THE ALBERTA TEACHERS' ASSOCIATION

MATHEMATICS COUNCIL

NEWSLETTER

1918-1968 ONE HALF CENTURY OF SERVICE TO ALBERTA

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Contents

Newsletter Editor: Mary Beaton
Faculty of Education, University of Calgary

AN ELEMENTARY SESSION
AT THE
SIXTH NORTHWEST MATHEMATICS CONFERENCE

A Report by **A.W. Bruns**

Mr. Bruns, assistant superintendent of Lacombe County Schools, is President of the Mathematics Council, ATA.

An exceptional session at the conference was the one entitled "What to Use and How to Use It" by Mrs. Roberta Chivers, University Hill School District, Vancouver. Mrs. Chivers teaches because of her love for children, her love for the work involved, her love for a challenge, for excitement, and the intrinsic awards of teaching.

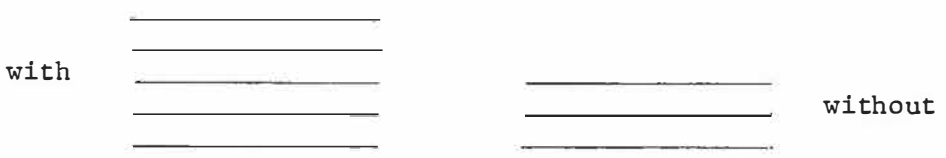
In her talk she emphasized group activities which produce individualized discoveries of basic concepts and ideas. To aid in the discovery of these, she uses a wide variety of inexpensive teacher-made or pupil-made materials.

Large charts assigned to one activity table required students in Grade I to first make a tally of those who had bikes and those who did not. This would be carefully explained to the group who were going to the activity table containing the chart labelled and marked on brown paper as follows:

I have a bike set of (picture of bike)	I do not have a bike ( ) empty set
John Jim Jack Jill Jean	Harry Mary Minnie

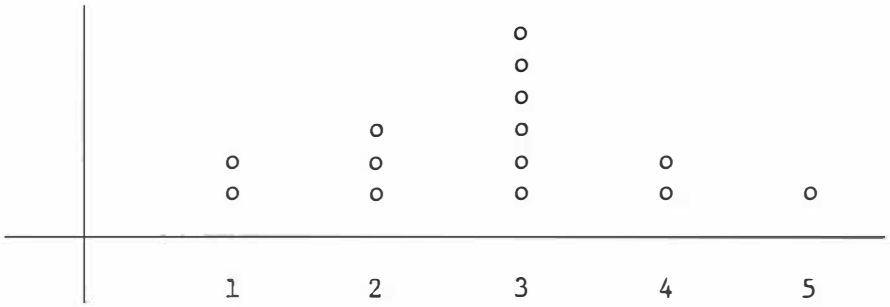
How can you tell whether there are more people who have bikes than do not have bikes? Pupils use yarn or colored pencils to show the matching - one-to-one mapping. This exercise could be extended later to develop relationships - ordered pair (5,3).

Graphing was begun by pasting name strips on a base line - simple bar

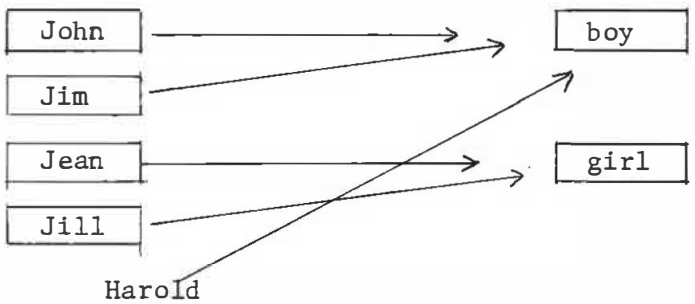


Similar exercises can be carried out with, for example, boys and girls in the class, or brothers and sisters.

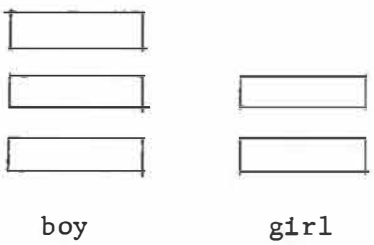
One activity group even prepared a graph showing distribution of children in the families.



