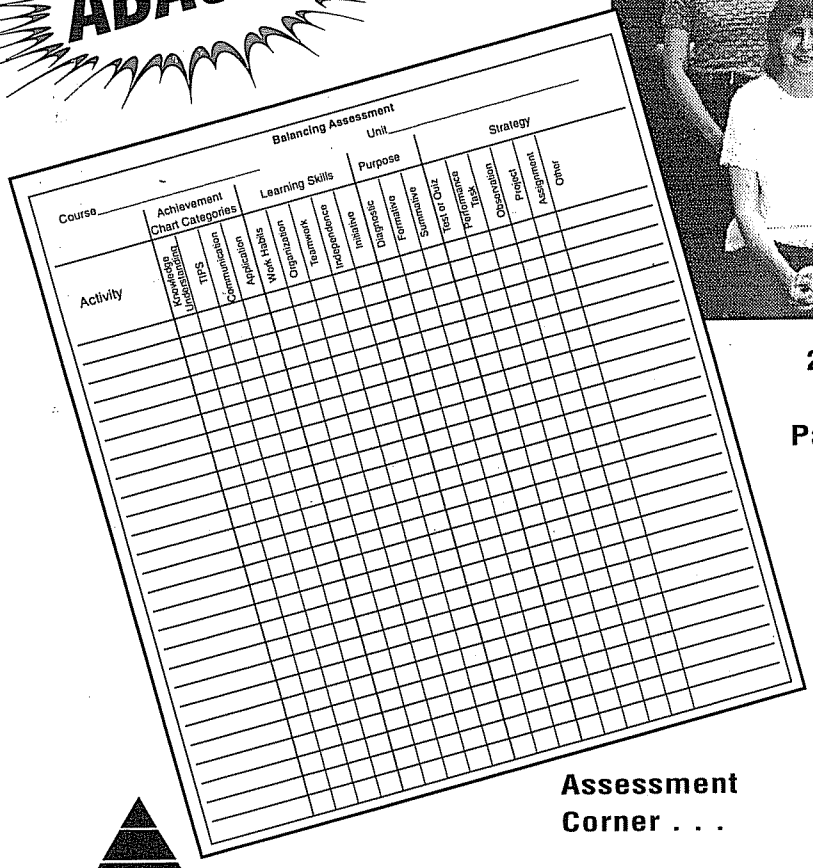
Gazette

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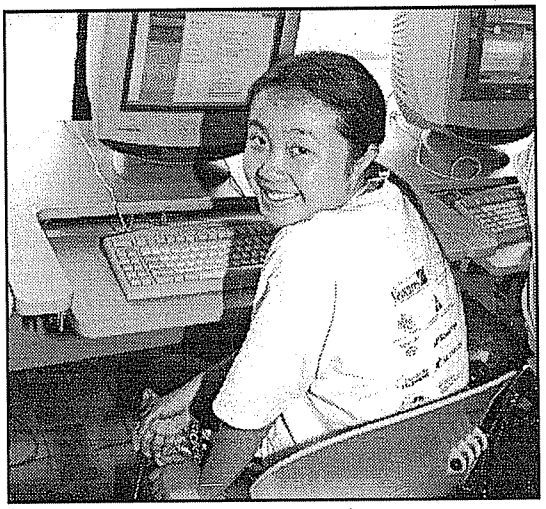
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Assessment Corner . . .



OMO'2001: A Northern Odyssey

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IN THIS ISSUE

- ▲ Technology Corner: TI-83+ Plus Parametric Equations = Graphs of Conic Sections
- ▲ Assessment Corner: What Really Counts – Building a Balanced Assessment Plan
- ▲ A Review of: *Linking Assessment and Instruction in Mathematics: Middle Years*
- ▲ Grades 7 and 8 to 9: Bridging the Gap
- ▲ Photo Math Contest Winners
- ▲ The Right Equation: Math Prof Wants His Students to Know That They're Number One
- ▲ Pursuing Probability Problems: Multiple Dice Rolls
- ▲ OMO'2001: A Northern Odyssey
- ▲ 2001 OAME Award Recipients
- ▲ Introducing OAME's New Executive Directors

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Articles must be original. Your article should be word-processed, doubled-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. The editor reserves the right to edit articles for publication.

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▲ Editorial



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

Welcome to Volume 40 of the *Ontario Mathematics Gazette*! The school year promises to be very exciting with the implementation of the new grade 11 mathematics curriculum. You can rest assured that OAME will continue to work hard to provide you with the necessary support to successfully implement the new curriculum via chapter, provincial, and leadership conferences, through the *Gazette* and *Abacus*, through projects that the OAME committees will work on during the upcoming school year, and through collaboration with the Ministry of Education.

Our president, Shirley Dalrymple, has experience as a writer for the new high school mathematics curriculum, is an author of the course profiles, and is a member of the Fields Institute. She will lead a very dedicated group of OAME board of directors – composed of elementary, secondary, and post-secondary educators. Many board members are textbook authors, workshop leaders, consultants and coordinators, and all are well-respected in the mathematics education community. Let Shirley or any board of director know what OAME can do to support you during these rapidly changing times.

Late last year, a task force, consisting of OAME vice-presidents, was formed to explore the role of the *Gazette*, *Abacus*, and OAME web site in meeting the needs of our membership. I was asked to submit a report outlining my role as the editor, the process of peer review of manuscripts, and what I felt that the *Gazette* does for our readers. I am pleased to report that this task force reported favourably in that, yes, the *Gazette* is meeting the needs of our membership. One recommendation was the need to expand the reviewers' list. If you are interested in reviewing 1 to 3 articles a year for the *Gazette*, please e-mail me at Louis_Lim@edu.yorku.ca for further information.

I think that a lot of the credit needs to go to submitters of manuscript. I get a wonderful balance of articles from elementary and secondary teachers, and from professors of mathematics and education. To these people, thank you! I strive to include at least one refereed article of interest to elementary teachers in

each issue. I encourage you to look through past issues of the *Gazette* and then submit your own manuscript. I believe that there is lots of potential articles "out there". Be sure to look at the article that Frances Schatz and I wrote in the June 2001 *Gazette* describing the process of submitting a manuscript.

Also, much credit needs to be given to Ron Lancaster, Frances Schatz, Marilyn Hurrell, Fred Ferneyhough, and Chris Suurtamm for their quality columns in each issue of the *Gazette*. You should know that each of these people stepped forward to address a need — Ron approached me shortly after I was appointed co-editor of the *Gazette* with his *PhotoMath* column to encourage teachers and students to connect mathematics to the real-world; Fred brought forth his proposal for a *Technology Column* at a grade 11 McGraw-Hill Ryerson textbook authors' meeting last year; Marilyn e-mailed me stating her interest to take over as columnist of the *Directors' Dialogue* shortly after I became an editor; Frances expressed the need to keep OAME members informed of NCTM happenings, and Chris spoke with me at the February 2001 board of directors' meeting about her willingness to share her expertise on assessment in a column for the *Gazette*. To each columnist and to the submitters of articles – thank you for advancing mathematics education in Ontario. Your efforts are appreciated.

In addition to excellent columns by Ron, Frances, Marilyn, Fred, and Chris, you will find in this issue an article summarizing the Ontario Mathematics Olympics in Thunder Bay; a review of OAME's newest publication, *Linking Assessment and Instruction in Mathematics: Middle Years*; an article written by OAME's grades 6-8 Committee on bridging the gap between grades 7 to 9, and *Pursuing Probability Problems: Multi-Dice Rolls.*

Be sure also to read *The Right Equation*, a reprinted article paying tribute to Professor Jack Weiner of the University of Guelph. May this article remind you that even though the political situation here in Ontario is not favourable for teachers, that in the end, it is our commitment, enthusiasm, and passion to work with students that prevail. Enjoy the school year! Your students are very fortunate to have you as their teacher. ▲



▲ Letter to the Editor

Dear Editor:

Those who were in the audience for the Friday keynote address given by astronaut Bjarni Tryggvason at the OAME'2001 Conference in Scarborough might have felt, as I did, that his closing comments were, at best, ill-advised. I decided to contact Mr. Tryggvason after the conference to express my concerns. What follows is the content of the message that I sent to him:

First of all, let me say that I am extremely impressed with the kind of detailed research you have been involved in with the Space Program, and the extensive mathematics you use in your work. It is precisely because of your background as a scientific researcher that I was so disappointed and dismayed by your closing comments. Based on a breakfast conversation with a mathematician friend, you determined that you have sufficient data to inform an audience of hundreds of mathematics educators that what they are doing is all wrong, and to suggest how it could all be done right.

You have devoted an entire career to the Space Program. I have devoted my entire career of over 30 years to the teaching of mathematics to young children, and to learning as much as possible about children's learning and the most effective ways to enhance it. Your presumption that I, and my colleagues in OAME and OMCA, are blindly pursuing some educational fad is an insult of the highest order. You should be ashamed of yourself for jumping to such conclusions based on data as "rigorous" as your breakfast chat with a friend!

If you are really interested in gathering more information about reform in mathematics education, I encourage you to explore the web site: http://www.mathematicallysane.com . In particular, for some data about why your notion of "more testing" is NOT an "ideal solution" for the problem, look under the Analysis section and click on "High Stakes Testing".

I certainly make no claim that we have all the answers, and there is certainly much room for improvement in mathematics teaching/learning reform, but we ARE making progress as we seek that balance of essential and basic mathematical skills with problem-solving/mathematical reasoning that will give our students true power with mathematics. The kind of diatribe that you unleashed in your closing comments at the OAME Conference does NOTHING to advance our common goal.

Ralph Connelly
Faculty of Education, Brock University ▲

▲ PRESIDENT'S MESSAGE

SHIRLEY DALRYMPLE
E-MAIL: shirleydalrymple@hotmail.com



The year 2001 is designated as "The Year of the Volunteer". In the dictionary, the word "volunteer" is defined as one who enters into any service on his own free will. These words describe so many members of the teaching profession. OAME would not be able to function without the generous support and strong efforts of its members. On behalf of the executive of OAME, I wish to thank the many volunteers in the mathematics education community who donate so many services; there are groups working on writing projects, preparing and presenting workshops and institutes on many topics, and researching and preparing resources. As well, there are many teachers from grades K to 12 who attend these workshops, work during their own time to prepare for the changes, improve aspects of their programs, or create new activities. To all of you, thanks.

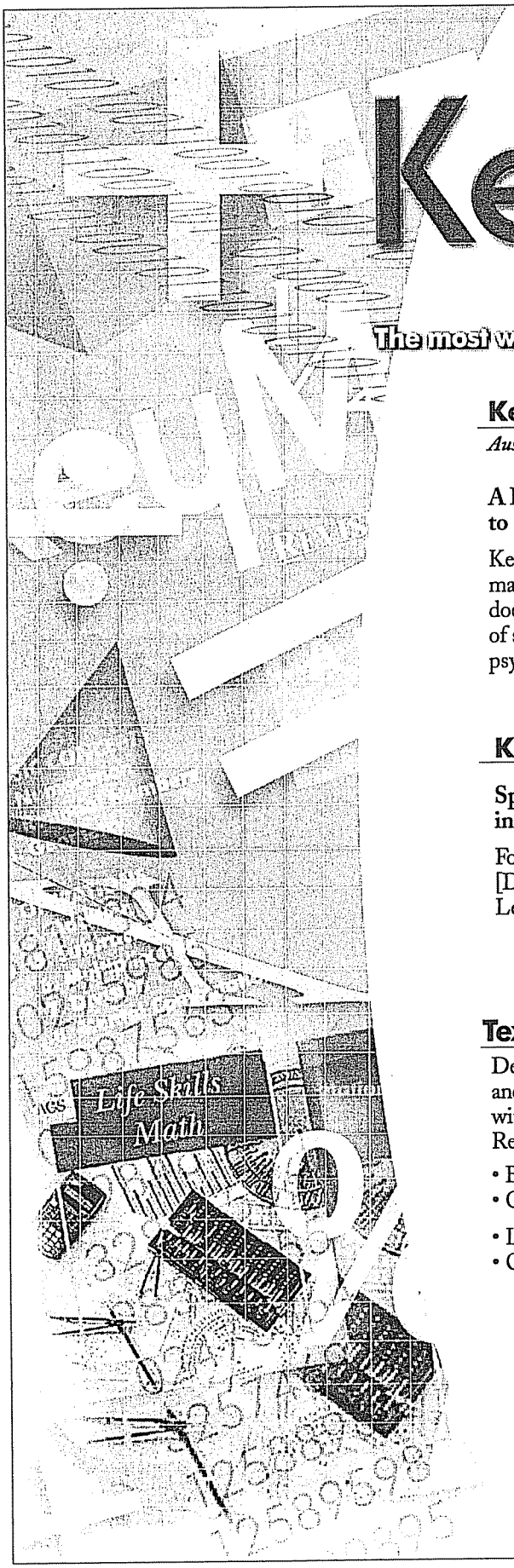
I would especially like to express my appreciation to those long-standing members who have completed their terms on the OAME Board in May 2001: Peter Saarimaki, David Zimmer, Wayne Fletcher, Kirsten Boucher, Carol Lemmon, Ed Barbeau, Geoffrey Roulet, Emilia Veltri, and Jack Weiner. Their contributions were many and varied, their enthusiasm and effort were apparent in all of their endeavours; thanks for a job well done. A special thank you, also, to Dave and Bonnie Alexander. They have been the hard working Executive Directors of OAME for the past seven years. Dave and Bonnie have decided to really retire and will be turning over the reins to David and Sue Hessey. Thanks Dave and Bonnie for the terrific job performed on our behalf and enjoy your well-earned retirement.

We are now well into the implementation of the new curriculum. Elementary teachers are looking back and revising, renewing, and improving. Secondary teachers are beginning year three of implementation. This promises to be another very busy year for us all. Some projects were completed over the summer and will soon be on the OAME web site, www.oame.on.ca, if they are not already. The Secondary Committee, in partnership with OMCA (Ontario Mathematics Coordinators Association), has been especially hard at work and several writing projects around assessment in the grade 11 courses have been assembled. There are assessment units for the 11U, 11U/C, and 11C courses, and Grade 11 Workplace activities have been developed to support the Workplace Profile. Watch the OAME web site for a way to get a CD version of technology activities for grades 9 to 11. These projects were made possible through funds from the Ministry of Education.

OAME is looking for ways to provide support and in-service for new teachers of less than five years. Many chapters are also considering this issue so watch for events advertised in your area. If you are a new teacher, please contact me or your chapter representative to let us know what we can do to help. (Our numbers and e-mails are all listed in the back of each edition.) If you are not a new teacher, please feel free to pass along any ideas that you have or some support that you would have liked. We look forward to hearing from you.

I am still, as usual, worried about not having enough time to do all the things that I need to do. I am sure that many of you are also feeling the same way and so I am ending my message with another time saving suggestion. OAME has formed a strong partnership with OMCA. We have, in the past, worked on writing and in-service projects; we have similar goals. One of the roles of mathematics coordinators is to research and prepare resources and workshops for teachers in their boards. They take the time required to become current on the latest research, familiarize themselves with new technology, test a variety of approaches, and create ways to share with their teachers. I have been jealous of the time that they have to accomplish these things but I have learned to rely on them for the time they save me. I encourage you to take the resources that they have to offer whenever you get a chance. Tap into their expertise and take advantage of the time they save you. I have many great ideas and resources as a result of their efforts.

Have a great semester and stay connected. Let's keep working together. ▲



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▲ Technology Corner - TI-83+ Plus Parametric Equations = Graphs of Conic Sections

FRED FERNEYHOUGH
E-MAIL: dybydx@home.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.

I had the opportunity to attend the NCTM annual meeting held in Orlando in April this year, and I picked up the following approach to graphing conics from Professor Bill Leonard of Illinois State University. Should you ever get the chance to hear him, don't miss it!

There are three problems with using the TI-83+ in function mode to graph conics:

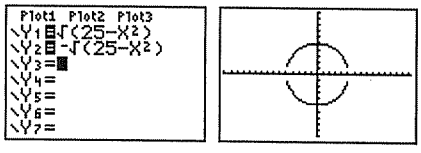
a) you have to first isolate variable y and recognize that it has two parts;

b) you have to enter two different equations, and

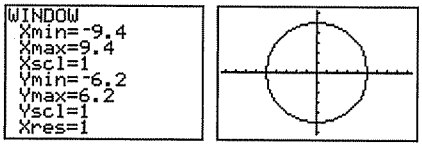
c) you get a graph that generally has gaps.

For example, to graph the circle $x^2 + y^2 = 25$, you first isolate y to get $y = \pm\sqrt{25 - x^2}$.

Now, enter these equations into the TI-83+ and press graph. Since the TI-83+ screen has different scales for x and y, most people press Zoom 5 to square the screen. The gaps by the x-intercepts bother most people.



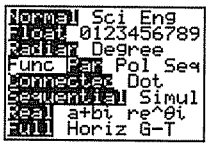
To get around this problem, set the window as shown and graph again to see the circle in its proper perspective. The values in the window is a method of squaring the window and relate to the resolution of the TI-83+ screen (94 pixels by 62 pixels). Notice that this circle has no gaps near the x-axis.



