



Mathematics Council NEWSLETTER

The Alberta Teachers' Association

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From the Editor

Welcome to the 1990s!

As we head into the '90s, mathematics is going to play an increasingly important role; hence, our students must become literate in mathematics. The National Council of Teachers of Mathematics (NCTM) presents a strategy to this challenge in its "Curriculum and Evaluation Standards for School Mathematics." I believe that all mathematics teachers have a responsibility to become familiar with the contents of this important document.

The NCTM document pinpoints policy decisions and trends for the future of our society:

Informed Electorate • NCTM identified that teaching mathematics could help develop an informed electorate. In a democracy in which political and social decisions involve increasingly complex technical issues, an educated and informed electorate is critical. Voters must be able to read and interpret complex and sometimes conflicting information tied to the political issues of the day--much of this information involves math concepts. This is a challenge in a society where 25 percent of high school students drop out before graduating, and only a few of those remaining complete four years of high school mathematics.

Math Literate Workers • NCTM identified the need to develop mathematically literate workers because modern methods of production make ever higher demands on workers' knowledge and skills. Advancing technology means that traditional standards of basic mathematical competence are no longer sufficient. Workers must now understand the complexities and technologies of communication and must be prepared to ask the right questions, assimilate new information, solve unfamiliar problems in unconventional ways and work cooperatively as well as independently.

Opportunity for All Students • Recent statistics indicate that the majority of math students are white males. Females and minority groups are seriously underrepresented in careers involving science and technology.

Problem Solving Skills for Life • The NCTM study shows that the typical worker will change jobs four to five times over the next 25 years. Individuals will need to adapt, to explore work and career opportunities, to accommodate changing conditions, and to actively seek and create new knowledge. Flexibility implies that mathematics education must emphasize a dynamic literacy centred on the application of mathematics to problem solving.

To conclude, the NCTM's reason for teaching mathematics is to develop in all students an understanding of math that lasts a lifetime and grows to meet the demands of our changing society now and in the future.

MCATA Hosts Regional

An exciting math conference is planned for October 25-27, 1990, at Calgary's Convention Centre. Topics of professional interest will be presented at the NCTM Regional Conference as will displays of current mathematics educational materials. Also, the opportunity to enjoy some real Western hospitality will be integral to the conference.

School systems are requested to declare Friday, October 26 a professional development day so math teachers can attend the conference. Urge your school system to honor this request.

MCATA hopes that well over 1,000 participants will attend the conference. It is not too early to start making plans to attend. We hope to see you there.

Watch for conference updates in future issues of the Newsletter.

Math Education Month

April is "Math Education Month." What do you and your colleagues plan to do? Here are some suggestions:

- Organize a math fair.
- Set up a display of math materials in your community.
- Decorate your classroom or the library around a special math theme.
- Organize a school inservice mathematics project.
- Organize a math inservice day for the teachers of your local.
- Have a mathematics contest among the students.
- Organize a MCATA regional in your area.

The MCATA executive will help with personnel and money--all you have to do is ask.

NCTM Annual Meeting

Salt Lake City - April 18 to 21, 1990

It's not too early to start planning to attend the NCTM's 68th Annual Meeting in Salt Lake City this April. An NCTM annual conference can be the experience of a lifetime.

Mathematics teachers, administrators, teacher educators, researchers and other professionals will convene to conquer new heights of professionalism and commitment in mathematics education. All participants at NCTM conferences and conventions have high ambitions, but the annual meeting is special. Every year, representatives from all parts of the United States and Canada, as well as from countries all over the globe, share their hopes and needs, and their problems and solutions.

This year's meeting promises to build on the momentum of the "Curriculum and Evaluation Standards for School Mathematics," to outline the goals of the New Teaching Standards Project, and to present new themes for comment and discussion. More than 500 sessions, including workshops at the elementary, secondary and college levels will be offered.

To allow flexible programming, the meeting will include many half-hour sessions. In-depth sessions will be three hours long and cover the following topics:

- Grades K to 4: Statistics
 - Assessment as the key to change
- Grades K to 8: Enhancing the mathematical achievement of minority students
- Grades 5 to 8: Cooperative learning
 - Manipulatives to help understanding
 - Using writing to develop mathematical concepts
- Grades 7 to 12: Discrete mathematics
 - Students' and teachers' beliefs about mathematics
- Grades 9 to 12: Pulling math from applications versus pushing applications into math
 - Motivation through manipulatives

The conference program will highlight topics such as "The Year of National Dialogue" (the outreach project of the Mathematical Sciences Education Board), mathematical connections, assessment, activity-based learning, and mathematical reasoning.