Brown paper and colored paper discs were carefully pasted in proper columns. For each family with 3 children a colored disc was pasted above the 3. Many interesting and varied conclusions were drawn by the groups who tried this exercise. The conclusions were not told - the pupils derived their own. An interesting mapping exercise of the many-to-one type was done. All the names of the boys and girls were pasted onto a flannel board and the words "boy" and "girl" in the following manner:



Next



And

	boy	girl
John	x	
Jim	x	
Jill		x

Mrs. Chivers had her pupils in Grade I do many sorting exercises for which she had plastic plates - red and blue. All the tall articles were to be placed in the red plate and all the short articles in the blue plate. She had gathered almost every conceivable shape and size of articles: wire, yarn, glass tall bottles, plastic short bottles, spheres, polyhedrons, pyramids, cylinders, and more.

Pupils used hula hoops for Venn diagrams. First, all the boys in a group (4 or 5) stood in one hoop and all the girls in another. Now she noticed that all the girls were wearing something blue and one boy was wearing something blue. She asked that all those wearing blue stand in one hoop and all the others in another hoop. It pleased her to see the boy try to stand in both hoops.

In the sorting she used squares and triangles and many different directions for sorting and classifying. Sorting exercises - according to number, shape, color, size (involving measurement), cylinders by height, width.

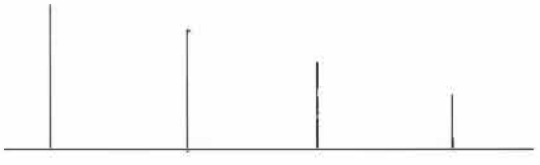
Another activity group was given instructions to answer or show in some way, "How long is my arm". The pupils could use yarn to measure each member's arm in the group.

John _____

Jim _____

Jack _____ and so on.

The children had to rearrange them to show order. Conclusions and observations were numerous. John had the longest arm; Janet had the shortest arm. Finally, these were arranged as a bar graph.



Another group made comparisons - What is big? What is tall? What is wide? What is heavy? Some interesting activities were carried out correlating mathematics and language by story booklets.

The question was asked, "How do you do all this?" Mrs. Chivers replied, "It is a matter of organizing your class, planning activities to meet needs of children; and during this whole period of activity, the teacher is the director and manager of the educative process." The key seemed to be to give the pupils just enough challenge to be successful in making some conclusion or generalization on their own.

Mrs. Chivers had a heterogeneous group. "Pupils learn to share, to cooperate, and it particularly helps to bring out the slow ones," she said. In fact, the slow child learns a good deal from the faster child. Individual

discovery takes place, and Mrs. Chivers felt that the group recordings were more educational than filling in the blanks.

Suggested activities included the polling of other classes, using such questions as:

What color is father's car?
How many eat lunch at school?
How many boys eat lunch at school?

To keep the activity program at proper levels, use multicolored assignment cards. For example, blue assignment cards for simpler mental process, red assignment cards for more complex processes, and yellow assignment cards for higher mental process (inferences and generalizations).

One teacher said that she had to cover the book and did not have time for all this. Mrs. Chivers replied by throwing a sheet over the transparency she was using which allowed no light on the screen. "Covering the book bothers me." She removed the sheet that covered the transparency - "See the light come through?"

Teachers are to uncover the child's difficulties and expand upon the concept; they are to work with the child by finding out where he is on the continuum of skills and work from there.

When asked about workbooks, Mrs. Chivers stated that she would rather have 25 different workbooks in math so that she could find the right level of material, tear it out of the workbook, laminate it, and file for future use.

A WORLD WITHOUT MATHEMATICS

A hundred miles from nowhere, turn left and you will find
A world without a math book, not a single clever mind.
If you had a clock it would be useless, for you see,
The people know no difference between twelve and half past three.
Of course there is no candy and cakes that taste so good,
Because the country's bakers never measure as they should.
Each house is topsy-turvy with a built-in, crooked door
And the inside is like that, I'm sure, you've never seen before.
Autos are unheard of, for mechanics haven't solved
Problems which are simple when a little math's involved.
A hundred miles from nowhere, turn left and you will see
A perfect model of a world that's not the place for me!

Susan M. Anderson, 9th Grade Student (1964), Morgan Jr. High,
Shoreline School District, Seattle, Washington.

Reprinted from *The Arithmetic Teacher*,
Vol. 13, No. 1, January 1966

A NEW SCHEME IN TESTING

A Report by **Marshall P. Bye**

Mr. Bye, past president of the Mathematics Council, ATA, is consultant in mathematics for the Calgary public secondary schools.

Dr. MacPherson, in addressing participants at the Northwest Mathematics Conference in Vancouver, spoke of new schemes in testing. He described a new type of test that will gain popularity as the accessibility of computers increases. He suggests this new test is an outgrowth of the work done by Bloom and Krathwohl.

