Vol. 32 #4, June 1994

Ontario Mathematics Gazette

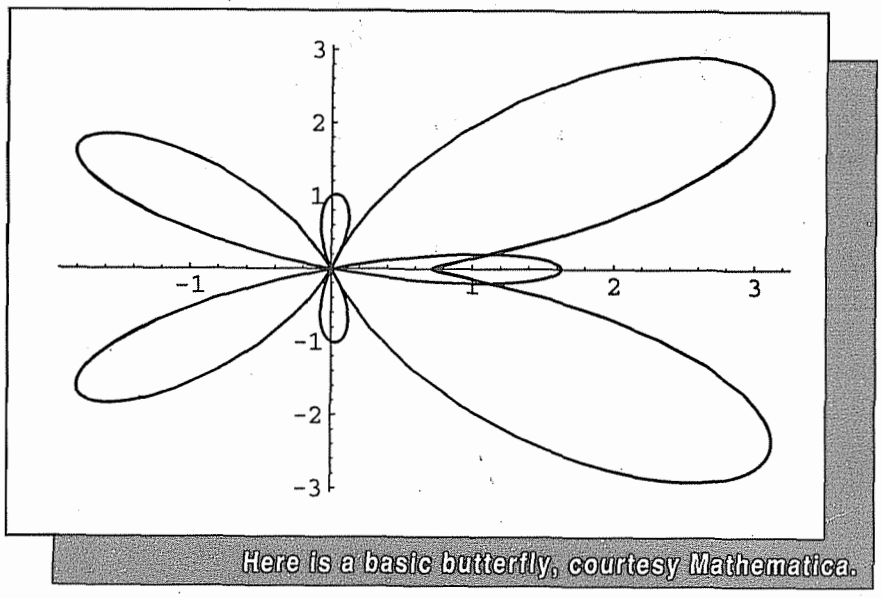
A Math Fair!

Your New OAME/AOEM Council!!

Prime Minister and OAME Award Winners!!!

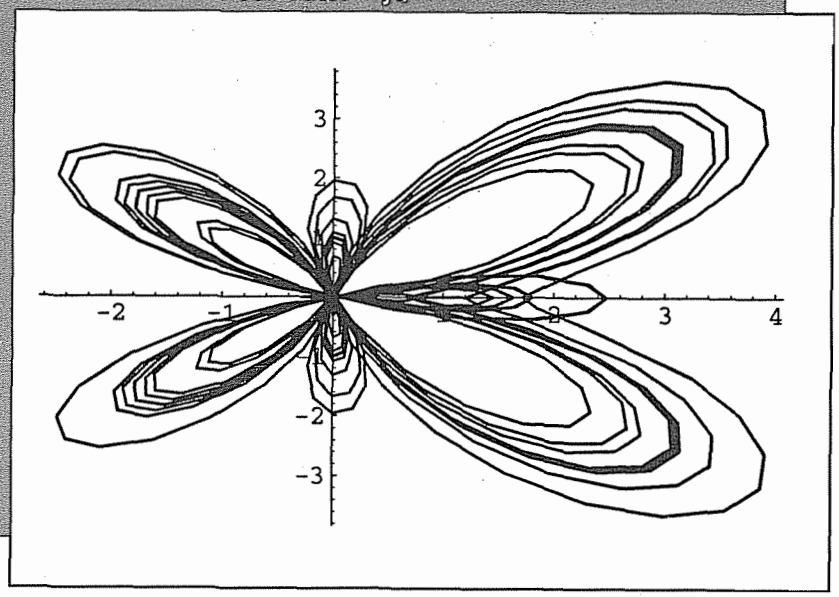
Have Your Say by the Honourable Dave Cooke!!!!

And, as always much much more!!!!!



Here is a basic butterfly, courtesy Mathematica.

Here is the fleshed out butterfly.



These curves were described by Temple H. Fay, in his article, "The Butterfly Curve", *American Mathematical Monthly*, May 1989, page 442. In polar coordinates, the equations are:
$r=e^{\cos(\theta)} - 2\cos(4\theta)$ and $r=e^{\cos(\theta)} - 2\cos(4\theta) + \sin^5(\theta/12)$.

ONTARIO ASSOCIATION FOR MATHEMATICS EDUCATION
ASSOCIATION ONTARIENNE POUR L'ENSEIGNEMENT DES MATHÉMATIQUES

About the Gazette

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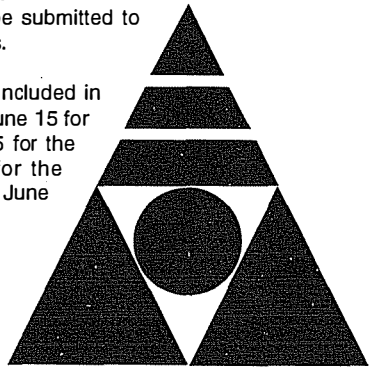
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Submission of Articles
Articles for the Gazette should be submitted to Jack Weiner at the above address.

Deadlines for information to be included in the Gazette or the Abacus are: June 15 for the September issue, October 15 for the December issue, January 15 for the April issue, and April 15 for the June issue.



Notice to Authors
Your articles should be typewritten, word-processed or photocopied from typewritten or word-processed copy double-spaced on 8.5" x 11" paper with 1.5" margins and single sided. Diagrams and figures should be in camera-ready form. Please submit three copies to the editor and keep one as protection against loss. We have all submissions blind-reviewed, so please send your full address and affiliation on a page separate from the manuscript.

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▲ EDITORIAL



This final issue the Ontario Mathematics Gazette, Volume 32, will be shorter than the traditional forty-eight pages (a tradition since September, 1992—can two years a tradition make?!?) I decided that articles scheduled to appear in mid-June might never see the light of a September classroom, an unfair fate, considering their quality and the authors' hard work. So, these articles have been shuffled ahead to Volume 33. You will find the usual columns, though. In particular, look for a "Have Your Say" by Minister of Education Dave Cooke, your 1994-95 Council, a listing of those Ontario mathematics teachers who have been honoured with a 1993 Prime Minister's Award, and more. And you will find an Abacus, the first under the helm of new Abacus editor Jennifer Weiner.

The 1994 OAME Annual Conference was a tremendous success. In spite of several last minute complications (including an on-campus strike by food services personnel and several session cancellations), Brian Gallagher, Margo Thompson and their terrific crew made us comfortable, fed us well, and educated us in grand fashion. Thank you and congratulations, Margo and Brian.

Gordon Cooke was one photographic chronicler of the conference. You will find many of his pictures throughout this issue. Below, I am reprinting, with permission, an editorial from the Kingston Whig-Standard, printed Monday, May 16, 1994.

Have a great summer vacation. Come back refreshed and happy and raring to go.

Jack

Kingston math conference shows teachers care for students.

Our educational system is constantly criticized for failing to provide students with the fundamental skills required to succeed in today's society. Teachers are usually the prime target of angry, dissatisfied parents searching for a human cause for their children's academic problems.

But, if you want to blame the teachers, think again. From May 12 - 14, more than 900 dedicated teachers attended the 21st annual conference of the Ontario Association for Mathematics Education, at Queen's University. Their presence proves to the people of Kingston that teachers really do care about the welfare of their students.

While some teachers arrived from as far away as Newfoundland, more than 70 were from the Kingston area. The teachers spent their time, energy, and sometimes their own money, to learn the latest techniques and strategies so they can do a better job teaching mathematics. The 200-plus presenters discussed the value of traditional teaching methods, offered alternative techniques and linked teaching mathematics to a variety of everyday activities. They emphasized making mathematics enjoyable, practical and understandable for students. Although the experience was educational for the teachers, it is their students who will benefit most from this three-day event.

These mathematics teachers are doing their best to provide students with a solid educational background. Unfortunately, many aspects of the educational system are beyond their control. For instance, the government chooses the curriculum, not the teachers. Since many people disagree with these decisions, the government, in an attempt to pacify society, makes impossible demands on the teachers to keep every parent appeased.

The hundreds of teachers who attended the math conference prove that the educational system, not the dedication of the teachers, is the problem. At a time when teacher-bashing is the norm, it is uplifting to see that in many cases the attacks are unwarranted. Many parents are concerned about their children's education. They can only be pleased that these math teachers have proven they take their job seriously and are eager to spend time honing their skills and teaching methods.

Teachers and their students were not the only people benefitting from the Ontario Association for Mathematics Education. The conference was run by a volunteer committee assembled from the students, teachers and student teachers from local high schools and Queen's University. By participating at the conference, these volunteers learned that they can contribute to improving education.