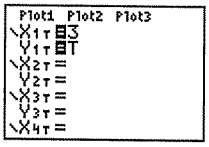
Later, we will come back to the circle and use a parametric approach. First, let's look at graphs that we have taught in grades 9 and 10 to see how they are done parametrically.

Think of a *parametric equation* as a description of the motion of a particle along the curve as a function of time. Then, any point P(x,y) on the curve should be expressed in the form x = f(t) and y = g(t). The bad news is that we still have to do some algebraic manipulations and we still have to enter two equations.

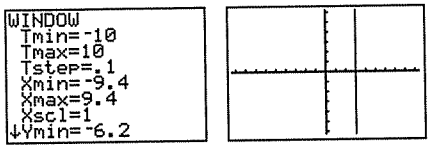
Now, let's try the same problem using a parametric approach. First, we need to change the mode of the calculator. Press the mode button and highlight the same options shown in the screen below. Using the variable key will produce the symbol T instead of x.



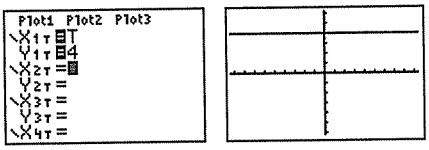
One of the advantages of using parametric form is that it is easy to produce vertical lines on the screen. Press the y = button and you will see that the equations are set up quite differently. There is a separate equation for the x variable and the y variable, and both are expressed as a function of the parameter, represented by T. For a vertical line, we know that x is a constant, so put a constant in the x-equation and let y change according to the parameter.



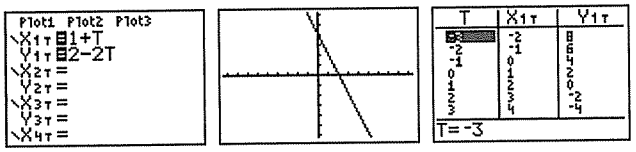
Set up the window as shown, and press the GRAPH key.



To graph a horizontal line, let the y-equation be fixed and let T change in the x-equation. An example follows for you to try:

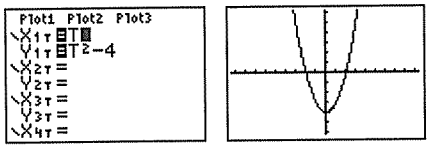


Okay, so it works for horizontal and vertical lines, but what about other lines? Easy. Consider a line through the point (1,2) with slope –2. In grade 9, we have asked our students to think of slope as a rate of change, so it would not be a stretch for them to think of slope as a ratio. Using this approach, we can say that the value of y changes by –2 when the value of x changes by 1. So, let's say that x starts at 1 and changes by 1 unit at a time, while y starts at 2 and changes by 2 units (downward) at a time. In parametric form, this would be represented in the first screen below:

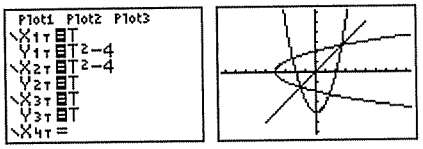


The second screen shows the graph, and the third screen shows a table of values, with values of T shown along with the x and y coordinates.

In grade 10, we examine the parabola. There are some advantages to working with parametric form in the graphs of quadratics. To get a basic graph, consider the function $y = x^2 - 4$. Let x = T, the parameter. Then, the equation becomes $y = T^2 - 4$, and we enter these into the parametric equations and graph the result.



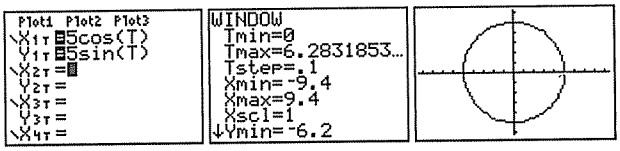
The advantage comes when you look at the inverse of the quadratic. We teach students to reverse x and y and solve. Well, now you can reverse x and y and not have to bother solving for y, and just graph it.



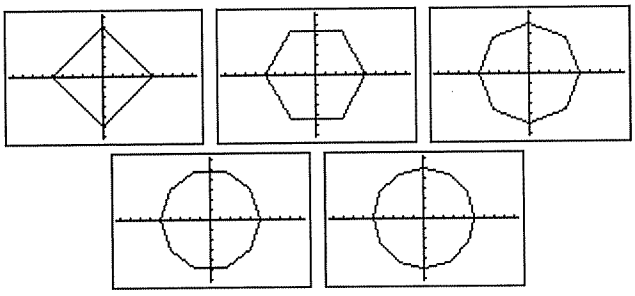
The third set of parametric equations produces the line y = x.

Let's look at that circle once again. Let T be the angle of rotation. If you take the equation of the circle $x^2 + y^2 = 25$, and divide through by 25, you get $\frac{x^2}{25}+\frac{y^2}{25}=1$. This can be written as $\left(\frac{x}{5}\right)^2+\left(\frac{y}{5}\right)^2=1$ which resembles the basic Pythagorean trigonometric identity $(\cos\theta)^2 + (\sin\theta)^2 = 1$.

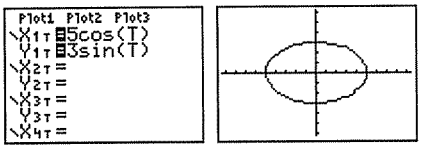
Comparing like parts, we get $x = 5\cos\theta$ and $y = 5\sin\theta$. It is these equations that we enter into the calculator, set the window, and graph the result.



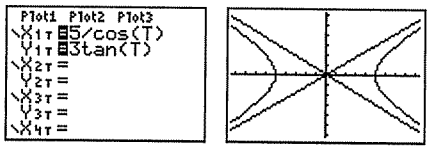
An interesting result comes about when you experiment with the value for Tstep in the window. The following screens correspond to values of $\frac{\pi}{2}, \frac{\pi}{3}, \frac{\pi}{4}, \frac{\pi}{5}$, and $\frac{\pi}{6}$ respectively. The smaller the value, the closer the graph comes to a perfect circle. However, a smaller value of Tstep takes longer to graph.



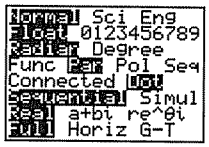
For the ellipse, we take the same approach. Start with $\frac{x^2}{25}+\frac{y^2}{9}=1$. Change it slightly to $\left(\frac{x}{5}\right)^2+\left(\frac{y}{3}\right)^2=1$. This still resembles the trigonometric identity $(\cos\theta)^2 + (\sin\theta)^2 = 1$, and we get $x = 5\cos\theta$ and $y = 3\sin\theta$. Enter these equations and press the graph key.

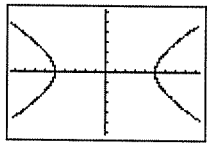


Finally, for the hyperbola, we change the approach slightly. The equation $\frac{x^2}{25}-\frac{y^2}{9}=1$ can be rewritten as $\left(\frac{x}{5}\right)^2-\left(\frac{y}{3}\right)^2=1$. This resembles the lesser known Pythagorean trigonometric identity $(\sec\theta)^2 - (\tan\theta)^2 = 1$. Comparing like terms, we get $x = 5\sec\theta$ and $y = 3\tan\theta$. The first equation should be changed into the form $x=\frac{5}{\cos\theta}$ so that it can be entered into the calculator. The only problem here is that we don't teach the reciprocal trigonometric functions in the new curriculum, so $\sec\theta$ should be presented as $\frac{1}{\cos\theta}$ right from the start. Enter the equations and press the GRAPH key.



At first glance, it appears that the calculator added in the oblique asymptotes in for us. However, we are not so lucky. One of the default settings for the calculator is to have successive points connected. As the graph moves from the point at the top right to the bottom left, the calculator wants to join the two points. To turn this off, change the mode settings as shown, and then in the window, change Tstep to .01.





Parametric equations are normally taught only in the present Algebra and Geometry course and will appear in the new Geometry and Discrete Mathematics course. Given that the best students will be in our grade 11U course this year, why not start teaching the conic sections using parametric form now. It provides a great vehicle for integrating algebra, trigonometry, and the conic sections. ▲

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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
118 Gledhill Ave., Toronto, ON, M4C 5K8 Business (416) 396-2174, Fax (416) 396-2238
Home (416) 425-9626 E-mail: stewartcraven@home.com

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 ( ) _____

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_____

Home Phone ( ) _____

Nominator's Information:

_____

Name of Nominator

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_____

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▲ A Review of: *Linking Assessment and Instruction in Mathematics: Middle Years*

JOANNE HARRIS



Joanne Harris is a grade 8 mathematics teacher in Georgetown, Ontario. She is always looking for ways to make mathematics more relevant and meaningful for her students.

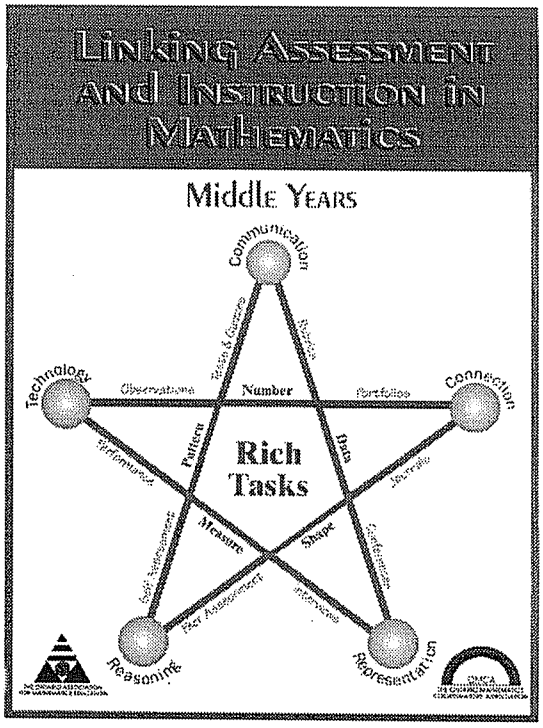
The Leadership Conference 2001, "Looking at Mathematics," saw the launch of the new resource *Linking Assessment and Instruction in Mathematics: Middle Years*. A writing team consisting of members from The Ontario Association for Mathematics Education (OAME) and The Ontario Mathematics Coordinators' Association (OMCA) collaborated to produce this high quality resource. All of the Assessment Tasks in the document have been field-tested in Ontario.

The document, published in February 2001, consists of two parts. In the first section, the authors include a significant amount of information for teachers on the current thinking and practice relating to the Middle Years Mathematics program. Two or three key concepts for each of the five strands are identified, followed by the main process components needed for a rich mathematics program. A description of what problem solving looks like in today's classroom is included.

The authors then took the curriculum document, *The Ontario Curriculum, Grades 1-8: Mathematics* (1997), and rearranged the expectations by topics within the strands and organized them across the three grades; that allows the user to see how a topic develops from grade 6 through to grade 8. This chart would also be an excellent planning tool for teachers with a split grade class whether it be a 6/7 split or a 7/8 split. The chart also allows you to see at a glance where the similarities are in the program and how a concept is developed over the three years. Action words from the expectations, for example, *construct,* or *estimate,* have been capitalized. In some cases, where the authors identified a gap in the development of a concept or procedure, an action word, phrase, or expectation has been added. These are clearly identified as they have been italicized.

The remainder of the first part of the document is a complete look at nine different Assessment and Evaluation techniques. By answering the questions "What are they,"? "How are they used,"? and "What do they look like"? for each technique, the authors have collected a large amount of information, simplified it, and organized it into one place. Some of the techniques described in this section include observations, anecdotal records, rubrics, peer and self assessment, and journals.

The second section of the resource consists of eleven sample Investigations. Each Investigation has a common planning format. There is an Overview which identifies what the task is about. Following the overview is a table that is used to identify what prior knowledge the students need, what materials are needed to conduct the task, and an estimate of the amount of class time needed to do the task. The Links to the *Ontario Curriculum, Grades 1-8: Mathematics* document are made for both Overall and Specific Expectations. Note that the numbering system used on the Ministry web site is used to identify specific expectations. These are followed by a second table that summarizes both the key teaching/learning tasks and also the Math Vocabulary used in the task.



Each task also includes a small section that suggests links to other subject disciplines. There are Activity Directions for the teacher and then the Activity itself. The pages are set up so that teacher hints appear throughout the process, materials, or types, and timing of assessment. Each Activity features an exemplar section where samples of student work, gathered during the field testing, have been included. Each sample has a level assigned along with two or three reasons for its designation. If specific dot paper (such as orthographic dot paper) is needed to complete an activity, it has been included as a Blackline Master in the resource.

The authors do not include any suggestions about when to use the specific investigations. The investigations have been designed to be appropriate for the span of years from grades 6 to 8. Individual teachers will have to look at their students to determine which tasks they would use in their classroom. The authors recommend using one investigation per term.

This worthwhile resource can be obtained by contacting the OAME Executive Directors at oame.hessey@sympatico.ca. ▲

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▲ Grades 7 and 8 to 9: Bridging the Gap

2000-2001 OAME GRADES 6-8 COMMITTEE

Ontario mathematics teaching and learning are changing: new curricula, expanded assessment foci, province-wide standards, and EQAO tests. Although these issues impact on all parts of the school system, the EQAO assessments have put the focus on grades 3, 6, and 9. But mathematics learning does not occur just in these grades; student success depends upon the teaching they receive in all years. At the elementary level, many schools and boards have presented this message of collective responsibility and have made improvement of EQAO scores a team effort. For the grade 9 Mathematics Assessment, this is more difficult: there is a physical gap in Ontario's school program, with part of the team, the grades 1 to 8 teachers, working in separate buildings, reading their curriculum expectations from separate documents, and following a style of school organization different from the grade 9 team members. In this article, we hope to bridge this gap and begin developing a situation in which grades 7, 8, and 9 teachers see the benefits of ongoing dialogue and sharing of resources.

Curricula are presented differently in the elementary and secondary schools, but the achievement charts in all mathematics documents (Ontario Ministry of Education, 2000; Ontario Ministry of Education and Training, 1997, 1999) indicate that mathematical reasoning and communication are key components. These ideas have appeared in the EQAO grades 3, 6, and 9 assessments. They are also the basis of investigation activities such as "Testing Paper Roofs". We have identified grades 7, 8, and 9 expectations that are addressed by this activity, and to help illustrate how pupils' skills grow through the years, we have linked these expectations across the grades. This is a good example of how activities can be adapted and effectively used across many grades. Other versions of this activity and teacher notes can be found in the *Grade 9 Course Profiles* developed by the Public District School Board Writing Partnership (1999a, 1999b) and in the OAME/OMCA *CARE Package* (Suurtamm, et al., 2000). Although the majority of students, when entering grade 9, will select the academic or applied courses, teachers may also wish to consult the *Essential Mathematics Course Profile* (Public and Catholic District School Board Writing Partnership, 2000) where the activity is connected to expectations from grades 6, 7, and 8; this could help support teachers when working with students headed towards the secondary school Workplace Preparation courses.

The specific expectations selected from the ministry curriculum guidelines show the process of building and expanding skills and knowledge through grades 7, 8, and 9. The TESTING PAPER ROOFS activity demonstrates that using the same activity will allow students at each grade to use their present skills and then extend their learning in future grades.

GRADE 7	GRADE 8	GRADE 9
DATA MANAGEMENT AND PROBABILITY	**DATA MANAGEMENT AND PROBABILITY**	**RELATIONSHIPS**
• systematically collect, organize, and analyze data	• systematically collect, organize, and analyze primary data	• determine the relationships between two variables by collecting and analyzing data
Collecting Data	**Collecting Data**	**Collecting Data**
• collect and organize data using simple data collected by the students • explore with technology to find the best presentation of data	• collect and organize primary data using a sample • manipulate and present data using spreadsheets	• pose problems, identify variables, formulate hypothesis, and apply principles of designing an experiment to investigate the relationship between two variables • organize and analyze data using appropriate techniques (tables and graphs) and/or technology (spreadsheets)
Analyzing Data	**Analyzing Data**	**Analyzing Data**
• identify and describe trends in graphs, using informal language to identify growth, clustering, and simple attributes • make inferences and convincing arguments that are based on data analysis	• know that a pattern on a graph may indicate a trend and discuss trends in graphs to clarify understanding and draw conclusions about the data • make inferences and convincing arguments that are based on data analysis	• describe trends and relationships observed in data • make inferences from data, comparing the inferences with hypotheses about the data
Concluding and Reporting	**Concluding and Reporting**	**Concluding and Reporting**
• display data on bar graphs, with or without the help of technology • use conventional symbols, titles, and labels • evaluate arguments that are based on data analysis	• construct line graphs, with or without the help of technology, and use the information to solve problems • determine trends and patterns by making inferences from graphs • evaluate arguments that are based on data analysis • use the information to solve problems and report information about data presented on line graphs	• communicate the findings of an experiment clearly and concisely using appropriate mathematical forms (tables, graphs, word equations or formulas) • justify the conclusions reached • solve and pose problems related to the experiment using the findings of the experiment

A blackline master for the activity is provided on the facing page. The criteria contained in the rubric have been selected from the full *Communication* and *Thinking/Inquiry/Problem Solving* rubrics that are available on the OAME web site www.oame.on.ca.