Participants will have many opportunities to visit the extensive commercial exhibits featuring the latest in textbooks, software, teaching aids and educational products. Special times have been set aside for elementary, middle, high school and college teachers and teacher educators to visit the exhibits area.

Square One TV

Forty new "Square One TV" programs will be shown from January 8 to March 5, 1990. The popular game shows explore math content and are designed for students 8-12 years old.

A new teacher's guide contains the game's rules, offers a range of follow-up activities, reproducible student pages and a complete program listing. Suggestions for adapting the "Square One TV" format to the classroom are provided.

Copies of the new guide are available for \$3.25 each (\$2.00 each for 50 or more copies). The original "Square One TV" teacher's guide is available at \$2.00 per copy or \$1.00 for 50 or more copies. The "Mathnet" teacher's guide is available for \$3.95 per copy or \$2.00 for 50 or more copies. Guides are available from Children's Television Workshop, School and Technology Division, One Lincoln Plaza, New York, NY 10023.

The producers, Children's Television Workshop, allow schools to tape the shows and to keep the copies in their libraries for three years.

The 10 Commandments for Teachers

by George Polya

1. Be interested in your subject.
2. Know your subject.
3. Know about the ways of learning.
4. Try to read your students' faces to see their expectations and difficulties. Put yourself in their places.
5. Give them not only information but also "know-how."
6. Instill in them the habit of methodical work.
7. Let them learn "proving."
8. Consider the problems at hand in order to solve the problems to come.
9. Do not give away your whole secret.
10. Suggest it. Do not force it down their throats.

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The Pilgrim's Problem

A kindhearted pilgrim had trouble choosing a turkey for the feast. So, when the turkeys were asleep, he entered the coop and woke the first turkey saying:

- "Thou shalt live. Run for your life!"

The turkey squawked and fled from the coop. The second turkey was left sleeping.

The pilgrim then woke the third turkey with the same message, and the fourth turkey was left sleeping.

The pilgrim continued using this method around and around the coop until just one turkey was left. To this turkey, the pilgrim said:

- "Happy Sunday Feast, Turkey!"

If 30 turkeys were in the coop, what place would a turkey avoid so as not to be part of the feast? What if there were 31 turkeys? 32 turkeys?

Find a pattern to predict which turkey would be chosen no matter how many turkeys are in the coop.

Directions for the '90s

The recent MCATA Conference in Lethbridge was a tremendous success with over 90 sessions divided among the four divisions. Sessions were held at the Lodge Hotel, the provincial building and the local museum. All of the sessions were within a one-block radius. Participants traveling from session to session experienced the temperament of Southern Alberta weather that ranged from gorgeous calm to howling chinook winds to heavy rain.

The keynote speaker gave a very thought-provoking introduction on the topic of thinking. It is now very hard not to think of a rhinoceros when I hear an administrator talking about "putting out fires."

On Friday night, participants were treated to an excellent banquet followed by the presentation of the Math Educator of the Year Award to Lois Marchand. The evening finished with a casino in which players started off with \$20,000 of "funny money." It closed with participants using their winnings to bid on various prizes donated by the commercial exhibitors.

During the two-day conference, people were heard in the hallways discussing the wonderful ideas they had picked up at the sessions. The "Make It Take It" room featured the originals of various ideas, all of which had copyright clearance. A total of 4,064 copies were distributed to teachers!

A special thanks to John Percevault - Program; Neil Gilbert and Ken May - Presiders; Gale Smook and Lorraine Wolsey - Facilities; Dennis Kosaka and Gary Canadine - Commercial Displays; and Gary Hill - Social. Your efforts and the tremendous amount of time you put into making the conference a success are much appreciated.

Remember, next year's conference will be held in Calgary from October 25 to 27. Mark your calendar, and we'll see you there!

-Dennis Burton
1989 Conference Chairperson

Math Olympiad

Mathematical Olympiads for Elementary Schools (MOES) is a contest in which elementary students are presented with problems that must be solved within a time limit.