Plans for next year's conference in Guelph and the 1996 one in London are already in progress. This time next year, after mathematics teachers swarm the streets of Guelph, they will return to their schools, including those in the Kingston area, rejuvenated and ready to turn on their students to mathematics.

Ania Halliop

Ania Halliop is a Grade 12 student at Regiopolis-Notre Dame Secondary School and is a member of The Whig-Standard's student editorial board.

▲ Out-going President's Message

RON LANCASTER



I have really enjoyed my year as President of this association and it has been a pleasure to work with so many people committed to improving the quality of mathematics education in Ontario. I would like to thank all members of the OAME Council for their hard work and spirited enthusiasm and the members of OAME for giving me an opportunity to serve them. I would also like to thank the administration of St. Mildred's-Lightbourn School for rearranging my full-time teaching schedule so that I had a number of free afternoons throughout the year to carry out the business of this organization. It is wonderful to work with an administration that values and encourages teachers to be professionally involved with organizations outside of their school.

It has been a busy year for OAME and what follows is a list of some of the initiatives that have occurred during my term as President. None of these things would have occurred without the tremendous help of all members of Council and other members at large.

The profile of OAME has been raised considerably throughout the year. More people are aware of OAME than ever before and the organization is being consulted by the Ministry and other organizations. Almost 10,000 copies of the Focus on Renewal of Mathematics document have been sold and it is being used by educators all over Ontario. The Ministry's Provincial Standards for Mathematics recognized the Focus document as a contributor and it contained a number of quotes and excerpts from it. A follow-up document that deals with the Specialization Years is now in draft form and it will soon be available to members of OAME and other educators.

OAME and OMCA were asked to give a joint presentation to the Royal Commission on Learning and we were subsequently asked to provide a written submission to the Commission. Our relationship with OMCA has continued to be very positive and productive and we were both heavily involved with the Mathematics Action Symposium run by the Ministry in May of this year. Members of both groups were on the steering committee and many other members were invited to be part of the Symposium.

OAME has played a major role in the forming of the Mathematics Education Forum. We have been well-represented at every meeting of this new organization. We endorse its efforts to improve the lines of communication between the universities and other levels of education.

OAME has moved to a new due-date membership system and it is hoped that this change will make it more desirable for new members to join. It should also make it easier for current members to be reminded to renew their memberships.

The 1993 Leadership Conference was highly successful and participants unanimously felt that it was good value and well worth attending. The conference sells out very quickly year after year. Plan early if you are interested in attending the 1994 Leadership Conference.

OAME will be jointly hosting a summer conference in 1995 with the Association of Mathematics Teachers of New York State (AMTNYS). This will be an exciting opportunity to connect with educators outside of Ontario and to attract new members from New York State.

The Gazette and the Abacus have both improved in quality and content to the point that they are now highly regarded by many educational organizations throughout North America. Jack Weiner has done a terrific job and he has attracted a number of hard-working individuals to help out with the task of publishing each issue. The advertisements that now appear in each issue have been well-received and Bob Robinson, the Advertising Manager, is to be congratulated for the outstanding work that he has done.

Several new OAME Committees (the Mathematics Promotion Committee and the Special Projects Committee) have been formed that will help us reach out to other groups and they will also be involved with creating publications and other items for the membership of OAME.

Starting this fall OAME will be making a strong effort to reach out to student teachers at the Faculties of Education across Ontario. Packages will be sent out later this year and members of Council will be speaking to classes on a regular basis.

A new chapter (TEY^{2}MS) has been formed and this will certainly help attract more members from Toronto and the surrounding area. Peter Saarimaki has been the catalyst for this new chapter and OAME owes him a great deal of thanks for his work in this endeavour and many others throughout the year.

There are a number of new individuals who have been

elected to Council this year and with Todd Romiens in charge, it will be an exciting and important year for the OAME.

I would like to encourage all members of OAME to consider increasing their involvement with this association. You might consider writing an article for the Gazette or the Abacus, or you could run for election. You might consider helping to organize a local conference. You could encourage others to join OAME or you might give a talk to a group of teachers, students or parents about a topic that is of interest to you.

This position has been another branch in my horizontal career (I have never been too interested in having a career that moves vertically) and it is something that I would certainly enjoy doing again. Thank you again for giving me the opportunity to serve you.

▲ Incoming President's Message

TODD ROMIENS



It's a great honour to be this year's President of OAME. I am very proud of what our organization does in the math community of Ontario. Thanks go to Ron Lancaster and Jeri Lunney for their leadership over the last few years. I know Ron will continue to have a positive influence on our organization as Past-President. To Jeri, who is leaving us, a warm farewell and keep in touch.

OAME must continue to be in the forefront of mathematics education in the province. There are many issues before us that require planning, development and action:

a. We have a Ministry Standards Document that is not complete. Since OAME and OMCA were the driving forces behind the production of the standards, they should also be the ones who complete it by producing exemplar assessment items to accompany the document. It is important that we continue to provide leadership in this area.

b. A Specialization Years supplement to the Focus on Renewal document has been written by an OAME committee. It is necessary that you take time to have input to this material, so that realistic content, approaches and assessment strategies are consistent with what we know about literacy and numeracy. Your voice is important.

c. We must continue to work towards smooth movement through the Transition Years. Your ideas concerning curriculum, assessment and general approaches to teaching during these years are critical. We all need to be aware of the success stories related to transition, and adopt those which can be used in our classrooms to help parents, students and teachers cope with change.

d. We need to find ways to incorporate the "Common Curriculum" and there is a need to deal with "integration". Sharing ideas that help to accomplish these tasks, without losing the integrity of mathematics, would be a great help.

e. OAME has a stated commitment to making membership more useful for our colleagues in the Elementary panel. Therefore, Focus issues of the Gazette, a continued publication of ABACUS materials and a Leadership Conference aimed at Primary through the Transition Years teachers are planned.

There are changing, exciting, times. We have an excellent council and executive. We will continue to be, as we have been, leaders in directing mathematics education in the province. I look forward to the coming year.

▲ Letter to the Editor

Editor's Note:

Correction: One of the authors of the article, "Geometry and Four Maximum Problems" in the April, 1994 Ontario Mathematics Gazette had his name incorrectly spelled as "Schultz", rather than the correct "Shultz". Professor Shultz writes:

Dear Jack:

Thank you for the copy of the April, 1994 Ontario Mathematics Gazette and your apology for the misspelling of my name, which you caught after the issue went to press. This misspelling has been a lifelong battle for my family and me. Mario Martelli and I do appreciate your attention to our work.

Sincerely,

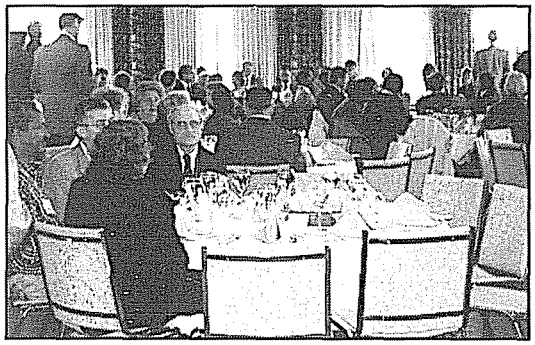
Harris S. Shultz, Professor of Mathematics

Editor's reply: Thank you, Harris, for your note and your implicit understanding and forgiveness. Best wishes,

Jack Wiener

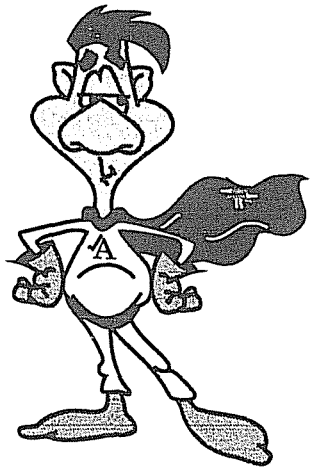


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▲ Have Your Say: Partnerships Will Help Improve Math



THE HONOURABLE
DAVE COOKE
MINISTER OF EDUCATION
AND TRAINING

Science and technology will play an increasingly important role in the industrial and economic development of Ontario, and a knowledge of mathematics is the foundation on which many of the scientific disciplines are built.

The government is committed to strengthening mathematics education and the related disciplines of science and technology at the elementary and secondary levels. I believe this is important both for the prosperity of the province and for the well-being of individuals.