TESTING PAPER ROOFS

You are assisting an engineer that has been commissioned to evaluate the design of a roof for a local manufacturing plant. There are concerns that the roof may collapse under the projected ice loads this winter. Use the following materials to test a model for this concern.

YOUR TASK:

After conducting the investigation below, you will prepare a report for the engineer that:

- summarizes your method;
- illustrates the data collected;
- predicts the breaking weight of a paper roof consisting of 100 sheets, and
- justifies your prediction.

EQUIPMENT:

Several 20 cm by 10 cm strips of paper

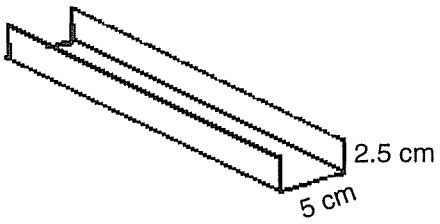
Two books of the same thickness

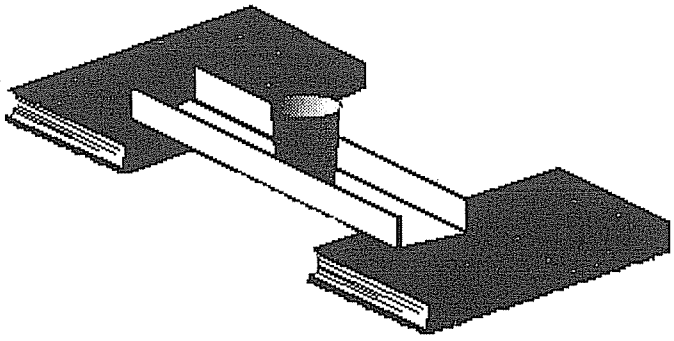
A small paper cup

About 50 pennies

DIRECTIONS:

- Make a paper roof by folding up 2.5 cm along both long sides of a paper strip.
- Suspend the roof between the two books.
  The roof should overlap each book by about 2.5 cm.
  Place the paper cup in the centre of the roof.
- Put pennies into the cup, one at a time, until the roof crumples.
  Record the number of pennies you added to the cup.
  This number is the *breaking weight* of the roof.
- Test a roof that is made from two paper strips together.
- How strong are roofs of 3, 4, 5, 6, and 100 layers of paper?





Assessment Rubric for Communication and Thinking/Inquiry/Problem Solving

Category/Criteria	Level 1	Level 2	Level 3	Level 4
Communication: Integration of narrative and mathematical forms of communication	Either mathematical or narrative form is present, but not both.	Both mathematical and narrative forms are present, but the forms are not integrated.	Both mathematical and narrative forms are present and integrated.	A variety of mathematical forms and narrative are present, integrated, and well chosen.
Problem Solving/ Thinking/Inquiry: Making inferences, conclusions, and justifications	Inferences/ conclusions are stated with no justification.	Inferences/ conclusions are stated and supported with some justification.	Inferences/ conclusions are stated and supported with detailed justification.	Inferences/ conclusions are stated and supported with detailed justification, showing evidence of reflection, and conditions are explained.

References

Ontario Ministry of Education. (2000). *Mathematics: The Ontario curriculum: Grades 11 and 12.* Toronto: Queen's Printer for Ontario.
Available:
http://www.edu.gov.on.ca/eng/document/curricul/secondary/grade1112/math/math.html

Ontario Ministry of Education and Training. (1997). *Mathematics: The Ontario curriculum: Grades 1–8.* Toronto: Queen's Printer for Ontario.
Available:
http://www.edu.gov.on.ca/eng/document/curricul/curr97ma/curr97m.html

Ontario Ministry of Education and Training. (1999). *Mathematics: The Ontario curriculum: Grades 9 and 10.* Toronto: Queen's Printer for Ontario.
Available:
http://www.edu.gov.on.ca/eng/document/curricul/secondary/math/mathful.html

Public and Catholic District School Board Writing Partnership. (2000). *Course profile: Essential mathematics: Grade 9.* Toronto: Queen's Printer for Ontario.
Available:
http://www.curriculum.org/occ/profiles/9/html/ESMAT1.htm

Public District School Board Writing Partnership. (1999a). *Course profile: Foundations of mathematics: Grade 9 applied.* Toronto: Queen's Printer for Ontario.
Available:
http://www.curriculum.org/occ/profiles/9/html/1PAPFM.htm

Public District School Board Writing Partnership. (1999b). *Course profile: Principles of mathematics: Grade 9 academic.* Toronto: Queen's Printer for Ontario.
Available:
http://www.curriculum.org/occ/profiles/9/html/1PACPM.htm

Suurtamm, C., Stanford, M., Azzopardi, A., DiLena, S., McEvoy, I., Ingalls, M., Damji, I., & Howe, M. (2000). *CARE package: Concerning assessment and reflective evaluation.* Rosseau, ON: Ontario Association for Mathematics Education [OAME]/ Ontario Mathematics Coordinators Association [OMCA].
Available: http://www.oame.on.ca/9-10.html

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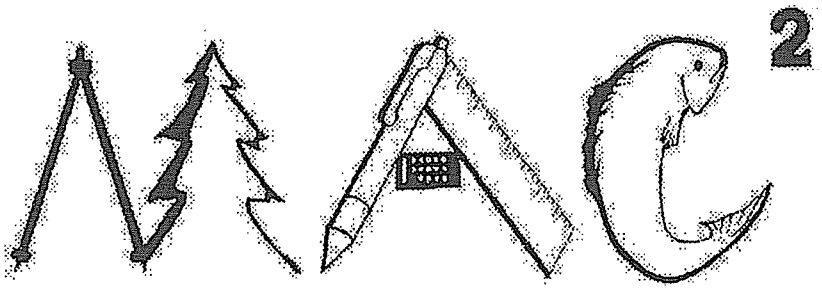
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▲ The Right Equation: Math Prof wants his students to know that they're number one

REPRINTED WITH PERMISSION FROM: ALEXANDER WOOLEY

"What do you call 10 to the power of 100?" asks Prof. **Jack Weiner**, Mathematics and Statistics, University of Guelph. On this evening, blank stares emit from some 300 first-year math students in the MacNaughton Building classroom.

"It's called a google," says Weiner. A few giggles about the google from the class. "Know why it's called a google?" He searches the faces of the students, who begin to display more interest. "Because the computer scientist who came up with the term was trying to think of a word that sounded *really big* (Weiner's voice rises). And he was looking for this word and he was at home rocking his baby, and then all of a sudden, his baby looked at him and said, in baby talk . . . "

"Google," choruses the class, getting it.

Count that as one lesson that won't have to be taught again to this particular group of students. "At the end of one of my classes," says Weiner, "I want students to say: 'Is it over already?'"

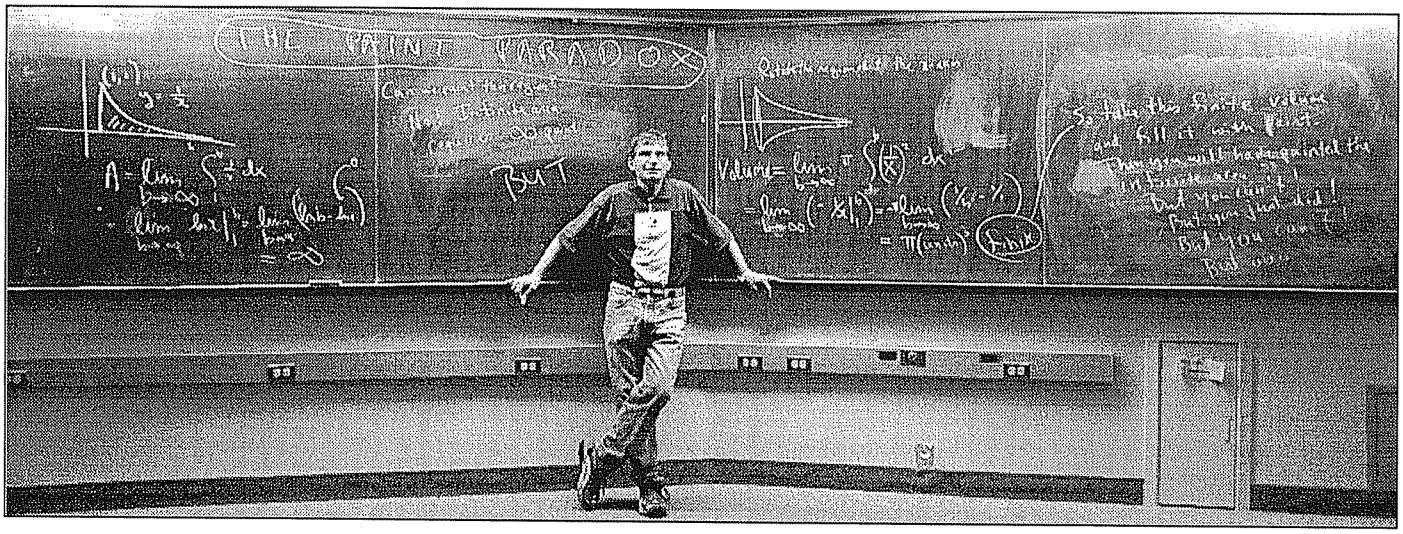
Super-teacher Weiner (1992 University of Guelph Faculty Association Teaching Award, 1993 Ontario Confederation of University Faculty Associations Teaching Award) has devoted his career at U of G to making sure each and every student who passes through his classroom doors understands that one is a prime number, and they happen to be that one. "I do everything in my power to ensure the honest success of every one of my students," he says.

Weiner's bag of tricks is large — some would say infinite. He questions, he cajoles, he raises his voice to catch students' attention, then lowers it so that students strain to catch what he's saying. He prepares special handouts for every class and then is scrummed by students at the end of a session, patiently answering each of their questions in turn. He uses mnemonics and anecdotes to get them to remember, as with one particular mathematical term that he tells students "is our famous beer point: 2,4."

Most of all, he encourages discussion. Singling out one student, he tells the rest of the class: "He's got it. If you don't, get his e-mail address or go over to his room and find out how he did it."

Students love Weiner. An April 5 editorial in the student newspaper *The Ontarion* called him "a mathematical god. . . . If you haven't taken calculus with Prof. Weiner and have an elective hanging around, do yourself a favour." He's also a perennial "Favourite Prof" in the *Maclean's* magazine *Guide to Universities* profile of Guelph.

Walking across campus, Weiner is frequently stopped by students wanting to pick his brain. They know they won't get a pat answer, but probably something that teases them in the right direction. The students love him



Photograph by Dean Palmer, ©2001

for it, for his earnest enthusiasm. Take undergraduate Ann Jakabfy's appraisal, for example, which she wrote in an e-mail to Weiner: "I am only in your class because it was my prerequisite for my major, but do you know what? I love it! You are a reason why students pay all that money to go to this school. I never had a teacher inspire me to actually want to go to class. You are one of those few teachers that help students live up to their potential. Thank you for making math fun."

Drama major Paloma Nunez credits Weiner with giving her the confidence to pursue a minor in mathematics. "I believe anyone could learn calculus from him, even my mother," says Nunez. "He teaches with clarity and precision, he explains things well and he's always enthusiastic about his material. It's clear that he loves what he does."

Another place students interrupt Weiner is where he can usually be found at noon: on a stationary bike in the Athletics Centre. He says he started working out in graduate school because he was beginning to gain weight. From home every morning, he takes long runs with his two dogs, Kelly, a golden retriever, and Denver, a malamute-husky-shepherd-wolf mix.

"I take being fit very seriously," he says. "For one thing, it tops up my energy for class. After running or being on the bike, I'm all ready to teach."

And make no mistake, students in Weiner's class work hard. Seeing some students close their books near the end of class, Weiner waves his hands in the air. "Three minutes left in the class, three minutes! You can't have them; they're my three minutes. We're still learning."

The blackboard is his main prop, his giant painter's palette. He uses it to mix his knowledge with the budding ideas of his students, who call out potential answers to problems-in-motion. Because his style is dependent on participation, Weiner worries about larger classrooms, locations like War Memorial Hall, where students may feel intimidated about taking part in class. His subject is numbers; his students aren't.

He also worries about some teaching technologies like PowerPoint that are everything except interactive. "The blackboard and the overhead, both of which I can write on while talking to the class, are essential to my teaching, because my style is to get students to develop answers and formulae with me. I can't do that on a laptop with PowerPoint, where everything has to be inputted beforehand."

Preparation is key to Weiner's success at teaching. He has a checklist he follows. "I have to understand my learning objectives, I have to prepare carefully and strategically choose examples for class so that students see concepts in action, I have to bring energy and enthusiasm to the classroom, I have to involve the students interactively, and I have to choose homework that reinforces the concepts learned."

Students notice. "The hard work that Prof. Weiner puts into every lecture he gives is clearly noticed and much appreciated," says Jakaby. "He has inspired me to put more solid effort into my work."

Weiner, who holds a master's degree in mathematics from the University of Waterloo and a bachelor of education from Queen's, first came to U of G in the mid-1970s. He spent two years on campus as a math instructor and co-ordinator of the Department of Mathematics and Statistics's learning centre, then decided to head back to high school — as a math teacher. After teaching high school for five years, he was invited back to U of G to teach and do liaison work with high school math teachers and students. He's never regretted the decision.

"If I was still at Parkside High School in Dundas, I'd be teaching great kids," he says, "but at the University, I've written a major textbook and educational resource pamphlets, I've spoken at conferences, and I get to challenge students as well as myself every day. As a high school teacher, I had a great job. Teaching at university, I've had a great life."

One high school program Weiner would like to resurrect from the 1980s is his Super Math Club. This was a math enrichment program he developed at U of G for high school students and teachers living within a 200-kilometre radius of campus.

Unlike other math groups, the club was not competitive, he says. "There were no evaluations. Instead, it was an opportunity to involve our community, to perhaps boost enrolment by turning some students on to the math programs at Guelph, but most of all to bring together teachers and students on the path to math learning."

So how many students in all has Weiner helped at the high school and university levels? It's a big number, hard to calculate. Leave it at this: more than one, less than a google. ▲

▲ Pursuing Probability Problems: Multiple Dice Rolls



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Teachers are always seeking ways in which probability concepts can be modelled. The use of dice of various shapes provides a rich opportunity for this endeavour. In the popular table game *Yahtzee*, a player rolls a set of five standard (six-sided) dice up to three times. After each roll, the player determines which, if any, of the results to "leave standing" and which, if any, to roll again. One of the goals in *Yahtzee* is to achieve as many as possible of a specific die face—such as a 6. We shall determine the probability that after a given "*Yahtzee*-turn" (up to three rolls), the player has five die faces of 6.

To address this problem, we will employ three probability processes:

1. The probability that one or the other of two disjoint outcomes occur is the sum of their separate probabilities. This summing process also applies for three or more events.
2. The probability that two events consecutively occur is the product of the probability of the first event and the probability of the second event, given that the first event has already occurred.
3. Suppose that a player rolls n dice. For each die rolled, the probability of a specific outcome, called success, is p; the probability that this outcome does not occur, called failure, is q or 1-p. The probability of achieving r successes among these n dice is $C(n,r)\cdot p^r\cdot q^{n-r}=\frac{n!}{r!(n-r)!}p^rq^{n-r}$. For example, if five dice are rolled, the probability of getting exactly three 6's is $C(5,3)\cdot\left(\frac{1}{6}\right)^3\cdot\left(\frac{5}{6}\right)^2=\frac{5!}{(3!)(2!)}\left(\frac{1}{6}\right)^3\cdot\left(\frac{5}{6}\right)^2=10\left(\frac{1}{6}\right)^3\left(\frac{5}{6}\right)^2$.

Now let us compute the probability of obtaining all 6's on at most three rolls with the five dice. At the end of each roll, any 6's which have resulted are not re-rolled; only the non-6's are re-rolled.

Table I depicts the numbers of die faces of 6 that could result in each roll, leading to the ultimate result of all 6's.

Possible Outcome Set	Roll 1	Roll 2	Roll 3	Possible Outcome Set	Roll 1	Roll 2	Roll 3
1	5	-	-	12	1	3	1
2	4	1	-	13	1	2	2
3	4	0	1	14	1	1	3
4	3	2	-	15	1	0	4
5	3	1	1	16	0	5	-
6	3	0	2	17	0	4	1
7	2	3	-	18	0	3	2
8	2	2	1	19	0	2	3
9	2	1	2	20	0	1	4
10	2	0	3	21	0	0	5
11	1	4	-				

Table I: Number of 6's on each roll

The probability for each of these 21 sequences of results can be calculated. We will consider three of the sequences in detail.

Outcome 1: (5, -, -)

The probability of rolling five 6's on the first roll is $C(5,5)\cdot\left(\frac{1}{6}\right)^5\cdot\left(\frac{5}{6}\right)^0=\left(\frac{1}{6}\right)^5$. There are no second or third rolls.