The program, designed by George Lenchner, is aimed at the pursuit of individual excellence in problem solving while enhancing creativity and resourcefulness--worthy objectives for gifted and talented students.

The program's goals are

1. to develop enthusiasm for problem solving,
2. to contribute to the cognitive development of students,
3. to provide the initial foundation for an intellectually stimulating and pleasurable mental activity.

Five Olympiads are held at monthly intervals starting in November. MOES sends the Olympiad package to members prior to the scheduled Olympiad dates. The package contains problems, answers and return envelopes. MOES presents awards to recognize achievement and participation.

To participate, schools must obtain an annual membership from MOES (\$60 US). The maximum number of team members is 35. For more information and membership, contact Mathematical Olympiads for Elementary Schools, Forest Road School, Valley Stream, New York 11582.

Mathematics Educator of the Year

Lois Marchand

Lois Marchand, mathematics specialist with the Calgary Board of Education, was presented with the Mathematics Educator of the Year Award at the MCATA Conference held in Lethbridge in November 1989. The following is an excerpt from George Ditto's presentation speech.

The purpose of this award is to recognize and honor individuals within the field of mathematics education who, through unselfish and committed purposes, affected mathematics education, students of mathematics, teachers of mathematics and mathematics programs in general. A number of people are instrumental in fulfilling such a responsibility. Each year an individual is recognized for having provided mathematics education leadership, and in many instances are continuing this contribution. The merit of this award is, simply stated, a reward for excellence in mathematics education.

Contributions toward this end include excellence in

1. teaching students mathematics (exhibited through direct or indirect involvement);
2. mathematics curriculum content and process;
3. teaching teachers;
4. pursuing personal professional development in mathematics and mathematics education (keeping abreast of current research and developments in both education and mathematics education through their own initiation, reading and participation)
5. providing professional development for colleagues
6. projecting an unselfish willingness to provide for the growth and development of mathematics students, teachers and programs (belonging to professional organizations, contributing to and benefiting from its membership); and
7. establishing local, provincial, national and international credibility in the field of mathematics education.

This year's recipient meets all these criteria, plus more. Tonight the award goes to Lois Marchand, mathematics specialist, Calgary Board of Education.

I was delighted to be asked to make this presentation as I was to have Lois receive the award. Lois and I have worked closely together for the past six years on the Math Team. One of the marvelous things about education, and particularly mathematics education, are the individuals I have had the opportunity to meet and work with. Many people recognize that the profile of mathematics education in Calgary and Alberta has been, in part, influenced by Lois's input.

Lois came to Calgary from the east--Saskatchewan--after completing her first wave of university at the University of Saskatchewan and after three years of teaching. Her masters degree was completed at the University of Calgary. Lois has been with the Calgary Board of Education for ... a year or two longer than me.

Her teaching and school administrative experience is somewhat unique, and likely speaks for her success in education. Lois has taught Grades 1 through 12. She has been a school administrator, vice-principal, assistant principal and principal at the elementary level.

For the past eight years Lois has been mathematics specialist with the Calgary Board of Education. She has also fulfilled acting supervisor responsibilities along with regular commitments. Lois has been involved in activities directly related to, and contributing to, mathematics education.

A number of superlatives could be used to describe the contributions that Lois has and is making toward mathematics education. In my view, her most prominent contribution would be her focus on being a "teacher of teachers." This focus is for the benefit of the number one stakeholder in the education process, the student. Her knowledge, dedication, dependability, commitment, capacity for work and, from working with a recent mathematics supervisor, her capacity for ambiguity, has brought Lois recognition and regard for her work with teachers. Lois possesses an uncanny ability to translate theory into practice, enabling teachers to provide effective and meaningful learning situations for students. Through her support and encouragement, opportunities are provided for students to learn mathematics, teachers to learn and improve their teaching of mathematics, and school and system programs to be designed, planned and followed for the betterment of mathematics education for students.

Many of the contributions Lois has made are readily apparent. Their quality is obviously being recognized by virtue of this award. Not all her contributions, attributes and qualities are as easily quantifiable. I have had the distinct honor and pleasure of working closely with Lois over the past six years. I was able to realize very early in our working relationship that her very presence is a catalyst for growth. Lois, the elements of collegiality, knowledge, common sense, purpose, support, encouragement and educational leadership have provided a growth opportunity for all those with whom you have come in contact. I personally am greatly indebted to you for the opportunity to have worked with you. I am aware of the positive effects generated during our working relationship, and I am confident that similar opportunities have been and will be experienced by others.