In December 1993, the results of the first national test of students' mathematical abilities were released. The assessment was conducted as part of the School Achievement Indicators Program. The results proved what most first year university mathematics professors already knew — that many Ontario students were not performing at a high enough level, particularly in the area of problem solving. From my perspective, the results were simply unacceptable.

This view was shared by many parents and educators. The mediocre showing of Ontario students presented us with a challenge: to improve math skills and math education techniques.

More than 400 students, parents, educators, business and labour leaders, and members of the public took up the challenge last month. The Mathematics Action Symposium, sponsored by the Ministry of Education and Training, was held on May 5 and 6, 1994, and it resulted in recommendations about ways people can work together to improve mathematics education in Ontario.

This is our premise: a solid knowledge of mathematics is an essential skill and a necessary result of a good education. An understanding of numbers, patterns, and measurement, and the ability to estimate and solve problems: these must be part of every student's learning. Students themselves must come to understand that this is not abstract or arcane learning. It is not intended for a select few. We must help students, from Junior Kindergarten to the OAC level, realize that mathematics is a tool for daily life and work.

We must also increase awareness of the growing number of careers that require knowledge of mathematics.

During the Mathematics Action Symposium, delegates worked together to find answers to some important questions. We looked at curriculum content and debated what knowledge, skills, and values young people need for future endeavours.

We discussed innovative ways to impress the relevance of mathematics on our diverse student population and to engage students in all grades and all abilities in mathematics education.

We also discussed ways to make mathematics more welcoming for girls. The problem is not with the achievement levels of the girls who are studying mathematics, but rather with the low number of girls opting to take mathematics courses at the secondary level.

We looked at teacher education — both at pre-service and in-service programs for mathematics teachers.

Finally, we asked ourselves questions about the assessment of students and of the effectiveness of the curriculum.

The people who attended the Symposium agreed that it was a good start — an opportunity for dialogue and for guiding partnerships.

Several messages to my ministry came through loud and clear. For example, we hear a clear call for greater participation by parents, the public, and the community in math education. We need to make it easier for parents, business people, labour representatives and other partners, to follow what is happening in the classroom and to work with educators. This, I would like to emphasize, is a message we heard both from teachers and from partners outside the education system.

The participants stressed the importance of local, as well as provincial, action. The challenge to my ministry will be, in part, to act as a catalyst and facilitator.

Finally, we also heard a strong conviction that we need to support classroom teachers.

The thread tying these disparate proposals together is partnership. The government cannot improve math education alone.

The Ministry of Education and Training will continue to work with a steering committee from all partners who

participated in the Symposium. A detailed report of the recommendations from the Symposium is being prepared and will be made available in the near future. The ministry will develop an action plan based on these recommendations.

In the meantime the ministry will continue its work in the areas of curriculum and assessment.

The Common Curriculum, Grades 1 to 9 will prepare students for life, work, and lifelong learning in a changing world. It defines the curriculum in terms of results - or learning outcomes - rather than objectives or allotted instruction time. It is based on a holistic view of learning that emphasizes connections and relationships among ideas, people and things in the real world.

In keeping with this view, mathematics is linked with other subjects. Key mathematical concepts such as problem solving, probability and statistics, tables and charts, scale drawings, and percentage formulas are used in classes which range from language studies to social sciences, family studies to geography.

At the same time, because it spells out what we expect students to achieve, the Common Curriculum helps the school system be more responsive to the public. To be more accountable.

The ministry's work in the area of provincial standards is an important step in improving accountability. The ministry publication *Provincial Standards: Mathematics* describes the knowledge, skills and values students are expected to have achieved by the end of grades 3, 6 and 9.

Taken together, learning outcomes and the standards are a solid base for accountability to parents and taxpayers.

Periodically, the ministry reviews the effectiveness of the curriculum and the level of student achievement so we can improve programs and increase student achievement. In addition, Ontario will continue to participate in national and international testing. In 1994/95 we will take part in the Third International Mathematics and Science study and in 1996-97 we will again participate in the National Student Achievement Indicators Program.

Testing and evaluating our system leads the way to better education, better teaching and better curriculum in mathematics. I was heartened by the enthusiasm of the students, parents, teachers, academics, and members of the public who took part in our Mathematics Action Symposium. And I am looking forward to a strong partnership with them to improve mathematics education in Ontario. Our students deserve no less if they are to succeed.

DON'T MISS THIS OPPORTUNITY!

OAME

Executive Director

Position Available

The Ontario Association for Mathematics Education requires an Executive Director to work closely with the President and Executive, to promote excellence in mathematics education in the Province of Ontario.

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- maintenance of automated membership and financial records and preparation of regular financial statements
- management of Association business and communication as directed by the Executive and Council

This position is renewable annually, pending ratification at the annual meeting. The position commences September 1994 or sooner, depending on circumstances. There is an honorarium attached to this position.

Candidates should apply in writing, stating qualifications, prior to July 15, 1994 to:

Ron Lancaster
Chairperson, Search Committee

▲ St. Mildred's Lightbourn School Mathematics Fair/Open House

SILVI DODMAN
MATHEMATICS AND COMPUTER HEAD

The Grades 10 to OAC students of St. Mildred's Lightbourn School were challenged with a Mathematics Fair in January. Students were given a wide range of suggested topics which expanded quickly as the students were encouraged to pick an area of interest to them to explore, research, and communicate. As a final product, they could use any medium to display what they had learned in an interesting and innovative way.

Projects ranged from studies in numerology, magic squares, billiards, cribbage, to fractals, as well as the expected topics such as Pascal's Triangle and The Golden Ratio. Some students chose topics from the curriculum and expanded them or chose to explore topics from levels beyond their present grade level. As displays, students made videos, slides, models, used roulette wheels, and even made an elliptical billiard table. Many of the projects were truly outstanding.

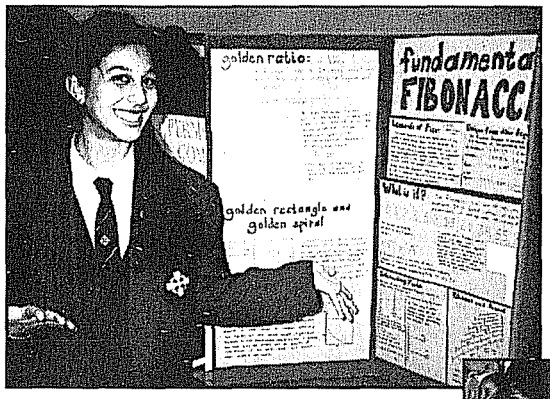
The gymnasium was set up with all the projects and the afternoon was used to demonstrate and explain the projects to students of Grades 4 to 9. The gymnasium was also opened in the evening to parents and friends.

Some students integrated the projects with independent units in other subject areas, thus helping to reduce their workload.

Students and staff alike considered the fair to be very successful. It was indeed a pleasure to see such enthusiasm in both completing the projects and in sharing what the students had learned from one another.

Students seemed to enjoy having the freedom to choose their topic and many commented that they enjoyed presenting their research in another mode. It was interesting to see emerge strengths drawn from art, communications and the sciences.

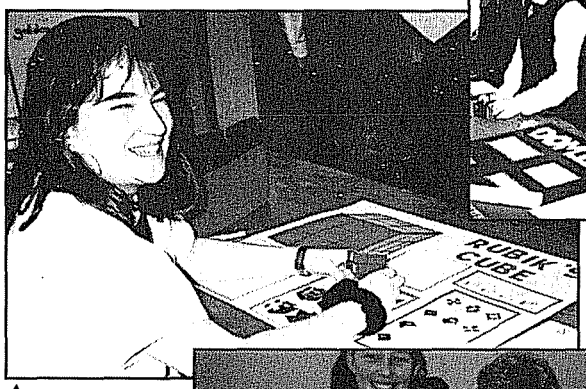
We are looking forward to our next Mathematics Fair and hope that this will become a regular part of our Mathematics programme.