Outcome 4: (3, 2, -)

For the first roll, the probability of getting exactly three 6's is $C(5,3)\cdot\left(\frac{1}{6}\right)^3\cdot\left(\frac{5}{6}\right)^2=10\left(\frac{1}{6}\right)^3\cdot\left(\frac{5}{6}\right)^2$.

In the second roll, which involves only two dice, the probability of getting two 6's is $C(2,2)\cdot\left(\frac{1}{6}\right)^2\cdot\left(\frac{5}{6}\right)^0=\left(\frac{1}{6}\right)^2$. No third roll is necessary. The probability of this two-roll sequence is then the product of the separate probabilities, or $\left[10\cdot\left(\frac{1}{6}\right)^3\cdot\left(\frac{5}{6}\right)^2\right]\cdot\left(\frac{1}{6}\right)^2=10\cdot\left(\frac{1}{6}\right)^5\cdot\left(\frac{5}{6}\right)^2$.

Outcome 10: (2, 0, 3)

For roll 1, the probability is $C(5,2)\cdot\left(\frac{1}{6}\right)^2\cdot\left(\frac{5}{6}\right)^3$.

For roll 2, the probability is $C(3,0)\cdot\left(\frac{1}{6}\right)^0\cdot\left(\frac{5}{6}\right)^3$.

For roll 3, the probability is $C(3,3)\cdot\left(\frac{1}{6}\right)^3\cdot\left(\frac{5}{6}\right)^0$.

The probability that these three outcomes occur consecutively is the product of the three probabilities or

$[C(5,2)\cdot C(3,0)\cdot C(3,3)]\cdot\left[\left(\frac{1}{6}\right)^2\cdot\left(\frac{1}{6}\right)^0\cdot\left(\frac{1}{6}\right)^3\right]\cdot$

$\left[\left(\frac{5}{6}\right)^3\cdot\left(\frac{5}{6}\right)^3\cdot\left(\frac{5}{6}\right)^0\right]=10\cdot\left(\frac{1}{6}\right)^5\cdot\left(\frac{5}{6}\right)^6.$

Using this method, Table II is constructed for the 21 sequences of Table I.

Sequence	Probability
(5,–,–)	$C(5,5)\cdot\left(\frac{1}{6}\right)^5\cdot\left(\frac{5}{6}\right)^0=\left(\frac{1}{6}\right)^5$
(4,1,–)	$\left[C(5,4)\cdot\left(\frac{1}{6}\right)^4\cdot\left(\frac{5}{6}\right)^1\right]\cdot\left[C(1,1)\cdot\left(\frac{1}{6}\right)^1\cdot\left(\frac{5}{6}\right)^0\right]=5\cdot\left(\frac{1}{6}\right)^5\cdot\left(\frac{1}{6}\right)^1$
(4,0,1)	$\left[C(5,4)\cdot\left(\frac{1}{6}\right)^4\cdot\left(\frac{5}{6}\right)^1\right]\cdot\left[C(1,0)\cdot\left(\frac{1}{6}\right)^0\cdot\left(\frac{5}{6}\right)^1\right]\cdot\left[C(1,1)\cdot\left(\frac{1}{6}\right)^1\cdot\left(\frac{5}{6}\right)^0\right]=5\cdot\left(\frac{1}{6}\right)^5\cdot\left(\frac{5}{6}\right)^2$
(3,2,–)	$\left[C(5,3)\cdot\left(\frac{1}{6}\right)^3\cdot\left(\frac{5}{6}\right)^2\right]\cdot\left[C(2,2)\cdot\left(\frac{1}{6}\right)^2\cdot\left(\frac{5}{6}\right)^0\right]=10\cdot\left(\frac{1}{6}\right)^5\cdot\left(\frac{5}{6}\right)^2$
(3,1,1)	$\left[C(5,3)\cdot\left(\frac{1}{6}\right)^3\cdot\left(\frac{5}{6}\right)^2\right]\cdot\left[C(2,1)\cdot\left(\frac{1}{6}\right)^1\cdot\left(\frac{5}{6}\right)^1\right]\cdot\left(\frac{1}{6}\right)=20\cdot\left(\frac{1}{6}\right)^5\cdot\left(\frac{5}{6}\right)^3$
(3,0,2)	$\left[C(5,3)\cdot\left(\frac{1}{6}\right)^3\cdot\left(\frac{5}{6}\right)^2\right]\cdot\left(\frac{5}{6}\right)^2\cdot\left(\frac{1}{6}\right)^2=10\cdot\left(\frac{1}{6}\right)^5\cdot\left(\frac{5}{6}\right)^4$
(2,3,–)	$\left[C(5,2)\cdot\left(\frac{1}{6}\right)^2\cdot\left(\frac{5}{6}\right)^3\right]\cdot\left(\frac{1}{6}\right)^3=10\cdot\left(\frac{1}{6}\right)^5\cdot\left(\frac{5}{6}\right)^3$
(2,2,1)	$\left[C(5,2)\cdot\left(\frac{1}{6}\right)^2\cdot\left(\frac{5}{6}\right)^3\right]\cdot\left[C(3,1)\cdot\left(\frac{1}{6}\right)^2\cdot\left(\frac{5}{6}\right)^1\right]\cdot\left(\frac{1}{6}\right)^1=30\cdot\left(\frac{1}{6}\right)^5\cdot\left(\frac{5}{6}\right)^4$
(2,1,2)	$\left[C(5,2)\cdot\left(\frac{1}{6}\right)^2\cdot\left(\frac{5}{6}\right)^3\right]\cdot\left[C(3,1)\cdot\left(\frac{1}{6}\right)^1\cdot\left(\frac{5}{6}\right)^2\right]\cdot\left(\frac{1}{6}\right)^2=30\cdot\left(\frac{1}{6}\right)^5\cdot\left(\frac{5}{6}\right)^5$
(2,0,3)	$\left[C(5,2)\cdot\left(\frac{1}{6}\right)^2\cdot\left(\frac{5}{6}\right)^3\right]\cdot\left(\frac{5}{6}\right)^3\cdot\left(\frac{1}{6}\right)^3=10\cdot\left(\frac{1}{6}\right)^5\cdot\left(\frac{5}{6}\right)^6$
(1,4,–)	$\left[C(5,1)\cdot\left(\frac{1}{6}\right)^1\cdot\left(\frac{5}{6}\right)^4\right]\cdot\left(\frac{1}{6}\right)^4=5\cdot\left(\frac{1}{6}\right)^5\cdot\left(\frac{5}{6}\right)^4$
(1,3,1)	$\left[C(5,1)\cdot\left(\frac{1}{6}\right)^1\cdot\left(\frac{5}{6}\right)^4\right]\cdot\left[C(4,3)\cdot\left(\frac{1}{6}\right)^3\cdot\left(\frac{5}{6}\right)^1\right]\cdot\left(\frac{1}{6}\right)^1=20\cdot\left(\frac{1}{6}\right)^5\cdot\left(\frac{5}{6}\right)^5$
(1,2,2)	$\left[C(5,1)\cdot\left(\frac{1}{6}\right)^1\cdot\left(\frac{5}{6}\right)^4\right]\cdot\left[C(4,2)\cdot\left(\frac{1}{6}\right)^2\cdot\left(\frac{5}{6}\right)^2\right]\cdot\left(\frac{1}{6}\right)^2=30\cdot\left(\frac{1}{6}\right)^5\cdot\left(\frac{5}{6}\right)^6$
(1,1,3)	$\left[C(5,1)\cdot\left(\frac{1}{6}\right)^1\cdot\left(\frac{5}{6}\right)^4\right]\cdot\left[C(4,1)\cdot\left(\frac{1}{6}\right)^1\cdot\left(\frac{5}{6}\right)^3\right]\cdot\left(\frac{1}{6}\right)^3=20\cdot\left(\frac{1}{6}\right)^5\cdot\left(\frac{5}{6}\right)^7$
(1,0,4)	$\left[C(5,1)\cdot\left(\frac{1}{6}\right)^1\cdot\left(\frac{5}{6}\right)^4\right]\cdot\left(\frac{5}{6}\right)^4\cdot\left(\frac{1}{6}\right)^4=5\cdot\left(\frac{1}{6}\right)^5\cdot\left(\frac{5}{6}\right)^8$
(0,5,–)	$\left(\frac{5}{6}\right)^5\cdot\left(\frac{1}{6}\right)^5=1\cdot\left(\frac{1}{6}\right)^5\cdot\left(\frac{5}{6}\right)^5$
(0,4,1)	$\left(\frac{5}{6}\right)^5\cdot\left[C(5,4)\cdot\left(\frac{1}{6}\right)^4\cdot\left(\frac{5}{6}\right)^1\right]\cdot\left(\frac{1}{6}\right)^1=5\cdot\left(\frac{1}{6}\right)^5\cdot\left(\frac{5}{6}\right)^6$
(0,3,2)	$\left(\frac{5}{6}\right)^5\cdot\left[C(5,2)\cdot\left(\frac{1}{6}\right)^3\cdot\left(\frac{5}{6}\right)^2\right]\cdot\left(\frac{1}{6}\right)^2=10\cdot\left(\frac{1}{6}\right)^5\cdot\left(\frac{5}{6}\right)^7$
(0,2,3)	$\left(\frac{5}{6}\right)^5\cdot\left[C(5,2)\cdot\left(\frac{1}{6}\right)^2\cdot\left(\frac{5}{6}\right)^3\right]\cdot\left(\frac{1}{6}\right)^3=10\cdot\left(\frac{1}{6}\right)^5\cdot\left(\frac{5}{6}\right)^8$
(0,1,4)	$\left(\frac{5}{6}\right)^5\cdot\left[C(5,1)\cdot\left(\frac{1}{6}\right)^1\cdot\left(\frac{5}{6}\right)^4\right]\cdot\left(\frac{1}{6}\right)^4=5\cdot\left(\frac{1}{6}\right)^5\cdot\left(\frac{5}{6}\right)^9$
(0,0,5)	$\left(\frac{5}{6}\right)^5\cdot\left(\frac{5}{6}\right)^5\cdot\left(\frac{1}{6}\right)^5=1\cdot\left(\frac{1}{6}\right)^5\cdot\left(\frac{5}{6}\right)^{10}$

Table II

In summing these 21 probabilities, note that each has a factor of $\left(\frac{1}{6}\right)^5$. Using the distributive property:

$$P=\left(\frac{1}{6}\right)^5\cdot\left[1+5\cdot\left(\frac{5}{6}\right)^1+5\cdot\left(\frac{5}{6}\right)^2+10\cdot\left(\frac{5}{6}\right)^2+20\cdot\left(\frac{5}{6}\right)^3+\right.$$

$$10\cdot\left(\frac{5}{6}\right)^4+10\cdot\left(\frac{5}{6}\right)^3+30\cdot\left(\frac{5}{6}\right)^4+30\cdot\left(\frac{5}{6}\right)^5+10\cdot\left(\frac{5}{6}\right)^6+$$

$$5\cdot\left(\frac{5}{6}\right)^4+20\cdot\left(\frac{5}{6}\right)^5+30\cdot\left(\frac{5}{6}\right)^6+20\cdot\left(\frac{5}{6}\right)^7+5\cdot\left(\frac{5}{6}\right)^8+$$

$$1\cdot\left(\frac{5}{6}\right)^5+5\cdot\left(\frac{5}{6}\right)^6+10\cdot\left(\frac{5}{6}\right)^7+10\cdot\left(\frac{5}{6}\right)^8+5\cdot\left(\frac{5}{6}\right)^9+$$

$$\left.1\cdot\left(\frac{5}{6}\right)^{10}\right]=0.013272056\approx 1.3\%.$$

Let us now re-do this problem (seeking five 6's) with different dice, each having eight faces. The very same steps apply except that each $\frac{1}{6}$ is replaced with $\frac{1}{8}$ and each $\frac{5}{6}$ is replaced with $\frac{7}{8}$.

$$\text{Then } P=\left(\frac{1}{8}\right)^5\cdot\left[1+5\cdot\left(\frac{7}{8}\right)^1+5\cdot\left(\frac{7}{8}\right)^2+10\cdot\left(\frac{7}{8}\right)^2+20\cdot\left(\frac{7}{8}\right)^3+\right.$$

$$10\cdot\left(\frac{7}{8}\right)^4+10\cdot\left(\frac{7}{8}\right)^3+30\cdot\left(\frac{7}{8}\right)^4+30\cdot\left(\frac{7}{8}\right)^5+10\cdot\left(\frac{7}{8}\right)^6+$$

$$5\cdot\left(\frac{7}{8}\right)^4+20\cdot\left(\frac{7}{8}\right)^5+30\cdot\left(\frac{7}{8}\right)^6+20\cdot\left(\frac{7}{8}\right)^7+5\cdot\left(\frac{7}{8}\right)^8+1\cdot\left(\frac{7}{8}\right)^5+$$

$$\left.5\cdot\left(\frac{7}{8}\right)^6+10\cdot\left(\frac{7}{8}\right)^7+10\cdot\left(\frac{7}{8}\right)^8+5\cdot\left(\frac{7}{8}\right)^9+1\cdot\left(\frac{7}{8}\right)^{10}\right]$$

$$=0.00391817\approx 0.4\%$$

Note that it is less likely to achieve five 6's with eight-sided dice than it is with six-sided dice.

Challenge for students: Analyze probabilities in other games, using the skills demonstrated in this article. ▲

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▲ PHOTO MATH - A NEW WAY OF PICTURING MATH

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

In the March 2001 issue of the *Gazette*, an opportunity was given to readers to develop their own questions related to a set of photographs. This task would have been easier had readers been able to be in the area where the photographs were taken. This would have allowed them to study the area from various perspectives and possibly notice other things that could have been brought into play. This may in part explain why no submissions were received through the mail. Fortunately, Louis Lim, Editor of the *Gazette*, arranged to have a table set up at the 2001 OAME Conference. Throughout the conference, he encouraged teachers to submit their questions. Well over 40 submissions were received during the conference. It was difficult to decide which submissions were the best, and in the end, winners were selected at random. The following five individuals will be receiving a copy of the game SET:

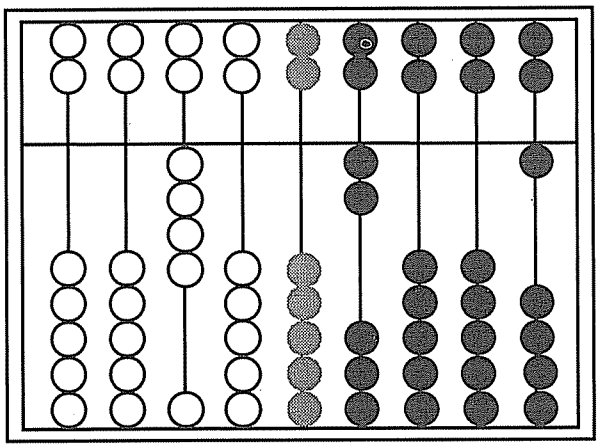
Brian English, Chatham; Kathleen Haché, Ottawa; Barbara Canton, Kingston; Glyn Mape, London; Kirsten Boucher, Pickering

Invented over twenty years ago by Marsha Falco, a population geneticist, SET has been used by mathematics teachers throughout the world to teach numerous topics. Information about this game can be obtained at the site www.setgame.com. Click on the link to SET and Trilogy and then select either the Mathematics link or the Teachers link. Additional information of interest to mathematics teachers can be found in the article "Developing Mathematical Reasoning Using Attribute Games" that appeared in the December 1999 issue of the *Mathematics Teacher*.

A question worth asking about this exercise is, "When do teachers receive training to develop and improve their ability to pose problems"? Perhaps the first question to be asked is, "Do they need this skill"? Is there anything wrong with teachers using nothing more that the questions provided by textbook writers or do we want to have teachers who are able to pose problems related to daily events, articles from newspapers or other events from our lives and the world around us? I would be very interested in hearing the views of readers on this issue.

Abacus

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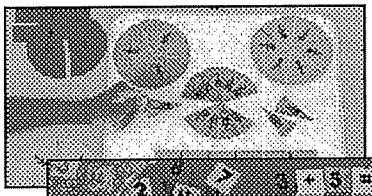
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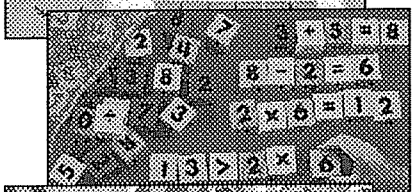
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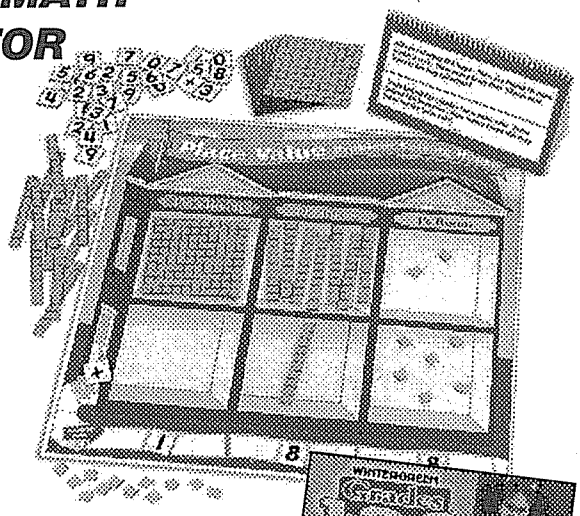
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▲ From the Editor's Desk

Caroline Rosenbloom, a mathematics instructional leader with the Toronto District School Board, has contributed two special activities for this issue. **Dice Difference** and **Calling Out Outcomes** addresses the strand *Data Management and Probability* for grades 5 to 8. Here are the specific expectations for these activities:

Grade 5: predict probability in simple experiments and use fractions to describe probability

Grade 6: connect the possible events and the probability of a particular event

Grade 7: identify the favourable outcomes among the total number of possible outcomes and state the associated probability.