The purpose of any one instrument will be to test the "level" in the taxonomy of educational objectives which a particular student has gained.

The instrument will be made up of 15 items, scaled for a certain area of study and for a certain population. The following five items would scale for general mathematical knowledge.

(a) 2×3
(b) 17×1901
(c) $(2x + 1)(3x^2 + 2x + 1)$
(d) $(4i + 3) - (2i + 1)$
(e) $\int_{-2}^{2} 2x + 3$

Any student who could do item (c) could do items (a) and (b). Any student able to do item (e) could do all the items. Applying the principle to 15 items, the student is given question 8 first. If he is correct, then it is held he can do the first seven questions also. Next he will be given question 12. If he is incorrect, he presumably cannot do questions 13 through 15. Next he is given question 10. If correct, it is held that he can do question 9. He is then given question 11. This question now determines whether he is at level question 10 or level question 11. Therefore, in four questions the student has been scaled.

Dr. MacPherson maintained that through the use of the computer, very reliable and valid instruments could be devised for any population stated and for any topic desired. As an example of a set of test items which may scale for some populations along understanding of the distributive principle are the following six items:

1. $8 \times 13 = 104$

   How much is 16×13?

2. Which of these examples could be worked by multiplication?

(a) $\begin{array}{r} 41 \\ +\ 4 \end{array}$ (b) $92 + 92 + 92$ (c) $\frac{5}{8} + \frac{3}{8} + \frac{1}{8}$

3. It is true that $176 \times 7 = 1232$.

How much is 178×7?

4. Which of the following will give the same answer as 15×38?

(a) $(15 \times 40) - 2$
(b) $(10 \times 38) + (5 \times 38)$
(c) $(38 \times 10) + 5$
(d) $(10 \times 30) + (5 \times 8)$

5. Which of the following is <u>not</u> a true statement?

(a) $15 \times 18 = 18 \times 10 + 18 \times 5$
(b) $15 \times 18 = 15 \times 10 + 15 \times 8$
(c) $15 \times 18 = 15 \times 20 - 15 \times 2$
(d) $15 \times 18 = 3 \times 18 + 5 \times 18$

6. If you know that 'a + b = c' and that 'd' does not equal one or zero, which of the following is true?

(a) $a + b + d = c$
(b) $a + b = c + d$
(c) $(a = b) \times d = c$
(d) $c \times d = a \times d + b \times d$

Perhaps some day, in the not-too-distant future, the student will sit before a computer console and 'write' the test based on this concept presented by Dr. MacPherson.

I PREFER "MATHEMATICS TEACHER"

Please, my son,
If it's all the same,
Don't tell everyone
I'm in the numbers game.

Paul H. Greeley, Jr.

Reprinted from *The Mathematics Teacher*
Vol. LVIII, No. 3, March 1965

TEST-MAKING

Marshall P. Bye

With the advent of the multiple choice, machine-marked examinations now being used by the Examinations Branch of the Department of Education, and with the advent of Bloom's Taxonomy, more and more concern is being voiced over teacher-made examinations. Generally, teachers find the work of preparing suitable examinations a very difficult task. The Mathematics Council of The Alberta Teachers' Association requested that some guidance be given to teachers which would assist them in preparing examinations. The following publications are strongly recommended:

No.5 - *Short-cut Statistics for Teacher-made Tests*
No.4 - *Making a Classroom Test: A Guide for Teachers*
No.3 - *Selecting an Achievement Test: Principles and Procedures.*

The above are available from Educational Testing Service, Princeton, New Jersey.

The most valuable assistance received by the writer is the kit (also supplied by Educational Testing Service) entitled:

Making Your Own Test

It consists of three filmstrips, three records to accompany the filmstrips, and a set of duplicating masters for a "work kit" to accompany the filmstrips. Copies of the work kit can be made so that the teacher does not have to take notes while watching and listening to the presentation.

The presentation is in three parts:

1. Planning
2. Construction
3. Analysis

The methods of performing the three steps is so simple that the teacher, after viewing the series, will wonder why he has not been following these steps all along. Cost of the kit is about $30.

THE EXPERIMENTAL COURSE IN MATHEMATICS 31

David Dyck

Mr. Dyck teaches mathematics at the Bowness Composite High School in Calgary.

An experimental course in Mathematics 31 is being conducted in 10 Alberta high schools. The course consists of two parts, each being taught for half of the school year. The first half of the course is trigonometry. In the second half, five classes are studying linear algebra, using a text called *Vectors and Matrices* by Elliott et al. Five classes are completing the course in calculus. Teachers were asked to evaluate the text, the course and student reactions.