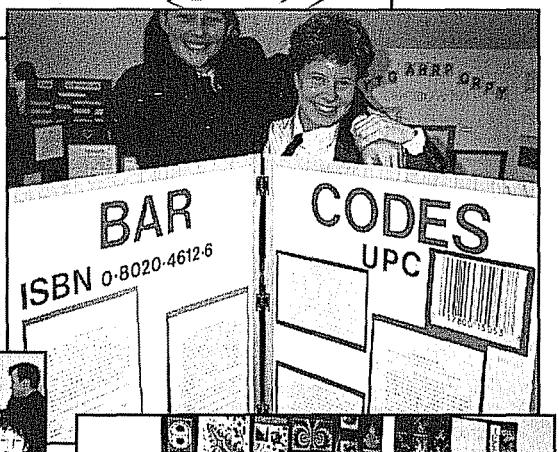
◀ *Johanna Diaz had a great project on Fibonacci numbers.*



Checking out the Domino display. ▶



▲ *Tracy Street solved the Rubik's Cube for her project.*



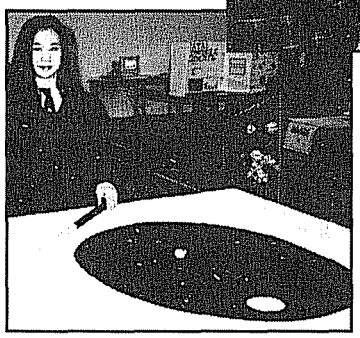
Jodi Dobbie (right) had a good project on Bar Codes and ISBN numbers for books. ▶



▲ *Melanie Amm and Kate Robertson did a fabulous project on dominoes.*



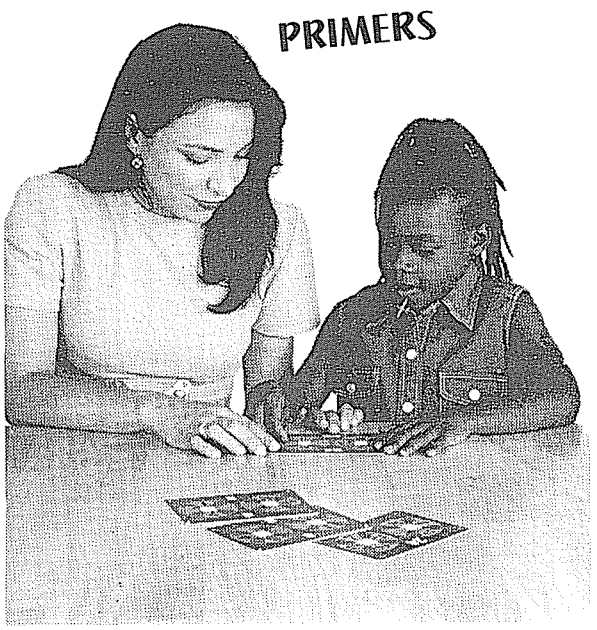
▲ *An amazing project on Fractals done by Melissa Chee and Jenny Fransis .*



◀ *Elaine Lo has the best project of all – an elliptical pool table.*

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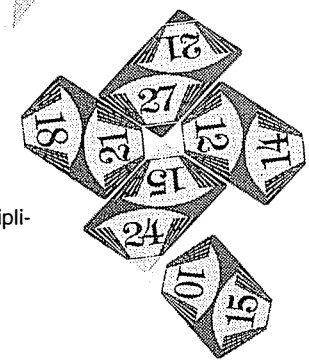


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Presenting Your 1993/94 OAME Award Winners

Mona MacGregor Award: Pole Printing, Forest, Ont



Since 1972, Pole Printing has served the printing needs of not only the community of Forest, Ontario but also the requests of customers originating well outside the immediate area. The business philosophy of Pole Printing has always been to provide quality products in a courteous and efficient manner to both small and large clients.

The employees of Pole Printing are indeed pleased with their ability to accommodate the special needs that arise with the production of the Ontario Mathematics Gazette. We appreciate the long-term association with the OAME/AOEM. The 1994 Mona MacGregor Award will serve as a continual incentive to ensure the quality and performance that your Association has come to expect from Pole Printing.

PHOTO: Terry Shepherd, Pole Printing

Morley MacGregor Award: Lorraine Duffin



It was indeed a great pleasure to receive the Morley MacGregor Award and it was such an honour to even have been nominated by the WOMA chapter.

In the past, as we have moved through a great focus on language across the curriculum, it is equally as satisfying to see the importance of mathematical and numeracy skills stressed in a variety of other subject areas as well. Art activities can include a focus on geometric and spatial concepts; design projects and science experiments require measurement skills; demographic information can be explored through data bases on a particular social studies topic.

Mathematics is about patterns, and recognizing a pattern is the intelligence in any subject area. With real-world experiences, children can begin to see the patterns in problem solving strategies and apply the knowledge and skills they have to any problem.

K.D. Fryer Award: West Carlton Secondary School, Carlton Board of Education



Front Row: Monique Aubry, Colleen Irvin, Anne Browne, Cindy Nephin, Mary Jane Dyment
Back Row: Bob Martin, Mark Lancaster, Ron Bender, Dave Fobert, Francine Menna, Denise Croteau

Although West Carleton S.S. is only six years old, its Mathematics Department has earned a reputation for excellence throughout the Carleton Board of Education. Innovative, progressive and dedicated, this group of Mathematics teachers has provided leadership in many areas. As with all good departments, the Math Department at W.C.S.S. has done more than its share of coaching, working with clubs and presenting workshops. But, in addition, a number of unique traditions have been started at the school by various members of the department. The school's leadership camp, the grad breakfast and the use of students as teacher-aides have been initiated by the Math Department. On the professional side, the creation of learning guides and instructional videos has provided opportunities for students to proceed in an Individualized Learning Environment. At most OAME or COMA conferences, there is usually at least one member of the department giving a workshop. These teachers are a closely-knit group who share a deep concern for the students they teach and who recognize the importance of school activities which extend beyond their classroom walls.

OAME Life Member: Tom Griffiths



It is a great pleasure for me to have this opportunity to write a few words concerning my thoughts and feelings for OAME.

OAME has been part of both my professional and recreational life since 1970 when I first became a councillor of the Ontario Association for Teachers of Mathematics, OATM.

I well remember council meetings at the College of Education in Toronto and dining on KFC. Some executive meetings were held in the evening in Kitchener, the geographic center for the executive. We did not get any expenses in those days, and there were no chapters. I remember spending a great deal of time discussing whether we could afford $50 for a committee meeting. The Gazette was published by the Ontario Mathematics Commission, and there was no Abacus. We've come a long way since then.

It has been a tremendous pleasure being part of the exciting growth of this organization, and watching it develop over the years. I have seen council meetings change location from The College, to the Ascot Inn, to the Ramada Inn. I have seen council's productivity increase enormously as a result of the organization's ability to pay for overnight meetings, food, transportation and accommodation, rather than a portion of these for only those furthest afield. The change to appointing a permanent pair as secretary/treasurers (now Executive Directors) made the job of the executive considerably easier, gave us continuity, and resulted in much more involvement in chapter affairs. The introduction of chapters was a major step in allowing the organization to become involved throughout the province. Likewise the Friday evening meetings of chapter representatives in recent years has helped considerably to consolidate the association with greatly improved communication.

Above all I remember with very great pleasure the numerous friends I have made over the many years. I also remember the help and advice many of these most influential and empathetic people have given me. Mostly, I remember the enthusiasm for mathematics that I have had the joy of sharing with these people. I find council meetings, and particularly annual meetings, to be rejuvenating experiences. It is such a joy to be part of the enthusiasm. When I become depressed by the "Its process not product that's important" or "Curriculum is not important" as well as other fashionable philosophies, I know that I can always count on an OAME gathering or a chapter meeting to restore my spirits and faith. I know that at these gatherings I will meet with many other people who also believe that mathematics is beautiful, fascinating and fun, and that our students have the right to have the opportunity to learn, understand and appreciate good mathematics.

This is perhaps my one constant in a changing world, and I thank OAME for being there to support me.

Serving this Association has been my pleasure, and the life membership award is icing on a great cake.

OAME Life Member: Bill Nimigon
North York Board of Education

Editor's Note: Unfortunately, photo and text for Bill Nimigon were unavailable at press time.

INTERNATIONAL MATHEMATICS OLYMPIAD 1995
YORK AND WATERLOO UNIVERSITIES CANADA

As most of you know, Canada is hosting the International Mathematics Olympiad in July, 1995 at York University.

We need your help.

We are looking for ten to twelve adults to host teams and supervise eight junior hosts over a two week period. Each team will consist of six students and two coaches. As an adult host, you will be available for most of the contests, either staying in residence or living near the university. It would be even better if you speak two or more languages.