Grade 8: compare predicted and experimental results in probability experiments.

[quoted from The Ontario Curriculum Grades 1-8 Mathematics, Ministry of Education, 1997]

Thank you Caroline for a thoughtful presentation of activities.

This issue marks the beginning of volume 40 for the *Abacus* and the beginning of my fifth year as your editor. Since I have been a member of OAME (joined in 1983), I have a copy of each *Abacus* produced through all the years of my membership. I decided to review the issues and pick out nuggets that will interest classroom teachers today. Children and mathematics haven't changed too much over the years. Hope you enjoy the tidbits by previous editors and writers.

Frances Schatz

▲ Teacher Notes - Dice Difference

Warm Up Activity: What are all the possible outcomes when you roll a pair of dice?

Activity Description: This is a game for two players.

1) Player A takes the set of answers {0,1,2} and player B the set of answers {3,4,5}.

2) Toss 2 dice. If the difference is 0,1 or 2, Player A wins. IF the difference is 3,4 or 5, Player B wins.

3) Play 20 rounds.

Questions:

a) Is the game fair or unfair? Justify your answer.

b) What is the probability that in any one round, A wins?

c) If you think the game is unfair, change the rules to make it fair. You must still keep the rule that you subtract the smaller from the larger. You may change the numbers which Player A wins though.

d) Change the game to "Dice Sum". How do you change the rules to make it a fair game?

Notes: Examine all the possible outcomes (36 possible pairs of numbers counting 1,3 different from 3,1).

Answer chart

probability (difference = 0) is 6/36

probability (difference = 1) is 10/36

probability (difference = 2) is 8/36

probability (difference = 3) is 6/36

probability (difference = 4) is 4/36

probability (difference = 5)is 2/36.

So the probability that A wins is 2/3 and the probability that B wins is 1/3.

Remedial: Check these students' answers to the warm up activity to ensure they are on the right path. Have them look at patterns before making their predictions.

ESL: Students can create a chart to record their results. This will elicit a visual pattern for them to see.

Enrichment: Students can create their own games using a product of the numbers. They can create a fair game and an unfair game.

▲ Teacher Notes - Calling Outcomes

This activity has been adapted from Quest 2000. Students are collecting data and looking at trends to make decisions on what sum they are most likely to get when they roll a pair of dice.

Activity description:

1) In this activity, students will use probability to think of possible outcomes.
2) Hand out a gameboard to each pair. Player A predicts the sum of the dice and records the prediction on the chart. Roll the dice and graph the sum on the game board. If their call is correct, A scores a point. Then player B takes a turn.
3) The game is over when one of the players reaches 5 points.
4) After the game, ask students if they noticed any patterns.
5) Students should complete the worksheet to find the total possible sums.

Questions: Why do the numbers on the tally chart go from 2-12? Where is the number one?

Remedial: Look at the student's predictions if the players seem to need help in developing a strategy, encourage them to look at patterns on their graph.

ESL: Students can draw their expectations for their journal entry. The game is hand-on and can easily be followed. If they are having difficulties understanding the game, ask them to watch other students and to also record their guesses on paper.

Enrichment: Adapt the game so that each player can call out a sum or the word "double". Double refers to the same number appearing on both dice. The scoring is as follows: correct sum 1 pt;Double call 2 points; incorrect call of double minus 2 points; first one to reach 5 wins.

Change the rules using the products.

▲ Nuggets - Metric Scavenger Hunt

(Abacus, September 1984, Editors Lorna Morrow and Trevor Brown)

Divide into groups and each group needs a bag.

Find as many items as you can, but only within the classroom.

If an object is too large for the bag, you may draw a picture of it.

The group with the most items is the winner.

List of items:

2 items heavier than 1 kg

2 items shorter than 10 cm

1 item longer than 1 m

3 items lighter than 10 g

1 item that holds more than 1 L

1 item that holds less than 1 L

1 item that is warmer than 20°C.

▲ Dice Difference

Toss 2 dice. If the difference is 0,1 or 2 then Player A wins. If the difference is 3,4 or 5 then Player B wins. Play 20 rounds. Record the dice difference of your rolls.

	Player A {0, 1, 2}	Player B {3, 4, 5}	Who wins: A or B ?
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

▲ Dice Difference

of times a 0 occurs = _____ (This is the relative frequency)

# of rolls _____

# of times a 5 occurs = _____ (relative frequency)

# of rolls _____

Is this game fair or unfair?

What is the probability that in any one round A, wins?

Total Possible Differences

	1	2	3	4	5	6
1						
2						
3						
4						
5						
6						

Probability (difference of 0) = _____

Probability (difference of 1) = _____

Probability (difference of 2) = _____

Probability (0, 1, 2) =____

Probability (difference of 3) = _____

Probability (difference of 4) = _____

Probability (difference of 5) = _____

Probability (3, 4, 5) =____

▲ Calling Outcomes

Find the total possible sums:

	1	2	3	4	5	6
1						
2						
3						
4						
5						
6						

What is the minimum sum? _____

What is the maximum sum? _____

List the probability of all the sums occurring?
Here are a few to start:
Probability (7 occurs) = 6/36 = 1/6
Probability (9 occurs) = 4/36 = 1/9

▲ Nuggets - A Problem That Won't Quit

(or a rich learning experience — editor)

(Abacus, *September 1987, author Bruce Black, Frontenac Secondary School, editor Ron Ripley)*

George, who was 1/3 his father's age 4 years ago and whose present age now makes a sum of 64 with his dad's, is mixing a 40% salt solution with a 25% salt solution to get 600 kg of 28% solution. He plans to see this mixture by driving from Montreal to Cornwall at 80 km/h and then from Cornwall to Belleville at 110 km/h. The total distance is 395 km, and the time is 4 hours. He will sell the mixture for $1.50/kg, and the money will be composed of a total of 54 ten dollar and twenty dollar bills. George then will invest part of his money at 12% and part at 16% in order to earn $122 interest for one year.

How old is George?

How much 25% salt solution will he need?

How far is it from Cornwall to Belleville?

How many $20 bills will he have?

What amount will he invest at 16%?

Why would a teacher ever dream up a crazy problem like this?

(Challenge to grade 6-8 students: write your solution for this problem and send to the current *Abacus* editor, Frances Schatz. Prize available for the best submission.)

▲ Nuggets - Monsters

(Abacus, November 1983, Editors Trevor Brown and Lorna Morrow)

Problem posing presents difficulties for children and we need to give children the opportunity to design their own problems. Here is an example.

Teacher: Make up a story for the addition fact 2 + 3 = 5.

Child: Two monsters were chasing three other monsters. I'm glad all five were running away from me.

▲ Nuggets - Duelling Cylinders

(Abacus, June 1995, Editor Jennifer Weiner)

Measurement: Capacity

Grade Level: 3-6

Materials:

- pourable materials
  e.g., vermiculite chips,
  aquarium gravel , rice cereal
- graduated containers
- paper
- tape
- bristol board square

Instructions:

Using tape and a sheet of paper for each, create two cylinders, one whose height is the width of the paper and the other whose height is the length of the paper. Fill the two cylinders with a pourable material.

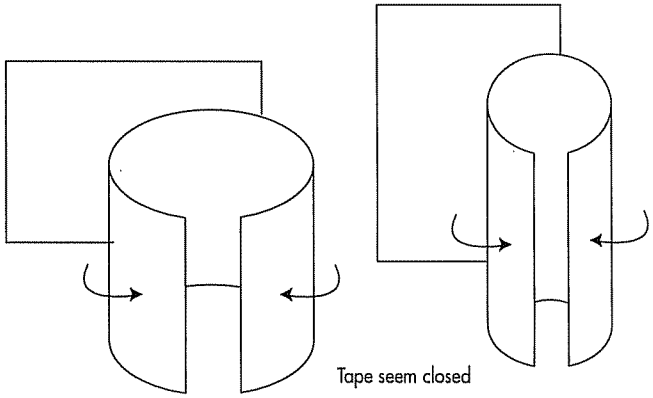
Compare the capacities.

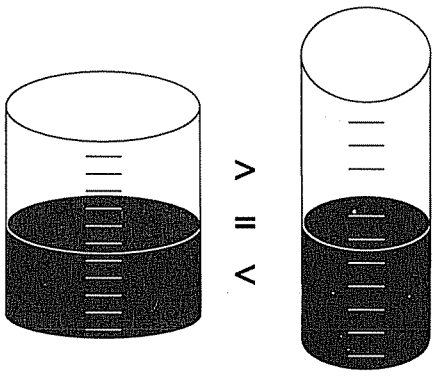
Home Connection

"Duelling Cylinders

1. Pick a container. Compare it to a litre box. Guess how many millilitres it holds.
   _____ mL
2. Now measure how much it holds.
   _____ mL
3. Collect some containers from the recycle box. Order them from the one you think will hold the most to the one you think will hold the least.
   Use a pourable material to check your estimate.







Summary of questions submitted by attendees at the 2001 OAME Annual Conference.

For the convenience of readers, the photographs from the March 2001 issue have been reprinted in this issue. Only minor alterations have been made to the submitted questions and submissions that were essentially the same have been combined to form one question. It is suggested that readers modify the questions to their own liking and then use them with their students.

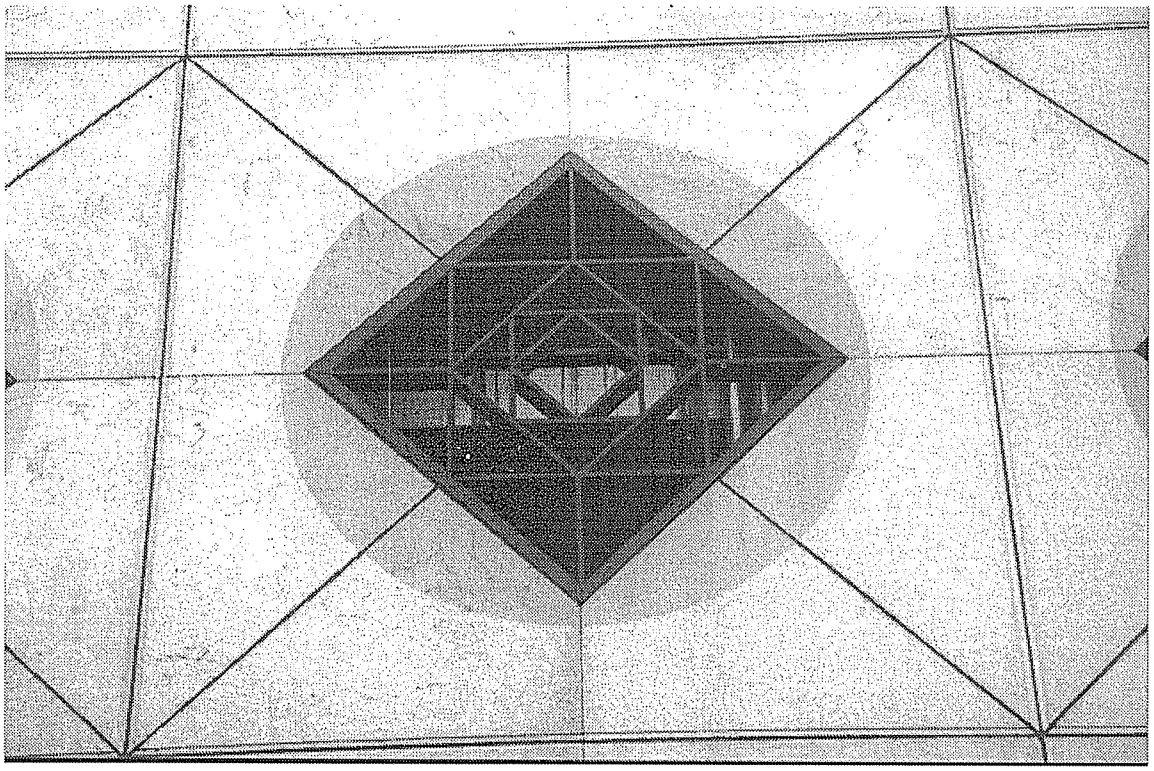
Photograph #1
Main building of the Grassroots Club, Singapore



- How much glass was used in the construction of the windows for this building?
- How large would the entire rotunda be?
- If one Club member comes along and closes every window, then a second member opens every second window, and then a third member changes the position of every third window (from open to closed, or closed to open), how many windows will be left open?
- How many different rectangles can be found in the photo?

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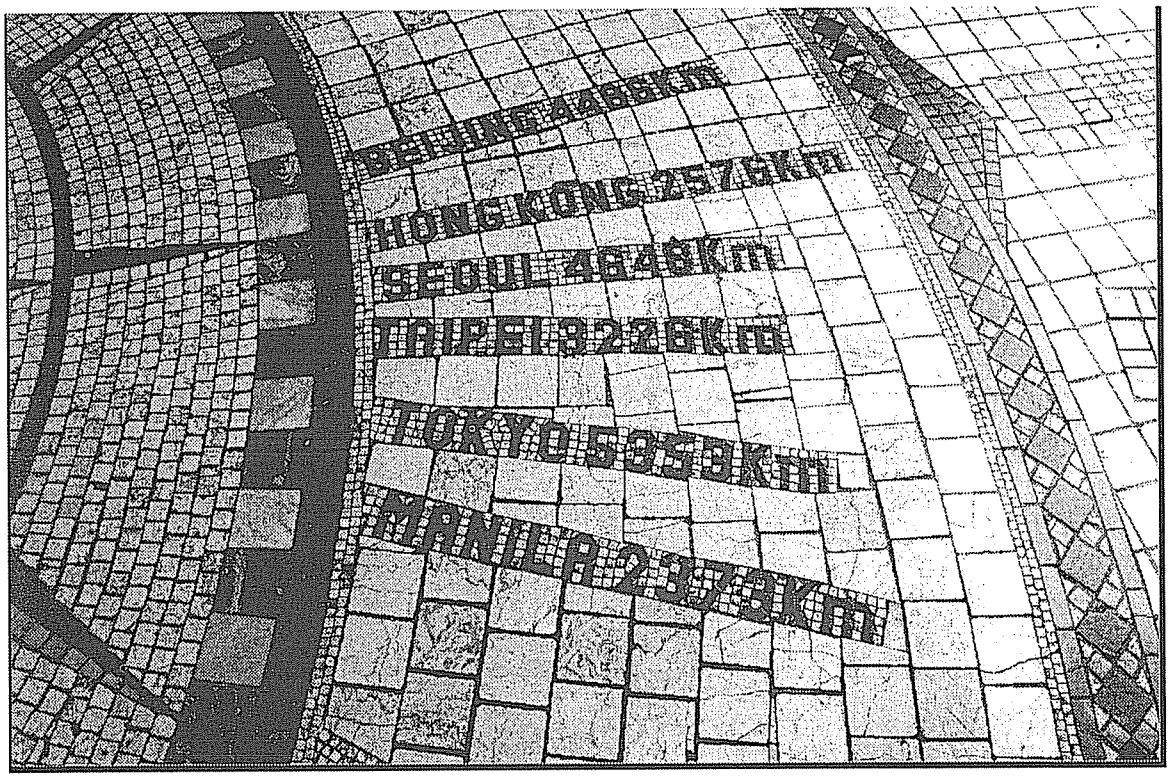
Photograph #2
Design on commercial building in Singapore



- How many different geometric shapes are there? Are there any congruent or similar shapes?
- How many squares and triangles are there in the photo?
- What is the equation of the ellipse?
- Find the ratio of the side of the smallest square to the side of the largest square.
- Reproduce the design using the *Geometer's Sketchpad* software.
- If the pattern of nesting squares were to be continued indefinitely, search for a pattern of the ratio of the areas of successive squares.
- If a 2 m long piece of wood was used to make the border of the outer square, how much wood was needed to make the whole window frame?
- What is the maximum area of a square that can be inscribed in a circle with radius equal to 1 m?
- If the length of one side of the largest square is 1 m, determine the sum of the perimeters of all the squares.