The experimental program is being conducted in four Calgary high schools. At Bowness Composite, we taught the course in the first semester, completing it by using the text *Vectors and Matrices*. Our impressions are that the material and the text in *Vectors and Matrices* are suitable for students taking Mathematics 31.

Student response to the course was generally good. The material is sufficiently challenging to maintain the interest of the top students, while the slower students were able to cope with the material. The course requires that the student be familiar with at least the trig functions from trigonometry. Since all the experimental classes taught the trig in the first half of the year, this was no problem. If, however, the linear algebra were to be used with students not having had trigonometry, it would be considerably more difficult, although, we feel, the trig required could be presented successfully as part of the linear algebra course.

DIGIT DIALING

"Your all-numeral phone number is the same
as your present one, except that numbers have
been substituted for letters." - Pacific Telephone

Each letter's been replaced by a digit
(The phone company decided to swigit)
But I ask with a smile:
Just what do I dial,
A number or a numeral; which igit?

- Joseph Moray, 121 Chester Avenue,
San Francisco, California.

Reprinted from *The Arithmetic Teacher*,
Vol. 13, No. 1, January 1966

THE CANADIAN ASSOCIATION OF MATHEMATICS TEACHERS

Marshall P. Bye

The Canadian Association of Mathematics Teachers, associated with the Canadian Teachers' Federation, held an invitational meeting in Ottawa on December 8 and 9. There were representatives from each province at this meeting, in some cases a representative of a teacher organization and in other cases representatives of both teacher bodies and the provincial Department of Education. In addition, representatives from universities, both mathematics departments and faculties of education, and a representative from the Canadian Mathematical Congress were present.

The purpose of the meeting was two-fold: (1) to illustrate what could be done at a national meeting, and (2) to hold a business meeting. The success of the meeting can be best described by summarizing the program and the business meeting.

Success in the first purpose of the meeting was achieved through the development of the theme "Mathematics Curricula in Canadian Schools". The representatives from each province outlined some of the philosophy and policies basic to the setting of the mathematics curriculum in their provinces. Copies of the mathematics curriculum or summaries thereof were distributed by each province. Several provincial representatives indicated the trends in mathematics and the change which might be expected in their provinces in the next few years. During the presentations, the objectives, present state and proposed development of the mathematics curriculum in the provinces were discussed at some length. Information regarding some of the ongoing experiments and the results of some of the past experiments were presented.

It would be impossible to attempt to summarize the reports given in a brief report such as this. However, a view contained in several reports deserves to be mentioned. There is an ever-increasing effort made to accommodate students, each at his own ability level and his own interest level, by the offering of multi-level programs. One illustration of this trend is shown in an excerpt from the presentation by Mr. Hall, Department of Education, Nova Scotia:

> At junior high school level, our comprehensive program provides possibilities for school systems to offer four distinct programs:
>
> 1. A standard program for those students who will likely take the matriculation program in high school.
>
> 2. The remedial program for those students of normal ability with some subject disability. In the case of mathematics, we hope to be able to correct the disability through remedial teaching and then have these students move on to the normal stream.
>
> 3. The adjusted course program designed for students who have a

history for over-ageness for grade and whose I.Q. appears to be slightly below average. For these pupils, a diagnostic and remedial teaching program attempts to bring them as far as they can go and to provide them with vital skills that will help them in the world of work.

4. Our auxiliary program which is designed for older-age pupils who are mentally retarded.

This multi-level approach to mathematics and the philosophy that teachers should play a major role in the decision as to what should be taught to a particular class lends initiative to the trend in some areas of eliminating the idea of the "textbook" being the course. It is suggested that this "textbook is the course" approach should be replaced by the use of a series of booklets, each developing a certain concept. The booklets on any one concept vary in difficulty and in method of presentation of the concept. The teacher decides what booklet to use, the decision being based on the type of students and on the interests of the students comprising the class. Ontario has, for Grade X, a central core of five topics with seven more from which a teacher may choose to meet the interest and needs of the students. Such a trend implies a faith in the teacher as a professional and competent authority in his field.

With the initiation of modern mathematics into all the curricula across Canada, there is a mounting concern about keeping mathematics teachers up to date. This raised the topic of inservice training. What should be the objectives of an inservice program? Whose responsibility is it: the association's, the local school board's, the provincial department of education's, the federal government's, or all these mentioned? Is there a role for Canadian television networks, for the CBC, for the National Film Board? Perhpas these questions could be the center of another national meeting.