If interested, please complete form at right and return it to

Tom Griffiths

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▲ About Problem Solving

JOHN GRANT MCLOUGHLIN
DEPARTMENT OF MATHEMATICS
MEMORIAL UNIVERSITY
CORNERBROOK, NEWFOUNDLAND



Let me begin by inviting feedback from interested readers and problem solvers. On a personal note, the winds of change are in motion once again. This summer I will be moving across the country to assume a position in math education. One of the primary roles of 'About Problem Solving' is to provide a medium for the exchange of problems and ideas. Please write to express your views or share ideas pertaining to problem solving.

A portion of this issue's column is devoted to the discussion of the following problem that was presented in the December 1993 issue.

The entries in each row and column are in arithmetic sequence. Find the value of *.

			*	
	74			
				186
		103		
0				

The problem may be solved by assigning a variable to one of the vacant boxes and using the idea of a common difference to assign values to other boxes. My solution is outlined below. By introducing a variable 'a', it is possible to express the values of different entries in terms of a. to I chose assign the value of a to the entry immediately above the 0. Now observe that the common differences for the third and fourth rows are

$$\frac{186 - 2a}{4} \text{ and } \frac{103 - a}{2}$$

respectively. This information is summarized on the grid shown below.

4a			*	
3a	74			
2a	$2a + \frac{186 - 2a}{4}$			186
a	$a + \frac{103 - a}{2}$	103		
0				

Now that three successive entries in the second column have been identified, one can algebraically determine the value of a. Note that twice the middle entry must equal the sum of the adjacent entries.† We need to solve the equation $74 + \left(a + \frac{103 - a}{2}\right) = 2\left(2a + \frac{186 - 2a}{4}\right)$

Therefore, the value of a equals 13. It is practical to determine the value of * by substituting a = 13 in the grid and proceeding to complete the grid. Actually we need only fill in some of the boxes to find the value of *. It can be seen below that its value is 142. You may wish to complete the grid to verify that indeed all entries in the rows and columns do form arithmetic sequences. Perhaps you would like to offer some alternative perspectives on this problem.

52	82	112	142	
39	74			
26	66			186
13	58	103		
0				

† Here are three successive terms in an arithmetic sequence with common difference, d:

$a_1 = x-d$, $a_2 = x$, $a_3 = x+d$.
so $a_1 + a_3 = 2x = 2a_2$.

This past semester I taught a course, Math 1051, which offers first year Memorial University students an alternative option to calculus. The course features a smorgasbord of topics such as number theory, geometry, modular arithmetic, and number systems. An effort was made to incorporate non-routine questions throughout the course. I would like to share two questions that appeared on the final exam. The first of these is a geometry question with an algebraic twist.

> The measures of the interior angles of a nonagon are A, A+B, A+B+C, 2A+B+C, 2A+2B+C, 2A+2B+2C, 3A+2B+2C, 3A+3B+2C, and 3A+3B+3C degrees respectively. Given that A,B and C are positive integers and the measure of the second largest angle is 236 degrees, determine the measure of the third largest angle, that is, 3A+2B+C.

The second question deals with the number of factors of a given number. Since this topic was not discussed in class, the concept was introduced as follows:

All natural numbers greater than or equal to 2 can be expressed as a product of prime factors. For example, $24 = 2^3 \times 3^1$ and $77 = 7^1 \times 11^1$. In general, a number

$$N = P_1^{a_1} P_2^{a_2} P_3^{a_3} \ldots . P_k^{a_k}$$

has $(a_1 + 1)(a_2 + 1)(a_3 + 1)...(a_k + 1)$ factors.

Consider 24 for example. According to the formula 24 has (3+1)(1+1) = 8 factors. Checking we find that 1, 2, 3, 4, 6, 8, 12, and 24 are the factors of 24. The number 77 has 4 factors because (1+1)(1+1) = 4. These factors are 1, 7, 11, and 77.

Following this introduction, the students were invited to provide answers to parts (a) and (b) below.

(a) Express 60 as a product of prime factors. Use the formula to determine the number of factors of 60. List these factors to verify that the formula is correct.

(b) Give an example of a number that has exactly 20 factors. (You do not need to calculate the number. An expression showing a suitable product of prime factors is acceptable.)

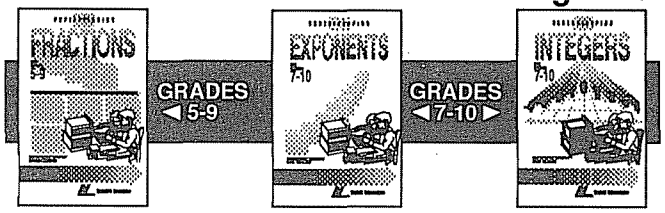
The rationale for including the number theory question in the discussion of problem solving is twofold. It exemplifies how one may incorporate problem solving into a test. I feel that it is reasonable to introduce a concept in a test provided that the basic ideas associated with the concept are familiar to students. It offers another dimension to evaluation. Students who expect to do well should be required to demonstrate an ability to grasp and apply new material which is relevant to the subject at hand. The secondary aspect of this question relates to a curious answer - one which illustrates how surprising responses may give birth to new questions. An errant conceptualization of the problem produced the following response to part (b).

$N = 2^1 \times 3^2 \times 4^3 \times 6^1 \times 7^2 \times 9^3 \times 11^1 \times 12^1 \times 13^1 \times 14^2 \times 16^5 \times 19^1 \times 20^2 \times 21^1 \times 22^1 \times 23^2 \times 24^3 \times 25^2 \times 26^3 \times 27^4$

The new question: "How many factors does N actually possess?"

In closing, there is a clarification to be pointed out. The April column contained an error that some of you may have caught. The square of a Fibonacci number is not necessarily one less than the product of its adjacent terms. Rather it differs by one from that product, alternating from less than to greater than. Have a wonderful summer holiday!

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Square Root
Cumulative Check

INTEGERS
The Meaning
Add, Subtract,
Multiply, Divide
Order of Operations
Cumulative Check

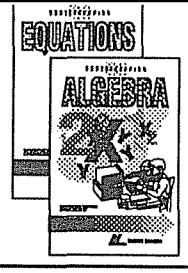
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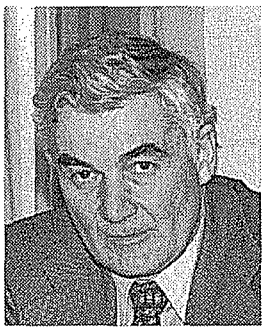
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Dr John Coleman recognized at OAME conference



Dr. A. John Coleman was presented with a certificate of recognition at the recent OAME conference in Kingston for his support of OAME's official publication – The Ontario Mathematics Gazette.

Back in 1972 when the Ontario Mathematics Commission dissolved, the loss of its financial support for the Gazette precipitated the decision to terminate the publication. Within a few months of the lamentable announcement of the Gazette's demise, the decision was reversed and publication resumed with barely a skip of the heartbeat. The survival of this publication is due to the generosity of one educator who offered personally to underwrite the publication. Although his funds were never required, it is John Coleman to whom OAME offers its grateful recognition for having the foresight and faith in a publication that has grown to be recognized with respect by mathematics educators throughout North America.

John Coleman was a student at Runnymede Collegiate and the University of Toronto, and in 1938 when U. of T. won the very first Putnam contest Coleman was one of the team members. John went on to do his M.A. at Princeton and his Ph.D. at Toronto in Relativistic Quantum Mechanics under Leopold Infeld.