Lois, on behalf of the Mathematics Council of The Alberta Teachers' Association and all your colleagues, I would ask that you accept the Mathematics Educator of the Year Award.

On Cue: Inservice for Teachers

Teachers are at the forefront of change and face exciting and sometimes overwhelming challenges in preparing students for the future. Questions about education will be addressed in "On Cue: Inservice for Teachers" aired on ACCESS Network the third Wednesday of the month at 4:30 p.m. Of special interest to mathematics teachers is the program "Senior High Mathematics" scheduled for March 21. This program offers samples of recently completed student resource videotapes and valuable tips on how to integrate these into the lesson plans.

The Right Angle

Videos & Films in Senior High Math

A collection of media resources that supports the senior high mathematics program is available. As with any resource, films and videos should be selected with due consideration for the expectations of the program and the needs of the class. Alberta Education has viewed a number of videos and films for the senior high mathematics program. Videos and films authorized as learning resources are referenced in the Teacher Resource Manuals.

How Are Audiovisuals Selected?

The criteria for selecting appropriate media resources is as follows:

- Does it support the expectations of the program?
- Does it meet individual student needs and learning styles?
- Does it reinforce, enrich or extend the program?
- Does the medium demonstrate abstract ideas?
- How appropriate is the timing?
- How well does the medium fit into existing curricula and teaching/learning needs?
- How clear are the educational aims and objectives?
- How are teaching and learning evaluated?
- What kind of preparation is required?
- What forms of follow-up are required?

Media Resource Centres

Twelve resource/media centres in Alberta carry films and videos that support the senior high mathematics program. Each centre publishes its own catalogue listing the resources in its collection. The centres operate much the same as libraries and loan audiovisual materials for a specified time period. A list of resource/media centres appears on pages 328 and 329 of the Mathematics 10/13/14 Interim Teacher Resource Manual. ACCESS Network Media Resources Centre also carries selected videos. For more information, telephone 1-800-352-8293.

Approved Audiovisuals for Mathematics 10/13/14

Math Ways is a series of three, 15-minute videos focusing on "The Percent," "Areas" and "Volumes."

"The Percent" focuses on understanding the concept of percent and determining what a given percent of a number of quantity represents. Some conversion of fractions and decimals to percent is described.

"Areas" looks at the circle and the cylinder. Through examples, the video derives π as the relationship between circumference and diameter. Area is then introduced by deriving the formula $A = \pi r^2$. A discussion of the surface area of the cylinder follows.

"Volumes" examines the volume of prisms, cylinders and cones. The cubic unit of measure is introduced with concrete objects. The rectangle and triangular prism and cylinders ($V = \text{area of } X \text{ height}$) are discussed. The video includes detailed examples of calculation.

Mathwise is a series of 12, 15-minute video vignettes dealing with a number of mathematics topics set in the everyday life of teenagers. The vignettes show actors using mathematics. A hostess introduces the topic of each video and closes by reviewing the mathematically significant points in each story. A teacher's guide with discussion ideas and a student worksheet for each video are included.

Grade 11 Approved Video

The video "Of Dice and Men" is authorized for Mathematics 20 and 23. This video is available through the resource/media centres.

Alberta Education Produced Videos

Math Sense is a series of short videos discussing relations and functions in Math 20. The videos will be available for the implementation of the Math 20 program in September 1990.

Catch Thirty-One is a series of 16, half-hour videos that are designed around the Math 31 curriculum. The series is slated for broadcast during the second semester of this school year and begins February 21, 1990, on the ACCESS Network. The program will be broadcast Wednesdays from 10:30 to 11:00 a.m. and can be taped for classroom use. Catch Thirty-One may be broadcast on the Night Owl service.

On-Cue · This one-hour program for senior high mathematics teachers will be broadcast March 21, 1990, on the ACCESS Network from 4:30 to 5:30 p.m. It will highlight the changes in the Mathematics 20/23/24 courses as well as provide some insight into the directions of the Mathematics 30 and 33 courses.

Catch Thirty-One (Formerly Math by Satellite)

If you thought velocity and acceleration were only of interest to race car drivers, and that the chain rule was used only in labor camps, then tune into ACCESS Network to find out how wrong you could be.