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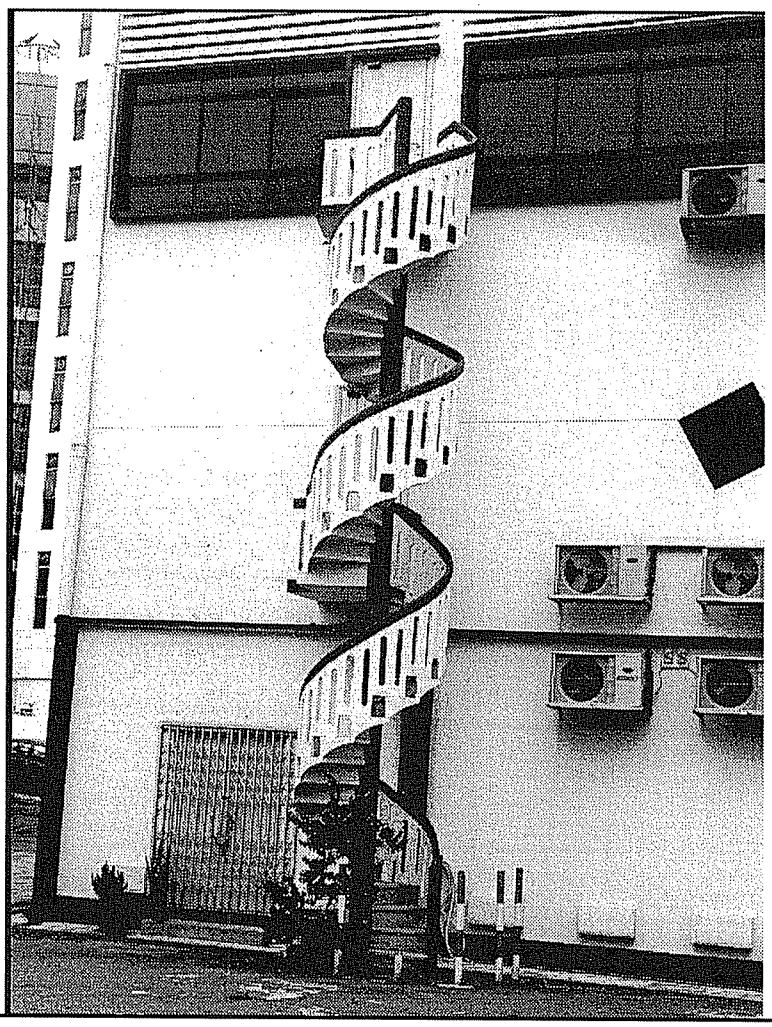
Photograph #3
Sidewalk mosaic of distances between Singapore and other cities in Asia



- Find the radius of the circular portion of the mosaic (left side of the photo).
- How far is it between Tokyo and Manila?
- For the cities listed in the mosaic, what is the average distance from Singapore?
- Using two cities of your choice, and Singapore as vertices of a triangle, draw a scale diagram of this triangle on a piece of paper. Measure the angles in this triangle, then use trigonometry to find the distance between the two cities you picked. Consult an atlas to find the actual distance between these cities and compare this with your calculated result.

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Photograph #4
Back entrance to Singapore Red Cross Building



- What equation could be used to produce this spiral?
- How many stairs are there?
- Which trigonometric function is most closely related to the staircase?

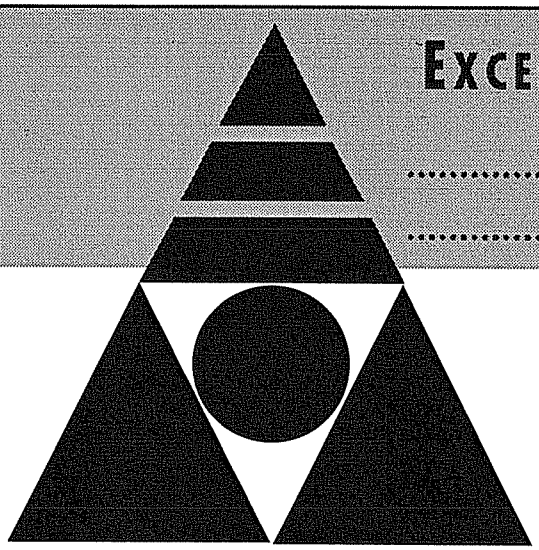
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Photograph #5
The Ascott Hotel, Singapore



- Where could the x and y axes be placed to illustrate the exponential function $y = 2^x$ that appears in this photo?
- Develop an equation for the curved part of the building.
- If an object slid down the side of the building, how fast would it be moving at the bottom?
- What curve does this building most closely represent?
- How many windows are there on the side of the hotel shown in the photo?

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▲ NOMINATIONS FOR OAME/AOEM BOARD OF DIRECTORS 2002-2003

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 18, 2002, to:

Mary Howe, Past President, 55 Ski Valley Rd., London, ON, N6K 3H2
Business (519) 663-2088 x 2518, e-mail: m.howe@ldcsb.on.ca

Include the nominee's qualifications with the Nominations Form. A nominee must be a member of OAME. By March 2002, 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 Barrie, May 2002.

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 ( ) _____

▲ Assessment Corner: What Really Counts - Building a Balanced Assessment Plan

CHRIS SUURTAMM
E-MAIL: suurtammc@aol.com



Chris Suurtamm is currently teaching in the Faculty of Education at York University. She is also an experienced mathematics teacher. She 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.

It is important that instructional and assessment planning reflect what really counts in a mathematics class. A teacher may say that problem solving skills and the way a student presents a solution are important, but are those elements incorporated in the assessment plan for a unit of study? The assessment and evaluation plan clearly tells a student what the teacher values, and it is critical to show the richness of mathematics both through instruction and assessment. This calls for a balance of multiple forms of assessment with a variety of purposes and strategies within a unit.

Mathematics assessment tells students and teachers how well students are learning mathematics. A well-balanced assessment plan should:

- Assess the mathematics that is important, focussing on the understanding of important concepts and processes;
- Provide students with multiple opportunities to demonstrate what they know and can do;
- Give clear guidelines and assessment criteria;
- Offer a balance of opportunities for students to show what they know and can do – long and short tasks, basic knowledge, problem solving tasks, individual and group work, and
- Include formative assessment opportunities, as well as diagnostic and summative, so that students know how they are doing and how they can improve before being given a summative assessment.

The "Balancing Assessment" planning chart on the next page is designed to help a teacher or department review the assessment opportunities that are being provided to students within a unit. The chart can be used in planning a unit or in reviewing and revising a unit. To use the chart, record each activity or lesson and place a checkmark in the assessment boxes that apply. Note that not every lesson should have formal assessment.

For instance, perhaps the first activity in the unit may include some informal diagnostic assessment through observation as students work. The teacher may determine what students know and don't know about the topic; or maybe "remember" and "don't remember" might be more realistic. In that case, on the planning sheet, the teacher would place a checkmark in the boxes labelled "diagnostic," "observation," and perhaps "knowledge" if the lesson is based on reviewing a skill. If students are also working in pairs and peer tutoring one another then the teacher could also check "communication" and "teamwork" to observe and note how well students are working in pairs and listening to the mathematical language and explanations given.

Another activity in the middle of the unit may be an investigation with the teacher providing feedback to students on their written submission. This could be considered a formative assessment. The teacher may call it a performance task or may want to write "investigation" in the "other" column. The activity may be focussed on "Thinking, Inquiry, and Problem Solving" and may include "Teamwork" and "Organization".

In filling out the chart, it is important to be realistic. It is not the quantity of checkmarks that is important but the spread of checkmarks that matters. A well-balanced assessment unit plan will have checkmarks that span a variety of Achievement Chart and Learning Skills categories, include diagnostic, formative, and summative assessments, and use a variety of strategies. The plan should also be manageable. Don't forget that this chart is only a tool to look at balancing. An assessment plan

should not only look at how and why we are assessing but also look at what we are assessing. Work individually or as a department to determine the "big ideas" or important concepts of the unit and be sure that your assessment plan takes those "big ideas" into account.

Building a strong, balanced assessment plan is a big task, however the "Balancing Assessment" planning chart is a good starting point. ▲

Balancing Assessment

Course_____ Unit_____

	Achievement Chart Categories				Learning Skills					Purpose			Strategy					
Activity	Knowledge Understanding	TIPS	Communication	Application	Work Habits	Organization	Teamwork	Independence	Initiative	Diagnostic	Formative	Summative	Test or Quiz	Performance Task	Observation	Project	Assignment	Other

▲ OMO'2001: A Northern Odyssey

Thunder Bay, ON, June 7–10

MARILYN HURRELL
OMO CO-CHAIR



They came, they saw, they hiked, they ate, they danced, and they sang. They planted trees, they enjoyed pie and ice cream at Silver Islet, and they dug around in the Agate and Amethyst Mines. They orienteered at Kingfisher Lake, and toured Old Fort William. They enjoyed an evening and a day of challenging Mathematics Problems. An unlikely combination? Not at all, for these were the 76 participants in the Ontario Mathematics Olympics (OMO), held from June 7-10, 2001 at Lakehead University.

OMO is a Mathematics competition for students in grades 7 and 8. This year, it was hosted by the Northwestern Ontario Association for Mathematics Education (NWOAME), a chapter of the Ontario Association for Mathematics Education (OAME). Nineteen teams, of four students each, arrived in Thunder Bay from across Ontario. NWOAME entered four teams this year, with representatives from Fort Frances to Marathon.

During the Thursday evening, Dr. Ann Kajander led the students on a Math Trail to acquaint them with the Lakehead University campus. On Friday morning, the buses pulled out at 8:30 a.m. for a "Northern Adventure". One group of students went to Sleeping Giant Park where they hiked in Middlebrun Bay, visited historic Silver Islet, and toured the Park's Interpretive Centre. Another group went to the Agate and Panorama Amethyst Mines, and hauled home pounds of memories. A third group went to the Kingfisher Lake Outdoor Education Centre and were given a day of instruction using a compass and caught pond critters. Lakehead University Forestry hosted the fourth group, and they went out to the Jack Haggerty Woodlot near Trout Lake and learned how to handle fire hoses and plant red pine seedlings. In all, they planted close to 500 seedlings and a sign was erected, complete with their signatures, to commemorate the event. Shirley Dalrymple, President of OAME, and I also planted our share. Maybe some of these students will come back in 10 years to view the success of their efforts! Many of the grades 7 and 8 students are from urban areas and have never experienced life as we know it in Northwestern Ontario. We wanted to showcase what the North has to offer. Then it was time to get to the real reason for their journey up north...Math!

On the Friday evening, they attended sessions on the use of the *Geometer's Sketchpad* and the TI-83+ graphing calculator. They were allowed to make notes to take into the competition the next day. OMO'2001 was officially declared by MPPs' Lyn McLeod and Mike Gravelle, Mayor Ken Boshcoff, and Lakehead University Vice Presidents Mary Louise Hill and John Whitfield on the Saturday. Emilia Veltri spoke with the participants in both French and English, and then they were off!!

Co-chair Wayne Fletcher, who was in charge of Contest Creation, describes the day:

The first event was an Individual one in which students had 45 minutes to answer problems of varying difficulty. The second was a group of four activity with teams made up of a grade 7 boy and girl and a grade 8 boy and girl. The teams were randomly chosen so none of the students had worked together before. Their challenge was to generate graphs that relate height to volume of several figures. This was followed by a real-life problem, the loading and unloading of a pop machine, and they had to draw a graph which represented this situation. The TI-83+ event saw students working in pairs composed of either two girls or two boys. The final challenge saw pairs of students, either both from grade 7 or both from grade 8, working with geometric software.

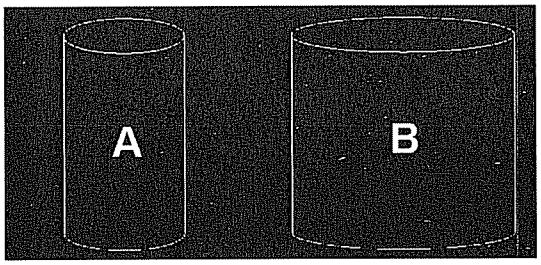
During the Math sessions, a stage group could be heard rehearsing "Annie" down the hall, and a vigorous soccer tournament featuring hundreds of kids was underway just outside the building. Guess who made more chatter and had great amounts of fun!!

That evening, an Awards Banquet was held in the Canoe Shed at Old Fort William. After dinner came the awards! The top five teams were announced; they differed by only four points in total scores and the winning team from Ottawa outdistanced the second place team from NWOAME by a mere half-point! Dancing to Fiddle music, supplied by Dave Kimpton and friends, and dancing with Nicole Maillet and her troupe, rounded out the evening.

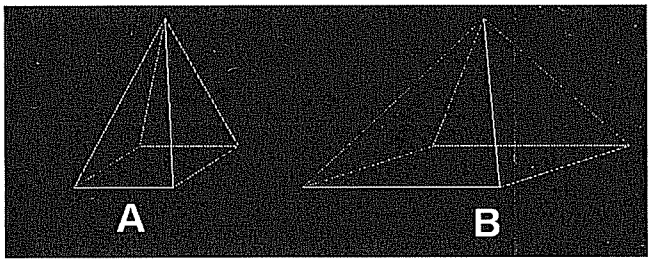
The high point for me, as co-chair, occurred when one young girl yelled as the buses were leaving, "Thanks! This has been the best ever!" We thought so too.

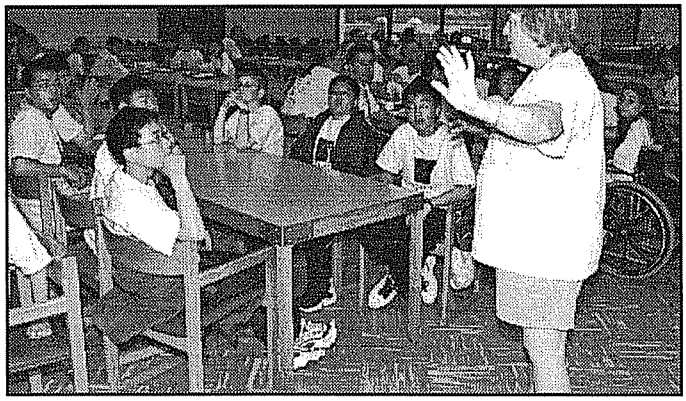
PART A - GROUP OF FOUR ACTIVITY

1. Your job is to determine the relationship between the height and volume of the two objects shown. Both are right cylinders and have the same height. Let us assume that you are going to fill the two cylinders with water. As you add a volume of water you measure the height of the water in the cylinders. Using the graph paper provided on the answer sheets for PART A, plot the volume versus height of both these objects on the same grid.



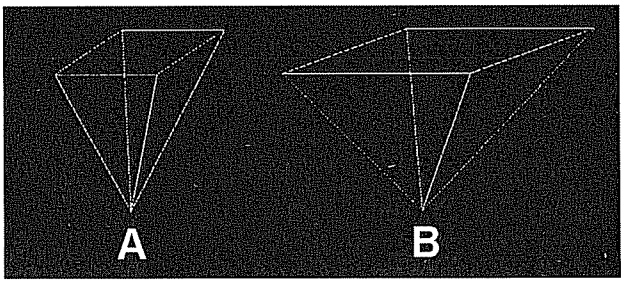
2. Your job is to determine the relationship between the volume and height of the two objects shown. Both are pyramids and they have the same height. Let us assume that you are going to fill the two pyramids with water. We can assume that you can add water to the pyramids so that the water will fill from the bottom up. As you add a volume of water, you measure the height of the water in the pyramids. Using the graph paper provided on the answer sheets for PART A, plot a volume to height graph for each pyramid on the same grid that would show this relationship.

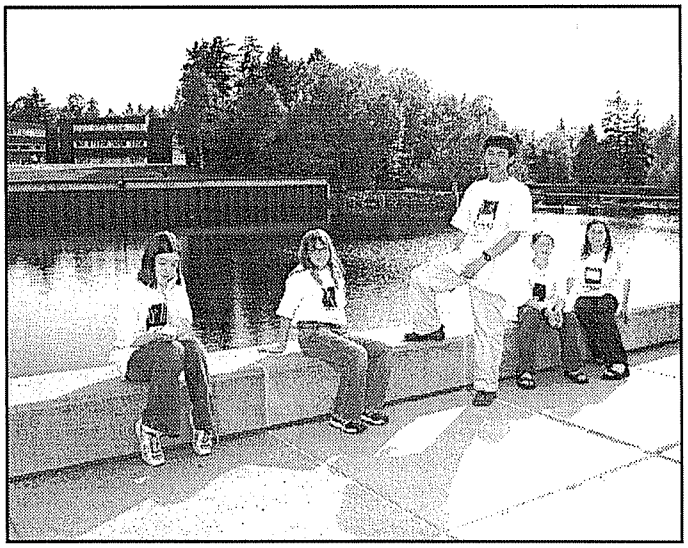




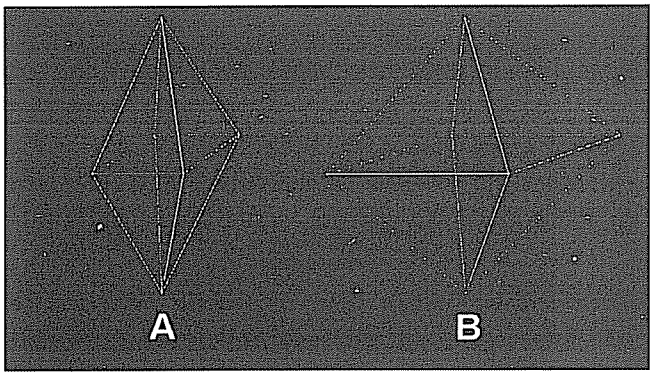


3. Your job is to determine the relationship between the volume and height of the two objects shown. Both are pyramids and they have the same height. Let us assume that you are going to fill the two pyramids with water. We can assume that you can add water to the pyramids so that the water will fill from the bottom up. As you add a volume of water, you measure the height of the water in the pyramids. Using the graph paper provided on the answer sheets for PART A, plot a volume to height graph for each pyramid on the same grid that would show this relationship.