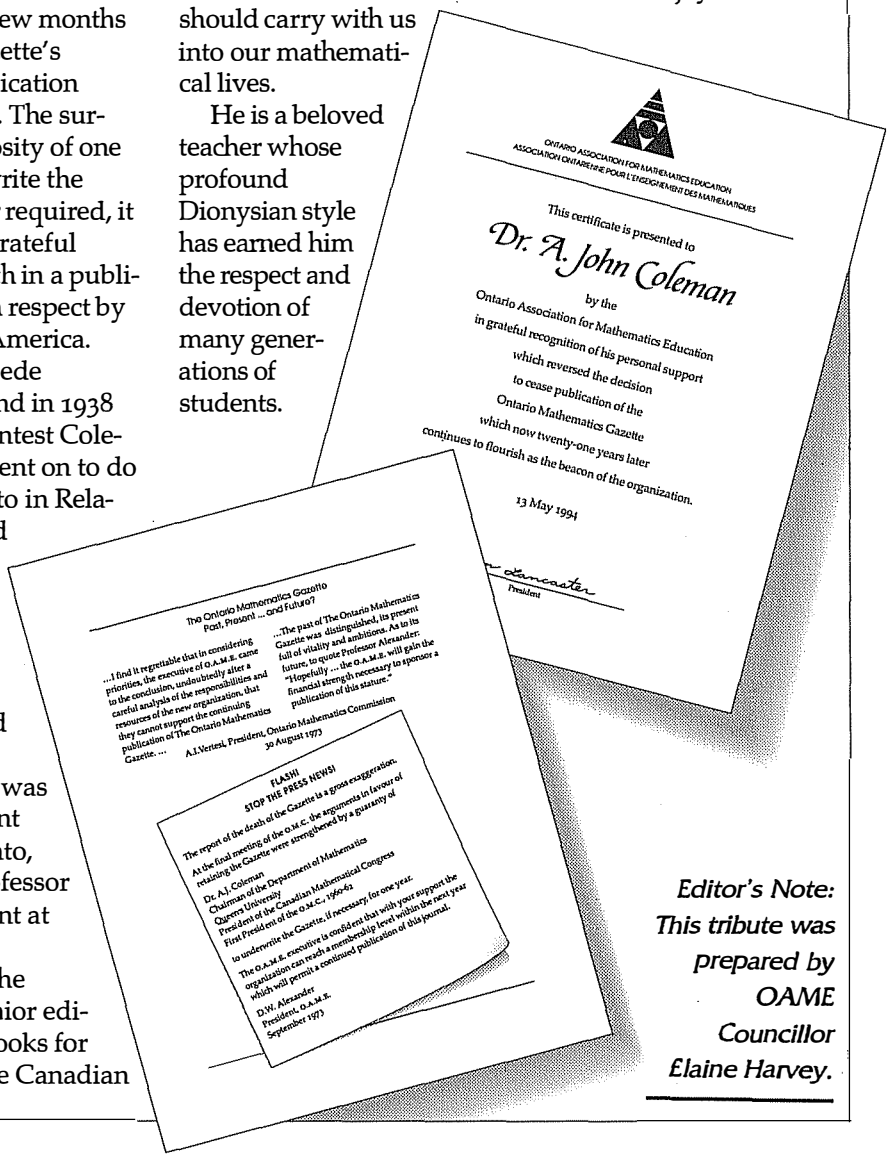
While at Toronto, he was secretary of the Student Christian Movement, and in 1945 became Travelling Secretary of the World's Student Christian Federation in Geneva. In the next four years, he visited some hundred universities in ten countries.

His first teaching job, from 1943 to 1945, was as a Lecturer at Queen's University. He spent the fifties on staff at the University of Toronto, and the sixties and seventies as Dupuis Professor of Mathematics and Head of the Department at Queen's.

From 1960 to 1964 he was Chairman of the Ontario Mathematics Commission, and senior editor of the Gage series of mathematics textbooks for grades 7 to 13. He has been a member of the Canadian Mathematical Society for many years and was its president from 1972 to 1974.

In 1975-1976, he directed a study of the Mathematical Sciences in Canada. His report, published in 1977, contained a number of far reaching recommendations for the school system. This document was way ahead of its time in describing the feelings of anxiety and low self-confidence some school teachers have about their abilities as mathematicians, a state which can separate them and their students from the essential 'joy' that we should carry with us into our mathematical lives.

He is a beloved teacher whose profound Dionysian style has earned him the respect and devotion of many generations of students.



ONTARIO ASSOCIATION FOR MATHEMATICS EDUCATION
ASSOCIATION ONTARIENNE POUR L'ENSEIGNEMENT DES MATHÉMATIQUES

This certificate is presented to

Dr. A. John Coleman

by the
Ontario Association for Mathematics Education
in grateful recognition of his personal support
which reversed the decision
to cease publication of the
Ontario Mathematics Gazette
which now twenty-one years later
continues to flourish as the beacon of the organization.

13 May 1994

Lancaster
President

The Ontario Mathematics Gazette
Past, Present ... and Future?

...I find it regrettable that in considering priorities, the executive of O.A.M.E. came to the conclusion, undoubtedly after a careful analysis of the responsibilities and resources of the new organization, that they cannot support the continuing publication of The Ontario Mathematics Gazette. ...

A.J. Vertesi, President, Ontario Mathematics Commission
30 August 1973

...The past of The Ontario Mathematics Gazette was distinguished, its present full of vitality and ambitions. As to its future, to quote Professor Alexander: "Hopefully ... the O.A.M.E. will gain the financial strength necessary to sponsor a publication of this stature."

FLASH!
STOP THE PRESS NEWS!

The report of the death of the Gazette is a gross exaggeration. At the final meeting of the O.M.C. the arguments in favour of retaining the Gazette were strengthened by a guaranty of

Dr. A.J. Coleman
Chairman of the Department of Mathematics
Queen's University
President of the Canadian Mathematical Congress
First President of the O.M.C., 1960-62

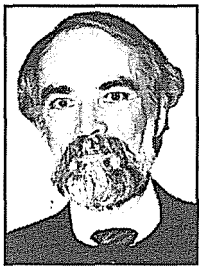
to underwrite the Gazette, if necessary, for one year.

The O.A.M.E. executive is confident that with your support the organization can reach a membership level within the next year which will permit a continued publication of this journal.

D.W. Alexander
President, O.A.M.E.
September 1973

Editor's Note: This tribute was prepared by OAME Councillor Elaine Harvey.

▲ Twenty-Five Ways to Improve Ontario's Standing on National and International Mathematics Tests



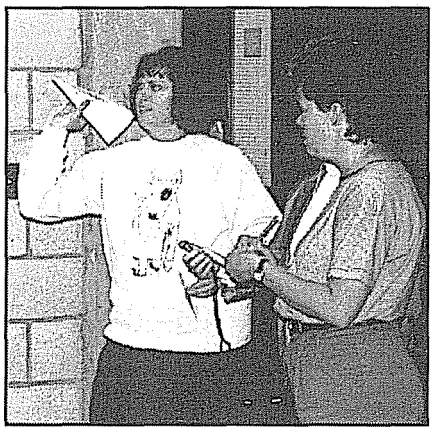
GARY FLEWELLING

Gary is on leave from the Wellington County Board of Education. At this very moment, he and his wife Barbara are camping in the Australian Outback!

The taxpayers of Ontario want our students to do better on national and international tests. Here are 25 things we can do that could improve our ranking in these tests.

1. Make our education system less egalitarian and more elitist.
2. Test a non-representative sample of our students.
3. Make our education system less comprehensive and more specialist in nature.
4. Students taking a test written in language A should come from homes in which language A is spoken.
5. Adopt an inflexible national mathematics curriculum.
6. Make the taking of mathematics to the OAC level a prerequisite for candidate teachers wishing to teach in elementary schools.
7. Increase the time given to preservice training in mathematics education at faculties of education.
8. Increase resources available for teacher inservice in mathematics education.
9. Improve student attendance.
10. Lengthen the school year.
11. Lengthen the school day.
12. Increase the time per day given to instruction in mathematics.
13. Make those items being tested that are presently optional in our curriculum compulsory.
14. Increase the use of multiple choice testing, particularly in elementary schools.
15. Increase the time that students spend doing homework in mathematics.
16. Limit the time that full-time students can devote to outside jobs.
17. Stress the basics as defined by national and international tests.
18. ncrease the use of private tutorial services.
19. Have the results of national and international tests make up a significant portion of the student's report card mark.
20. Select a base year and then make comparisons to that year's average mark.
21. Improve the stability of the home environment.
22. In the home, increase the value placed on learning and the encouragement given to the student for learning.
23. Teachers and parents set higher expectations for students.
24. Raise the general level of test literacy in the public.
25. Set clearer standards of achievement in mathematics.

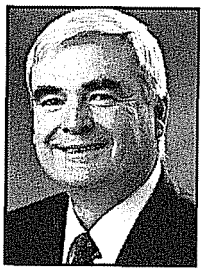
It is left to the reader to decide which of the above steps are worthy of consideration. The author thinks that many of the suggestions above clash with what we believe to be important in our educational system and that, for Ontario in the 1990's, only about one third of these suggestions are worthy of any serious consideration. Many of the suggestions are simply incompatible with present day Ontario society. It is also left to the reader to decide just what the connection is between these tests and the issue of quality education.



Using Technology to Investigate Mathematical Happenings through Hands-On Activities: Peter Komlos and Sharon Cook

▲ COUNCIL COMMENTS

BOB ROBINSON,
GOLDEN SECTION CHAPTER REPRESENTATIVE



These notes were taken at the OAME Council Meeting held March 26, 1994 at the Ramada Inn-Airport West in Mississauga. Please send any correspondence directly to the editor.