Catch Thirty-One is a 16-part series that begins February 21 at 10:30 a.m. During each 30-minute broadcast, the television tutors will present lessons based on some of the more difficult concepts in the Math 31 curriculum. The series, designed primarily for distance learners, will also serve as an excellent review for all high school math students. Teachers are encouraged to tape each broadcast for use as a classroom resource, and to let their Math 31 students know about the programs so students can record the programs for home study. Tutors will be available via telephone after each broadcast.

Catch Thirty-One showtimes are Wednesdays at 10:30 a.m. A program list follows:

February 21: Background to Course Content/Limits
February 28: The Derivative of a Function by First Principles/The Power Rule--
The Derivative of x^n
March 7: The Chain Rule of Derivatives
March 14: The Product and Quotient Rule for Derivatives
March 21: Applications Involving Maximum and Minimum Problems and Graph
Sketching
March 28: Maxima and Minima
April 4: Motion--Velocity and Acceleration and Derivatives/Graphing
April 11: Derivatives for Relations
April 25: Related Rates Problem Application
May 2: Integration
Concept of a Primitive
May 9: Areas Under or Between Curves
May 16: Vectors--Definitions, Notations and Representations;
Geometric and Algebraic Representations;
Visualization on to a Coordinate Grid
May 23: Geometric Vectors--Linear Combination
May 30: Algebraic Vectors--Linear Combination
June 6: Dot Product and Projections--Applications
June 13: Resolution of Vectors--Applications

Mathematics in the Sun

The Council of Presidential Awardees in Mathematics (CPAM) announces summer institutes for teachers of high school mathematics. Stipend, housing and travel costs are funded by The National Science Foundation.

Courses offered:

- High School Geometry --University of Northern Iowa, Cedar Falls, Iowa
- Middle School Mathematics --Northern Arizona University, Flagstaff, Arizona
- Non-College Bound, and Algebra 1 & 2 --University of New Hampshire, Durham, New Hampshire (pending funding)
- High School Geometry, and Algebra 1 & 2 --Northwestern State University, Natchitoches, Louisiana (pending funding)

Dates for the Summer Math Institutes are July 9 to 20, 1990. For more information, contact Teachers Teaching Teachers, Department of Mathematics and Computer Science, University of Northern Iowa, Cedar Falls, Iowa 50614. Telephone: (319)273-2175.

Mathematics Education Month

NCTM Suggested School Activities

April is Mathematics Education Month, and the National Council of Teachers of Mathematics suggests the following school activities:

•**Wall of Honor**• Decorate one corridor of your school with posters. Each class is responsible for making a single poster about a mathematician from another century. The poster lists his or her accomplishments and includes a drawing of what he or she looked like.

•**Poster Project I**• Each class makes a poster that begins with the title: "If there were no math, there would be no...." An appropriate drawing would embellish the poster. Display the posters near the front of the school.

•**Poster Project II**• Each class makes a poster that consists of a drawing made only from a certain geometric shape of different sizes, for example, triangles, circles and parallelograms.

•**Poster Project III**• Suggested poster themes are Math in Nature, Math in the City, Math at Home, and Math at Work.

•**Geometric Shapes Contest**• Each class is responsible for building geometric shapes, such as a bridge or a pyramid, with popsicle sticks and glue.

•**Teachers' Challenge**• Have the math teachers leave brain teasers around the staff room for teachers of other subjects.

•**Calcula-Trivia Challenge**• Create a calcula-trivia for the students of each grade level to solve. A simple example follows:

Calculate:
$$\frac{\sqrt{a} + (bc)^{\frac{1}{2}} - d^e}{f^3}$$

Where a = speed of light in m/e (to the nearest 100,000

b = number of primes between 100 and 150

c = age of Einstein when he died (to the nearest 10)

d = number of doorknobs on the first or second floor of your school

e = the smallest prime number

f = height of Mt. Everest (to the nearest 100 metres)

•**School Survey and Calculations**• How many steps are taken in your school in one day? Which student walks the most in one day according to his or her timetable? How many hours of homework are done in your school in one week? What is the total time students spend on school buses in one day? What is the total distance the school buses travel in one day? What is the average busing distance per student? Which student has the longest distance to travel? What is the total volume of air in your school? What is the most common type of garbage? How much water is used each day?