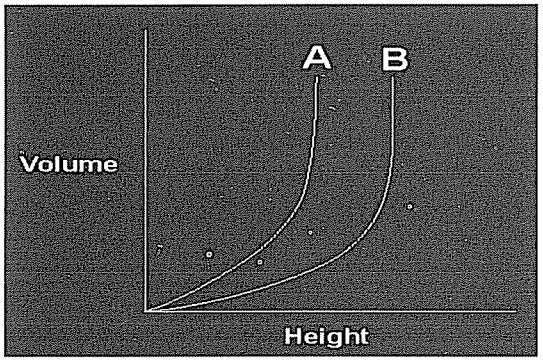


4. Your job is to determine the relationship between the volume and height of the two objects shown. Both are double pyramids and they have the same height but different bases. Let us assume that you are going to fill the two double pyramids with water. We can assume that you can add water to the double pyramids so that the water will fill from the bottom up. As you add a volume of water, you measure the height of the water in the double pyramids. Using the graph paper provided on the answer sheets for PART A, plot a volume to height graph for each double pyramid on the same grid that would show this relationship.

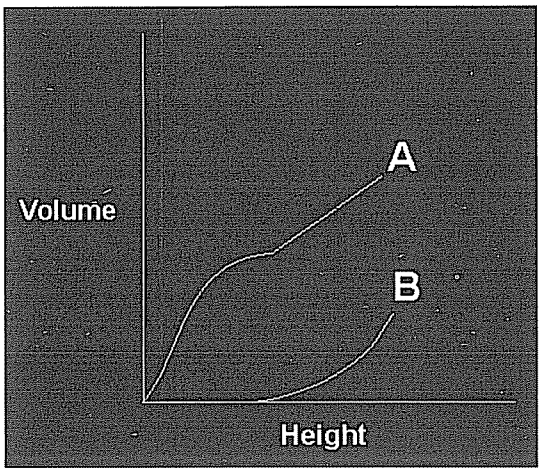


PART B – GROUP OF FOUR ACTIVITY

1. The following graph plots the volume to height of some containers. On the answer sheet for PART B, sketch these containers.



2. The following graph plots the volume to height of some containers. On the answer sheet for PART B, sketch these containers.

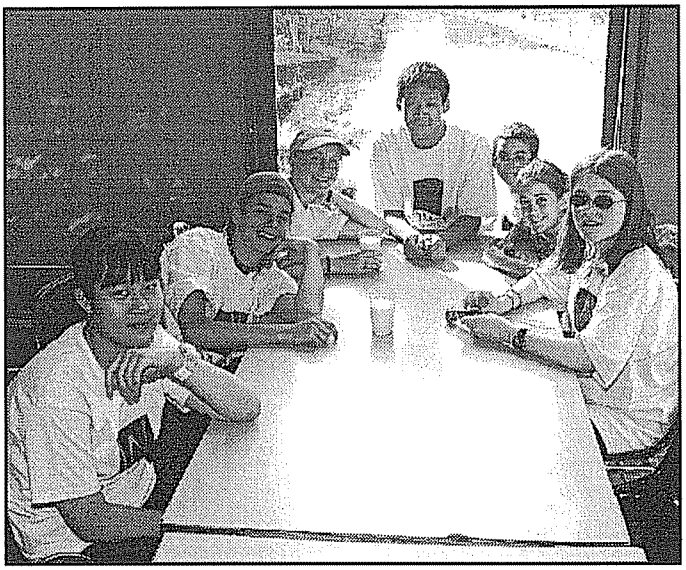


PART C – GROUP OF FOUR ACTIVITY

Your school's caferteria contains a vending machine which sells drinks. On a typical day:

- the machine starts out half full;
- no drinks are sold before 9:00 a.m. or after 5:00 p.m.;
- drinks are sold at a slow rate throughout the day, except during the morning and lunch breaks (10:30 to 11:00 a.m. and 1:00 to 2:00 p.m.) when there is a greater demand, and
- the machine is filled up just before the lunch break. (It takes about 10 minutes to fill the vending machine.)

Sketch a graph to show how the number of drinks in the machine might vary from 8:00 a.m. to 6:00 p.m. ▲



▲ OAME/NCTM SEPTEMBER 2001 REPORT



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On return to our classrooms or education offices, I think that mathematicians should wear the t-shirts I saw in Orlando at the annual NCTM meeting last spring: "Math rules!" read the t-shirt worn by several teachers while another one, "Irrational, but well-rounded" was noticed.

NCTM's newest journal, *On-Math,* is seeking articles, reviewers, and individuals to develop Web components to accompany its articles. Initial free issues of *On-Math* will be available on-line beginning in March 2002. The journal will be geared towards educators whose students range in age from early childhood to young adult, and will address the teaching and learning of mathematics; teacher education will also be an important topic. Readers will have many opportunities to use dynamic tools that are unique to the electronic medium, such as applets and Web-videos. For guidelines to submit articles, visit www.nctm.org/onmath/guidelines.htm. If you are interested in reviewing or developing this project, send an e-mail message with queries or information about yourself to onmathassistance@nctm.org.

NCTM has a call out for manuscripts for the 2003 Focus Issue: "Proportional Reasoning" for *Mathematics Teaching in the Middle School.* How have you helped your students understand the notion of "equivalent ratios" without relying on cross multiplication? What models can be used to help students analyze and solve problems involving geometric similarity and scale factors, including measurements of length, area, and volume? These are two ideas to stimulate your thinking about this topic. Your manuscript should be no more than ten double-spaced pages, with figures or photographs included at the end. Send six copies for review to NCTM by January 30, 2002. If you have ideas for a manuscript and would like to discuss them, contact Kathleen Lay at NCTM klay@nctm.org.

NCTM membership is an investment as mathematics and science technologies grow. The current individual NCTM membership is $68 US ($85.00 CAD) plus $10 CAD for postage. For this price, you choose one of the journals, *Teaching Children Mathematics* (K-6), *Mathematics Teaching in the Middle School* (5-10), or *Mathematics Teacher* (8-OAC), and you qualify for 20% discount on NCTM educational materials and special products. Currently, I have copies of the *Navigations Series.* Each one is $41.40 CAD non-member or $33.15 CAD with NCTM membership number. (This price includes tax and shipping.) When I receive the items from NCTM, the price is determined by the exchange rate on that particular day. Once the current copies are gone, this price could go up or down depending on the exchange rate of the new shipment. For the price and availability of other catalogue items, please contact me at the above address.

The newest titles from NCTM, available through me as your Ontario NCTM rep, are (all prices quoted as of Summer 2001 CAD):

#756 *Guidelines for the Tutor of Mathematics*, 2nd Ed $33.20, NCTM Member $26.55;

#757 *The Young Child and Mathematics* $20.75, NCTM Member $16.60;

#12047 *Geometric Designs* $38.10, NCTM Member $30.50;

#12051 *Mathematics Assessment* (pink) *Cases and Discussion K-5* $34.80, NCTM Member $27.80;

#12050 *Mathematics Assessment* (green) *Handbook Grades 3-5* $38.10, NCTM Member $30.50.

NCTM encourages us to visit the web site www.figurethis.org for family mathematics materials. *Figure This! Mathematics Challenges for Families* engages families in the mathematics that their grade 5-10 students should know. The challenges are exciting activities that can be done at home and demonstrate how math is used in the real world. A total of 80 mathematical challenges will be released and will be available on-line.

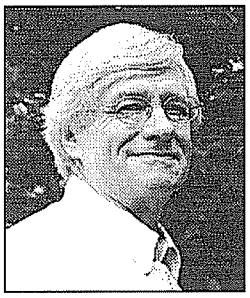
For more information about NCTM programs, visit www.nctm.org, or contact me if you need information about NCTM membership or books and products.

REMEMBER: Each new individual membership with NCTM generates $5 US for OAME. 20% of the price of publications or supplies by NCTM remains in Ontario for OAME projects.

Have a great school year. ▲

▲ 2001 OAME Award Recipients

2001 Life Membership Award Recipient: PETER SAARIMAKI



It is a great honour to receive this prestigious award. Thank you. Thank you. Thank you.

My first thank you goes to the students I encountered at Malvern CI, Riverdale CI, and Parkview SS for their charm, intelligence, cooperation, problem solving skills, awkwardness, disobedience, recalcitrance, . . . in short, for all the challenges that make teachers try their best to "get through to them"! You led me to projects, presentations, and rich learning tasks that I might not have otherwise tried.

My second thank you is to the teachers and administrators I worked with as a consultant and coordinator – you are a rich field of creative ideas, practical strategies, and enthusiasm for me to catalyze (if that's a verb!? – 'to be a catalyst for' sounds too awkward!).

My third thank you is to the members of OAME and OMCA who provide such a variety of forums to discuss, refine, and share our vision of mathematics education for Ontario. I encourage all *Gazette* readers to take advantage of the many opportunities that OAME and its chapters offer, and to meet with other educators from across the province to further the goal of "mathematics for all."

Retiring after 35 years from the Toronto DSB will now provide me with more time and energy to participate in other ventures. So again, many thanks for this award, and I look forward to your contributions in the future.

2001 Don Attridge Award Recipient: CHRIS SUURTAMM



I am very honoured to be the recipient of the 2001 *Don Attridge Award*. There are so many people who I feel share this award with me, for it is through working with these talented people that I have learned so much and have been able to grow as a mathematics educator. We're in this together!

As a classroom teacher, I have tried to generate enthusiasm for mathematics and to acknowledge and encourage the potential of each individual student. In my more recent work with teacher education and development, I have tried to maintain these same goals. These are difficult times in education, but as I work with other teachers, I notice that despite obstacles placed in their way, teachers appreciate and honour "what really counts in schools." Classroom teachers have the capability to recognize, support, and promote the uniqueness of each individual student and to encourage student growth. One of my favourite quotes is by Seymour Sarason: "Educational change depends on what teachers do and think – it's as simple and complex as that." Teachers hold the power!

I look forward to further exciting work with students and teachers as we move forward with the implementation of the new curriculum. Thank you for this award and for the opportunity to be part of a vibrant educational community.

2001 Kenneth D. Fryer Award Recipient: MATHEMATICS DEPARTMENT, PARKSIDE COLLEGIATE INSTITUTE, St. Thomas, Ontario



(Left to Right) Back Row: Murray Alexander, Ed Monteith, Paul Callahan, Jeff Moores, Steve Langley
Middle Row: Michelle Safadi, Nancy Scidmore, Linda Foster, Ann Howard
Front Row: Linda Alton, Maureen Rowthier (Dept. Head), Lynda Seeley, Margaret Sawatsky

The members of the Parkside Collegiate Institute

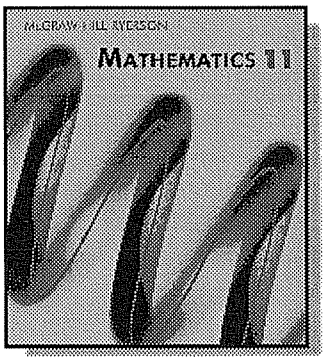
mathematics department are honoured to receive the *Kenneth D. Fryer Award* from our fellow colleagues in OAME. Members of our department have always enjoyed working together, not only in our school, but also in the wider community of mathematics teachers in both WOMA and OAME. The mathematics department members are fun-loving, enthusiastic, and caring teachers who are always there for their students. This award certainly means a lot to us!

Our department consists of a group of dedicated teachers who are always willing to learn new ideas, to share with their colleagues, and then to give back to their school and students. Over the years, the mathematics department has contributed its talents not only to the enrichment of mathematics, but also to coaching and other activities within the school. They have served as coaches in curling, track and field, basketball, soccer, field hockey, swimming, and football. Members have also been involved with fundraising, yearbook, cheerleading, and the drama productions here at the school. In recent years, we have also provided a math help room at noon hour, supported peer tutoring in junior math classes, promoted the writing of math contests, and run junior and senior math clubs. We have also stayed abreast of current changes in mathematics education by having members serve as WOMA president, WOMA chapter representative to OAME, Descartes markers at the University of Waterloo, and workshop leaders in graphing calculators and the *Geometer's Sketchpad* across southwestern Ontario.

Teacher's Material with You in Mind

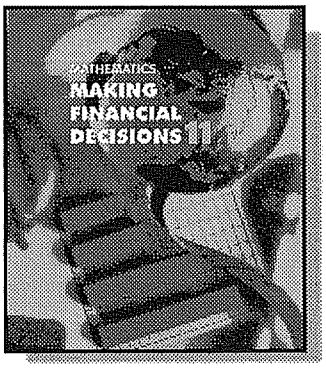
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The department's focus over the last several years has been to effectively integrate technology into the classroom. We were the first school in our area to have a class set of TI-graphing calculators and we have been active in integrating their use in our math and science classrooms. We have hosted workshops for math and science teachers in the area, as well as travelled to other boards to offer workshops on the TI-83's and the *Geometer's Sketchpad*. We have also worked hard to establish our own computer lab of 14 computers in one of our math classrooms. The hard work is paying off as we see the benefits to the learning and understanding of mathematics with our students. Once again, we thank OAME most sincerely for this tribute. To be recognized by one's peers is truly an honour.

2001 Mona MacGregor Award Recipient: JOHN KEARNS, Spectrum Educational Supplies



It is an honour to be the recipient of the *Mona MacGregor Award*. I would like to briefly share my views on mathematics education. I am a firm believer that what is most important for children is to be able to think, reason, solve problems, and to make sense of mathematical ideas. In working closely with the mathematics education community, my goal is for students to understand and enjoy what is being taught to them.

In addition, giving students valuable and essential hands-on experience with mathematical concepts in using materials such as pattern blocks, cubes, and calculators, together with proper curriculum in-service for teachers, are absolutely essential for the benefit of all students in this province.

In closing, implementation of the math curriculum is made possible only with the input and support of very caring math teachers and the best possible mathematical resources.

2001 Morley MacGregor Award Recipient: HELEN HART



I am a strong advocate of the constructivist approach. I believe that students learn best when they are challenged to make meaning for themselves. The beauty of students working together is that it allows me more time to directly work with students who need closer attention and reinforcement. I am able to assess more students on a frequent basis using this approach.

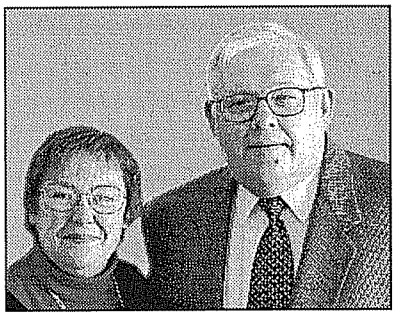
I instituted a math club in my elementary school where intermediate students were trained to act as mentors/tutors for junior level students. The tutor would then be responsible for preparing a lesson around a difficult concept or topic that a particular student had. They were to prepare a lesson that would encompass 30 minutes and make use of manipulatives. It was during the lesson that the tutor would check for understanding and then have the student perform a task before they were able to move along. The tutors took great pride in the work they prepared for their younger students. Younger children were learning from older students, and they ended up helping each other.

As President of Y^{4}MA, I am part of a team of dedicated teachers representing four different boards who devote time and practice to the advancement of mathematics in their respective areas.

Each year, we promote Junior Math Olympics and this year, our organization was able to send three teams of students to the Ontario Math Olympics in Thunder Bay.

At my own school, I will be heading up a team of teachers who will be working with parents and students as we prepare for EQAO. In September, the results of our first year of testing will be analyzed and an action plan will be put in place to address any concerns. Part of this action plan will be to institute a math club of intermediate students who will act as tutors for the younger children. There will also be a home program in place for parents to help their children. Training and materials will be provided for the parents. ▲

▲ Introducing OAME's New Executive Directors



MARY HOWE

Please join me in welcoming the new Executive Directors of OAME, **Sue** and **Dave Hessey**. The Hesseys, married for 32 years, reside in London, Ontario where they have raised two adult sons and currently parent a schnauzer named Murphy. They have recently moved into a new one floor home, as Sue jokingly explains, "to allow for storage of the many boxes of OAME documents."

Sue and Dave bring a wealth of educational experience to the Executive Directors' position. Sue is a Learning Coordinator in Program Services with a Mathematics/Science/Technology portfolio, and a major responsibility for K-OAC mathematics in the Thames Valley District School Board. Prior to her present position, Sue was Mathematics Department Head at Saunders Secondary School in London. You may have met Sue at the OAME'95 Conference in London, as she chaired the Registration Committee. She was often seen helping out at the registration desk and greeting folks as they arrived at the conference. Dave is a retired elementary school principal with the Thames Valley District School Board and the former Middlesex County School Board. Both Sue and Dave have been very active in all aspects of education throughout their long and busy careers. Neither Sue nor Dave show any signs of slowing down their rapid pace, even in retirement.