PROVINCIAL STANDARDS

Provincial standards are available in both English and French. Contact your principal or consultant to receive a copy.

SCHOOL ACHIEVEMENT INDICATORS PROJECT (SAIP)

The SAIP report is available from the following:

Report on Mathematics Assessment (1993)
Council of Ministers of Education, Canada

AWARDS COMMITTEE

These award winners were formally recognized at the Kingston Annual Conference.

Mona MacGregor Award
Pole Printing (accepted by Terry Shepherd)

Morley MacGregor Award
Lorraine Duffin
Maisonville Public School
London

Ken D. Fryer Award
Mathematics Department
West Carleton Secondary School
Carleton Board of Education
Dunrobin, Ontario

Life Membership
Tom Griffiths, WOMA
Bill Nimigon, North York Board of Education

MATH EQUITY

Responses to the Math Equity questionnaire distributed to council at our last meeting have been tabulated and will be analyzed. The Math Equity breakfasts will be as in the past (ie., preceding the council meetings) but an information package will be distributed to councillors explaining the role of this committee and the breakfast function.

PUBLICATIONS COMMITTEE

Amy Parker is leaving the position of Abacus editor. Thank you, Amy, and best wishes in your future endeavours. A replacement should be announced at the June Council Meeting. We are searching for a Mathematics Resources Editor. If you are interested please contact Bill Otto.

OAME'94

By the time you read this column the Kingston annual is history. I know we are all very appreciative of all the hard work that the "Kingston Folk" put into this outstanding event.

LEADERSHIP'94

Todd Romiens is coordinating another exciting Leadership Conference. Watch for announcements and plan to attend this event which will be held on November 9 and 10, 1994. We are looking for another sell-out this year.

OAME'95

The site will be the University of Guelph rather than Brantford because of the work-to-rule in Brant County. This situation created serious difficulties for planning.

OAME'96

Watch for it! It's coming to London.

MEMBERSHIP/PUBLICITY

Special renewal cards have been approved for distribution. A letter is being designed to go to Faculties of Education to suggest that future teachers become members of OAME. A joint OAME/NCTM membership form is being designed and is in its final stage of production.

EARLY YEARS/FORMATIVE YEARS

A measurement activity issue of the Abacus is being designed for the December issue.

SPECIALIZATION YEARS

A draft of the Specialization Years section for the FOCUS ON RENEWAL document has been written and distributed along with a response form.

NCTM

The Scullys (Jan and Barry), outstanding NCTM reps. for several years, are stepping down. They will be missed. Council unanimously congratulated them on a job well done. Keep your eyes open for a new Middle School Journal from NCTM. The News Bulletin sent to members is, alone, worth the membership fee.

CHAPTER REPORTS

Note: Because of many of the spring conferences will have taken place by the time you receive this issue of the Gazette, I have not included some chapters in my "comments". These hardworking chapters are in this category: CHAMP, NOMA, Pine Ridge, SAME, and WOMA.

COMA

COMA has agreed to host the first Provincial Mathematics Olympics in the spring of 1995. They are looking for support of OAME in this project.

GOLDEN SECTION

The Niagara-Brock Interface group has responded to the Mathematics Education Forum regarding OAC Calculus. Some department heads were disturbed that these consultations were taking place without input at the school level. Some said that they would not have been aware of such discussion if it had not been for this meeting.

GVMA

Hopefully you have received or examined a copy of the new GVMA publication, Sample Algebra and Geometry Exams II, that was to be available at the Kingston Conference.

ISOMA

A newsletter is available from John Kersley.

NWOAME

NWOAME's first newsletter was mailed in March. It is edited by Joe Hall, Math Head at Westgate CI and VI who is the new Communications Officer. NWOAME'94 is tentatively scheduled for September 23-24, 1994.

SWOAME

Chapter activities have been hampered by this year's elementary school teachers' strike and work-to-rule sanction that is currently in effect in the secondary schools in Windsor. The chapter is still planning to conduct a fall mathematics conference in 1994.

Y⁴MA

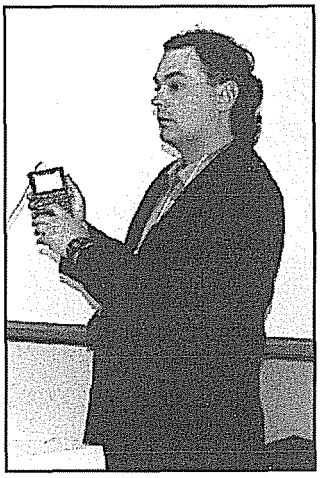
Y⁴MA will be assisting the IMO committee. Jan Scully and Shirley Dalrymple will co-chair a committee to enlist senior students to serve as guides. They will also enlist teachers to act as monitors and provide general assistance for the July, 1995 event. As well, the chapter will make a donation to the Canadian team.



Committee Members



Queen's Reception at the Faculty Club.



How to tell Your Asymptote from a Hole in the Graph: Gord Cooke



Student Volunteers at Kingston Hall



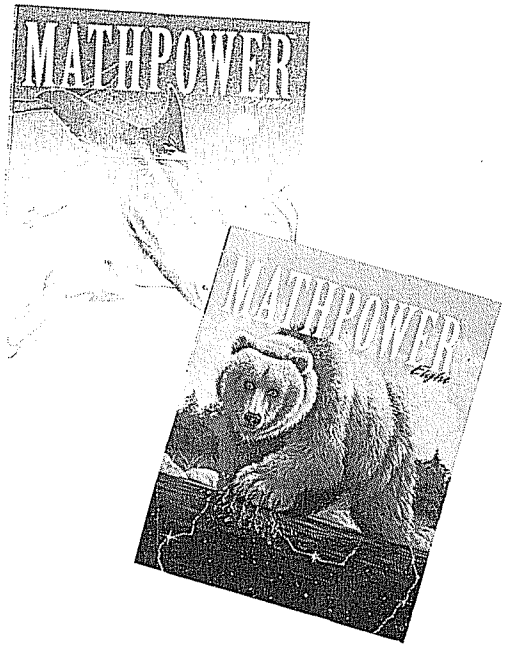
Queen's Reception at the Faculty Club.
Pictured from left to right: Bill Higginson, Hugh Allen, Peter Taylor

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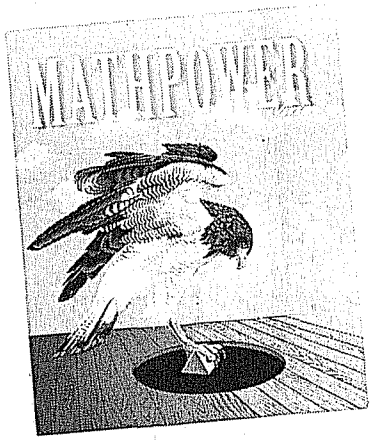
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▲ Mathematics and the World Around Us



RON LANCASTER
ST. MILDRED'S-LIGHTBOURN SCHOOL

Readers are invited to submit items from newspapers, magazines, books or other sources that contain information that can be related to any area of mathematics. Sufficient information about the source of the item should given so that other readers can obtain additional details. Teachers are encouraged to use the contents of this regular feature of The Gazette as an aid to helping their students see the connection between mathematics and the world around us. The content may not fit in with what you are currently teaching your students, but many of the items can be used to begin your classes in an interesting and engaging manner.

The National Council of Teachers of Mathematics has a new journal for middle school teachers and it is a publication to which every middle school teacher should have access. For now, it will be published 4 times per year and each issue will be about 100 pages long. The articles are filled with great ideas on how to use manipulatives and how to connect mathematics with other subjects. There is even a regular column that uses commercial cartoons to highlight mathematics in an interesting way. For more information call (800) 235-7566.

I feel lucky that I have been asked to have a regular column in this journal and it will be in the same style as this one. My first column had several items that I felt readers here might be able to use and so I decided to use it as the column for this issue of the Gazette.

Over the summer holidays I would appreciate it if you could keep an eye out for items that could be used in this column. Send me whatever you find and I will try to use them next year. In the meantime, have a great summer!

This article was written to celebrate the fortieth anniversary of the New York City subway token. This anniversary was worth noting because in the not-too-distant future the token is going to be replaced by a plastic fare card. The article is excerpted here, along with several questions for students to ponder.

NEW YORK'S TOKEN TURNS 40

Today is the 40th birthday of the New York City subway token, "and there'll never be a 50th," said Jared Lebow, a spokesman for the Transit Authority. Tokens will soon be replaced by plastic fare cards, which are essentially pre-paid credit cards read by a card-swipe turnstile. Fare cards are already in experimental use.

To celebrate the token while it is still jingling in the pockets of New Yorkers, here are some facts about the brass coin that serves as a ticket to the biggest subway system in the world.

DAWN OF THE TOKEN

At the beginning of the subway system, in 1904, passengers bought paper tickets at a ticket booth for five cents each. An attendant at the turnstile would then chop the paper ticket in half. The turnstiles were later adapted to operate with a nickel, eliminating the middleman. When the fare doubled to a dime in 1948, a coin could still be used.

But when the fare went to 15 cents on July 25, 1953, there was a problem - the turnstiles operated by a single coin dropping into a slot. So the Transit Authority introduced New York's first token.

New York City was not the first to use tokens. Dallas, Indianapolis and Pittsburgh, among others, were earlier.

IMPOSTERS

The brass "bullseye" tokens, the first of their kind, were introduced to combat the use of slugs. The steel centers are read by magnets, making it harder to counterfeit than the old all-brass models, but by no means impossible. The Transit Authority takes in 20,000 slugs a month, out of a total volume of about 150 million. Before the bullseyes, the figure was about 165,000 a month.

The token's plastic heir may not be immune from spurious substitutes. Hackers have already counterfeited automatic teller machine cards, so the fare card, which uses a similar magnetic-strip system, could be a target too. Transit Authority officials speak vaguely but confidently of "security measures" that will safeguard the system.

The following table lists various years and the fares charged.

YEAR	FARE	YEAR	FARE
1953	$0.15	1981	$0.75
1966	$0.20	1984	$0.90
1970	$0.30	1986	$1.00
1972	$0.35	1990	$1.15
1975	$0.50	1992	$1.25

Source: Mathew L. Wald and the New York City Transit Authority, printed in the New York Times, July 15, 1993.

QUESTIONS

1. Why does the Transit Authority consider the change from a token design to a fare card to be an advantage?
2. How much money does the Transit Authority lose due to slugs in a one-month period? Over the course of a year? How much money would it lose had the bullseye token not been introduced? How do these losses compare with the amount of revenue brought in by the Transit Authority over one year?
3. Draw a graph that represents subway fares from 1953 to 1992.
4. Consider your graph. Estimate the subway fare for the year 2000. At what years can you anticipate fare increases between 1992 and 2000? Explain your thinking.

FRIDAY THE 13TH CLUB MEETS ONCE IN '93 JUST FOR GOOD LUCK

Marcellus, NY. - Over the past 25 years, Ray and Janet Smith's Friday the 13th Club has faithfully gathered to observe what many consider the most foreboding day on the calendar.

They even bring a stuffed black cat to sit as the 13th member of their group.

"We've never missed a date. That would be unlucky," Mr. Smith says with a laugh.

So, the Smiths and friends will meet again today, the only Friday the 13th of 1993. They'll have drinks, dinner and quiet fun, making it 26 years in a row.

While Mr. Smith and other members of the club in Marcellus, a Syracuse suburb, chortle over testing their good fortunes on Friday the 13th, to others the confluence of the unluckiest of days and the unluckiest of numbers is a serious matter.

As many as 21 million Americans suffer from paraskavidekatriaphobia - the fear of Friday the 13th, according to Dr. Donald Dossey, a behaviorial scientist and author.

Their symptoms range from mild anxiety and a nagging sense of doom to full blown panic.

"Some will not even get out of bed or leave their homes," said Dr. Dossey, who works at the Phobia Institute in Los Angeles. "Others will go through all kinds of rituals to counteract the effects."

It is estimated that $750 million US will be lost by American businesses because people won't shop, travel or take risks of any kind on Friday the 13th, says a study cited in Smithsonian Magazine.

"For some people the fear is absolutely debilitating. The symptoms might start a week or two before and progressively worsen as the day approaches," Dr. Dossey said. "Amazingly, when the day is done, so is the phobia."

The fear of the number 13 is deeply rooted in history dating back to ancient Rome and before.

Because of the structuring of the Gregorian calendar, there is always at least one Friday the 13th during the year and never more than three.

Mr. Smith's club met officially for the first time Jan. 13, 1967. Last year, to celebrate their 25th anniversary, the group travelled to Salem, Mass., site of the 17th century witch trials.

Their plans this year do not include a viewing of the newest Friday the 13th movie installment, *Jason Goes To Hell: The Final Friday*, which opens around the country today.

Source: This Associated Press article was printed in The Hamilton Spectator, Friday 13, August, 1993.

QUESTIONS

5. Consider the following excerpt from the article.

   Because of the structuring of the Gregorian calendar, there is always at least one Friday the 13th during the year and never more than three.

Carry out an investigation to show that this comment is true.

6. How many times has this club officially met since 1967? Their 100th meeting will be held on what date? Explain your thinking.

MATHEMATICS INVESTIGATOR: HINTS AND SOLUTIONS

1. Is it for ease of advertising or cost to turn the bullseye into a valued collector's item, or....?
2. In one month the Transit Authority loses about $25,000 owing to slugs. In one year it loses about $300,000. If it took in 165,000 slugs in a month, it would lose $206,250 per month. In one year this amount would be $2,475,000, which is clearly worth worrying about. All these figures, however, are small relative to the revenue brought in by the Transit Authority over one year.
3. A bar graph or line graph are two possible ways of displaying how the cost of taking the subway has increased since 1953. Students can confer with classmates to see what type of graph was used. Which format is the best?
4. Did you notice that with one exception (from 1980 to 1990) the cost of taking the subway doubled every ten years? If this trend continues, the subway fare will be $2.20 in the year 2000. Raising the fair to $2.20 can be done in many ways but the increases will not be well received by those who must travel in New York City.
5. Look at a current calendar and verify the truth of the statement for 1994. How can you extend your thinking to include all years?
6. Any given year is either a leap year or a non-leap year. Seven days are possible on which 1 January can land and, consequently, only fourteen different types of years are possible. Take some time to locate or make up these fourteen calendars to see that the statements made in the article are true.



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Editor's Note: Our thanks to OAME Councillor, Kaye Appleby for preparing this report.

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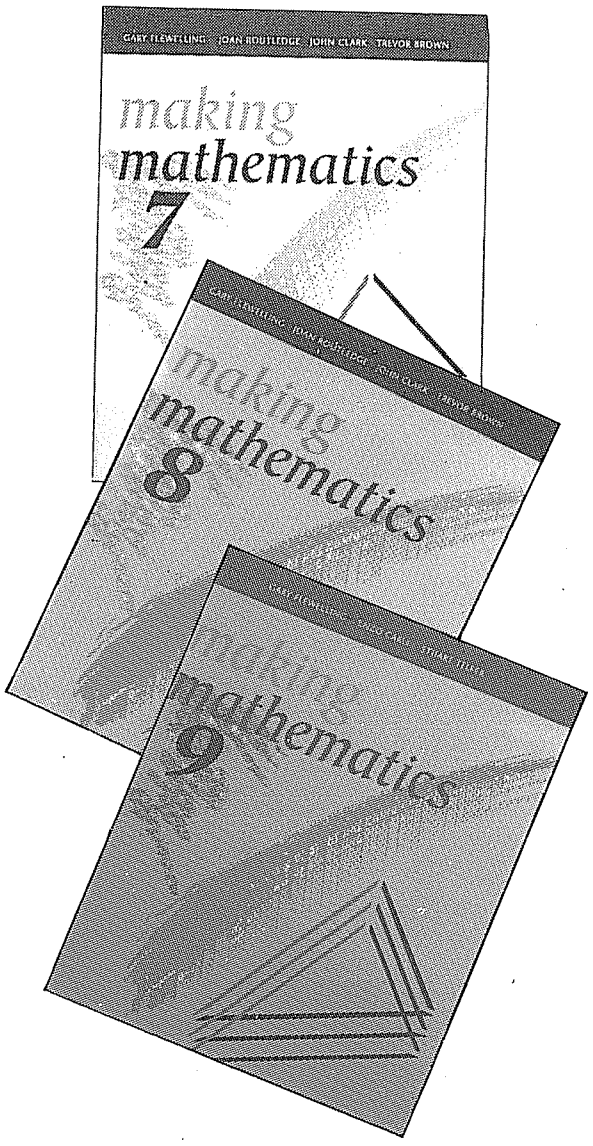
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