Sue plans to work one more year before beginning her retirement, and Dave will be taking the lead until then, carrying out the majority of the Executive Directors' role. Contact the new EDs at: 70 Chestnut Court, London, ON, N6K 4J5, Phone & FAX number is 519-471-6324, e-mail address: oame.hessey@sympatico.ca.

OAME is very lucky to have Sue and Dave taking over the day-to-day operations of the organization. The concerns of the Ontario mathematics education community are in good hands! Welcome, Dave and Sue! ▲

▲ Directors' Dialogue



MARILYN HURRELL, NWOAME
LAKEHEAD DISTRICT SCHOOL BOARD
THUNDER BAY, ON
E-MAIL: mhurrell@alumni.lakeheadu.ca

This edition of Directors' Dialogue *highlights the Saturday, June 16, 2001 OAME Board of Directors' meeting at the Four Points Hotel in Mississauga.*

President Shirley Dalrymple welcomed new Chapter Reps Mary Bourassa (COMA), Rona Doyle (NWOAME), Sumintra Koowar (SAME), Pat Margerm (TEAMS), Heather Boychuk (NOMA), and new elected directors Joanne Graham, Anna Jupp, Caroline Rosenbloom, and Lynn Strangway.

Mary Howe introduced the new Executive Directors, Sue and Dave Hessey, who will assume duties September 1, 2001. Sue is currently a Learning Coordinator for K-OAC mathematics of the Thames Valley DSB and plans to retire in 2002. Dave is a recently retired elementary school principal from the Thames Valley DSB. They reside in London. Welcome!

PRESIDENT'S REPORT:

Shirley Dalrymple presented her Mission Statement for 2001-02. She described these as the "best and worst" of times. Change is exciting, but can be scary. On the one hand, there are stimulating challenges with the new curriculum resulting in professional development opportunities. On the other hand, there is so much to do in such short time-lines. Some people embrace these changes, while other resist them. Our role in OAME is to help the mathematics teachers of Ontario. We need to forge strong relationships with coordinators who have been given the time to develop resources. It is difficult to attract young people to a career in teaching. We need to mentor new teachers and not allow them to "drop out". Shirley urged each chapter to deliver this message from OAME. She expressed her appreciation for all the time volunteered by members of the OAME board.

OTHER HIGHLIGHTS:

1. Executive Director, Dave Alexander, pointed out that OAME membership is down significantly and may fall

below 1000 by September 2001. This is probably a reflection of the labour unrest experienced by teachers.

2. NCTM: Frances Schatz congratulated Mary Bourassa on winning a FLAMeS Award to attend the NCTM annual conference in Orlando. Frances suggested looking at www.figurethis.org as a resource for Family Math and www.nctm.org for information on NCTM resources.
3. Fields Institute: Shirley Dalrymple reported that four task forces are meeting regularly. The issues being examined are: Resources for the new grade 12 Data Management course, a conference for On-Line Learning in the fall of 2001, the transition from high school to university and college, and the issue of shortage of math teachers.
4. Mary Howe announced that the Ministry of Education and the Ontario Teachers' Federation are providing funds to support grade 11 implementation. The Ontario Mathematics Coordinators Association (OMCA) and OAME have won a contract to undertake four projects that would support pressing needs as teachers implement the new grade 11 courses. These are a set of summative materials for the 11U and U/C courses, a set of summative materials for the 11C course, a CD of activities for each of the four grade 11 courses using the *Geometer's Sketchpad* or TI83+, and a set of classroom-ready teaching and assessment materials for the 11W course. All these materials will be posted on the OAME web site, www.oame.on.ca.
5. PLAR (Prior Learning Assessment Recognition): A template is available that would see students submit a portfolio of work to substantiate their claim for credit in a course not yet taken. This would involve teacher time. Sue Hessey said that this is a local "process" that each board will have to be prepared for and to handle.

COMMITTEE REPORTS:

1. **Secondary:** Chris Suurtamm, Chair, reported that there are many areas to explore. These include assessment and evaluation, samples of good assessment, issues around EQAO, helping students and teachers make good decisions for grade 11 courses, smooth implementation of grade 11, and preparation for grade 12. An overall task will be to create a network for sharing of resources in all these areas.
2. **Awards:** Peter Saarimaki received a Life Award which was presented to him at the OAME'2001 conference. Other award recipients were: Chris Suurtamm, John Kearns, Helen Hart, and the Mathematics Department at Parkside CI in St. Thomas. Chapters are asked to fill out nomination forms for the OAME awards so that outstanding math teachers from across the province can be recognized.
3. **Futures:** Rosey Mastrofrancesco announced that OAME'2003 has been awarded to the Pine Ridge chapter for May 9-11, 2003 at Durham College in Oshawa. Jacqueline Hill and Charles Wysznkowski will serve as co-chairs to the conference. OMO'2002: Y^4MA; OMO'2003: WOMA.

   Promotions: Suggestions were made to inform new teachers about OAME and the benefits of membership. Marg Warren suggested that a welcome letter on OAME official letterhead be sent to each new math teacher.
4. **Equity:** Sue Stuart reported that attendance was down at this year's equity breakfast, due likely to the location and the new format of making the Equity workshop a regular session at the provincial conference. A decision will be made at the next meeting regarding the format and a keynote speaker.
5. **Publications:** Sue Hessey asked for ideas of links for the OAME web site be sent to Doug Evans. The *Gazette* and the *Abacus* are on the lookout for articles. Contact Louis Lim (*Gazette* editor) or Frances Schatz (*Abacus* editor) for further information.
6. **JK-8:** Caroline Rosenbloom reported that the K-5 and 6-8 committees have joined forces to produce a CD that would show teachers how to look at a task and identify the expectations that are related to it.

PROFESSIONAL DEVELOPMENT:

1. **OAME'2001:** Sumintra Koowar reported that the conference went well and a full report will be presented at the fall OAME board meeting.
2. **OMO'2001:** Marilyn Hurrell, co-chair, reported that nine chapters (76 students and 25 coaches and parents) participated. They arrived in Thunder Bay on Thursday, June 7 and were housed at Lakehead University. On Friday, four groups went on various field trips to "showcase" Thunder Bay and Northwestern Ontario. Saturday saw an exciting Math Competition with surprisingly close results. On

Sunday, weary students boarded planes for their trip home. See the OMO article in this issue of the *Gazette* for full details.

Marilyn Hurrell recognized the major sponsors: Thunder Bay Ventures (FedNor), the Trillium Foundation of Ontario, and Esso Kids Program. OAME provided special events funds for teams flying to Thunder Bay. Smaller donations were received from ten other sources for a total of $27 300. It seems that many organizations are very willing to invest in the youth of Ontario! Thanks to Wayne Fletcher, co-chair, and our amazing committee!

3. **Leadership 2001:** Mary Howe reported that the Leadership conference was very successful with lots of positive feedback. She thanked all participants and workshop leaders.
4. **OAME'2002:** May 2, 3, 4, 2002 at Georgian College in Barrie. Lisa Abernethy distributed a list of speakers and will provide further information at our next meeting.
5. **OMO'2002:** Rosey Mastrofranceso (Y^{4}MA) reported that the first meeting will be held in June to begin planning the event.
6. **Leadership 2002:** February 21-23, 2002. Shirley Dalrymple reported that plans are well underway with a number of workshops confirmed. Details will be on the OAME web site in the fall.
7. **OAME Board Meetings:** October 19 and 20, 2001 and February 8 and 9, 2002.

CHAPTER NEWS

CHAMP: Rep Irene McEvoy:

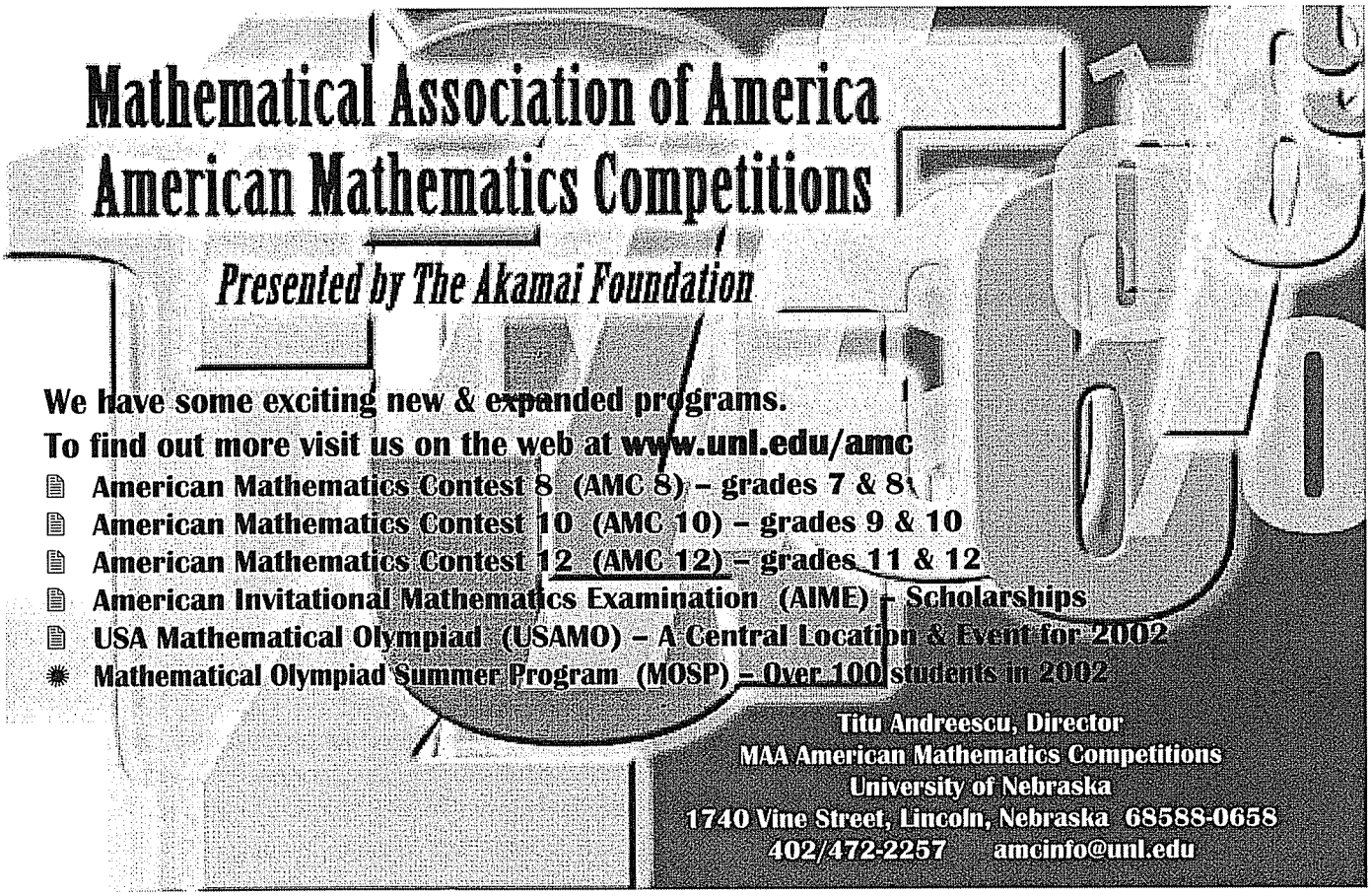
COMA: Rep Mary Bourassa: President for 2001-02 is Peter Lenczewski. Two teams attended the provincial Math Olympics in Thunder Bay; one team finished first! The COMA mini-conference is planned for Saturday, November 17 at the University of Ottawa.

GOLDEN: Rep Elizabeth Pattison:

GVMA: Rep Cathy Eagles/Paul Fennell: President is Dean Murray. A successful Spring Conference was held in April. The GVMA web site is http://home.golden.net/~gvma/.

ISOMA: Rep TBA:

MAC^2: Rep Lisa Abernethy: President is Lyn Vause. A fall mini-conference is planned for October 4, 2001, with Peter Saarimaki as the keynote speaker. The



chapter is very busy planning for OAME'2002 with many of its members involved in committees.

NOMA: Rep Heather Boychuk: The chapter has been very active. A fall conference is planned in Sudbury for October 12 and 13, 2001 at LaSalle SS with the theme, "Exploring the Real Millennium".

NWOAME: Rep Rona Doyle: The main focus of NWOAME has been the planning and hosting of OMO'2001. The winning team was from COMA, with a team from NWOAME placing second by only a half point! In fact, the top five teams were separated by a mere 4.5 points. Third, fourth, and fifth places went to WOMA, SAME, and TEAMS respectively.

Some examples of "new" things we attempted were: A web site which featured photos as the event progressed, "Math Minutes" on our local CBC station leading up to the event, CBC radio interviews in both English and French, applying for and receiving a Trillium Foundation of Ontario grant, and planning field trips to educate students from other parts of the province. We will submit a full report in October. NWOAME will meet in September to hold elections for executive positions. A mini-conference will be scheduled for later in 2001-02.

PINE RIDGE: Rep Jacqueline Hill: President is also Jacqueline Hill. Plans are underway for OAME'2003, with a strong team committed to OAME's vision being assembled. Jacqueline shared some examples of student writing related to mathematics and a related rubric. She also showed a Survival Guide she uses to help her students in MFM 2P organize their knowledge for summative evaluations.

QSLMA: Rep Wendy Gallant: The Executive met with Peter Saarimaki in June to brainstorm for re-organization.

SAME: Rep Sumintra Koowar: President is Jeet Parmar. SAME is pleased with OAME'2001 and offers to help the organizers of future OAME conferences. Two teams went to OMO'2001 in Thunder Bay with one team placing fourth. Merilyn Fox and Riyaz Ismail did an excellent job preparing the teams and organizing the trip. A fall conference will be held on October 23 with the theme and location tba. Kirsten Boucher is spending a year in Germany and invites colleagues to keep in touch via e-mail.

SWOAME: Rep Frank Di Pietro:

TEAMS: Rep Pat Margerm: Note the name change to reflect Toronto Educators' Association for Mathematics. TEAMS sent three teams to OMO'2001 in Thunder Bay, with one team placing fifth. A mini-conference will be held next February at Leaside High School. Watch for details.

WOMA: Rep John Ferguson: President is also John Ferguson. Tom Griffiths and Marg Kemp prepared two teams for OMO'2001 in Thunder Bay. One team placed third. Congratulations! Tom has begun to plan for OMO'2003, hosted by WOMA. Congratulations also to the Mathematics Department at Parkside CI in St. Thomas on winning the Kenneth D. Fryer Award.

Y^{4}MA: Rep Rosey Mastrofrancesco: President is Helen Hart. Three teams attended OMO'2001 in Thunder Bay and a great time was had by all! Y^{4}MA will host OMO'2002.

Y^{4}MA plans to start an advertising blitz to promote membership through department memberships. We will also try to improve teacher morale by presenting a Y^{4}MA Award to one elementary and one secondary teacher who have shown exceptional creativity in the classroom. We hope that this will encourage the use of student-centred teaching methods.

CLOSING REMARKS:

A presentation was made by Mary Howe, Shirley Dalrymple, and all members of the Board to retiring ED's Dave and Bonnie Alexander. They were thanked for the many hours they have devoted to the smooth operation of OAME during the past 7 years. Enjoy your retirement!

Jack LeSage was the winner of an OMO'2001 t-shirt with a correct answer to the February palindrome dates quiz. Now I need your help! Please send me any ideas you have for an OAME trivia question that I can use in this column. I will reward (somehow, Louis) the best five suggestions.

By the time you read this, you will have enjoyed your summer break. Best wishes for a productive return to classes. ▲

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2001-2002 OAME Board

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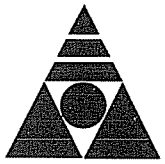
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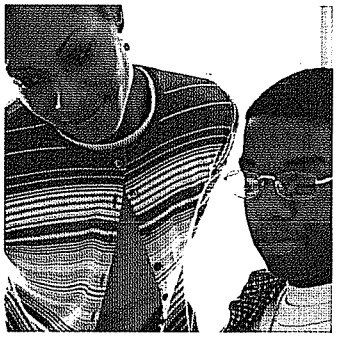
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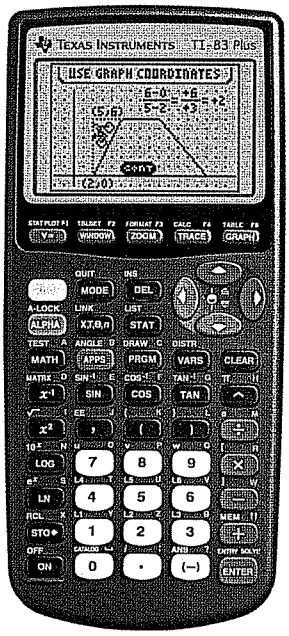
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