Many other topics of concern on the national scene were mentioned during the presentations. It seems that there is a need for an extension of inter-provincial discussion in mathematics. It was stated repeatedly that "North-South" communications were more common than "East-West" communications with the obvious result that any provincial mathematics curriculum is influenced more by that which is current in the United States than by that which is current in another province. The question may well be asked of the reader: What do you know of the progressive work in mathematics in Ontario, or Alberta, or British Columbia, or any other province? Your answer to this question might give support to the CAMT.

The second purpose of the meeting was to approve a constitution and bylaws necessary to fully establish the Canadian Association of Mathematics Teachers. In addition to this, an executive council was elected and will be active in carrying out its duties. One of the duties is the preparation and distribution of a newsletter to mathematics organizations and interested people. Other duties will be to plan and prepare the activities of CAMT.

The Canadian Association of Mathematics Teachers has the support of

most areas of Canada. There had been some question as to whether it would be a 'national' voice for mathematics teachers, but with the support now granted - in some cases support in principle - it appears that CAMT will be a truly national association.

Father Egsgard, chairman, pointed out that with the reserve funds of $650 presently being held by CTF for CAMT, donations of $50 from the various mathematics associations across Canada would allow CAMT to carry on for another year. In addition, each organization wishing to send a representative to the next annual meeting is asked to budget $200 for travel, with a view to equalizing travel costs. A number of reasons for equalizing travel costs were presented.

While the budget will limit the amount of activities which can be done in the coming year, it is felt that with the need for a national association of mathematics teachers being brought to the forefront and with the value of such an organization being made evident, the CAMT will grow, its effect will spread, and a growth cycle will be established.

SEAFARING

That narrow bound between the sea and sky
Called the horizon, could not but effect
Efforts of reason in those forced to ply
Between th' Aegean isles in craft low-decked.

The circle challenges the human mind:
What is my nature? Use your native skill
To state it clearly. Search until you find
All the conclusions reason can distill!

Each line of sight's an equal radius:
A central angle's formed by any two;
What is the measure of the interval?
Did Greek geometers first reason thus?
The sailor's duties give a steady view
Of basic problems geometrical!

Alan Cyril Bates, American School, Chicago, Illinois

Reprinted from *The Mathematics Teacher*,
Vol. LVIII, No. 3, March 1965

M C A T A
SPEAKERS' LIST

Ray Cleveland

Mr. Cleveland, University of Calgary, is the Faculty Representative on the MCATA Executive.

The purpose of this list is to provide a source of available speakers classified according to general and specific topics as well as a recommended type of audience. Interested groups should contact the speaker directly, and all details of arrangements should be planned to the mutual satisfaction of the speaker and the group.

Many outstanding talents backed up by years of study and experience are represented on this list. We hope that it will be put to good and frequent use.

Aggarwala, B.D., Department of Mathematics, The University of Calgary, Calgary.
Topics in applied mathematics - for example, "What is Applied Mathematics?" Senior high school students and/or teachers.

Anderson, Bernice, mathematics consultant, Calborne Junior High School, Calgary.
Topics in junior high mathematics curriculum and instruction. Junior high school teachers.

Anderson, Ruby, teacher and consultant in mathematics, Vincent Massey Jr. High School, Calgary.
Topics in junior high school mathematics. Junior high school teachers.

Armour, Carole, Senior High Mathematics Curriculum Committee, Ernest Manning High School, Calgary.
Topics in senior high school mathematics curriculum and instruction. Senior high school teachers.

Atkinson, Tom, Faculty of Education, University of Alberta, Edmonton.
"Number Systems"; "Problem Solving". Secondary school teachers.

Beaton, Mary, Faculty of Education, The University of Calgary, Calgary.
Topics in mathematics curriculum and instruction; K-12. Teachers.

Bruns, A., assistant superintendent, Lacombe County schools, Lacombe.
Topics in elementary mathematics curriculum. Elementary teachers.

Bye, Marshall P., junior and senior high school mathematics consultant, Calgary Board of Education, Calgary.
Topics in secondary school mathematics curriculum and instruction. Secondary school teachers.

Freedman, H.I., Department of Mathematics, University of Alberta, Edmonton.
Topics in mathematics - for example, "Large Numbers", "What Are the Odds?", "How Many Equations Are There?"

Gibb, A.A., associate dean, Faculty of Education, The University of Calgary, Calgary.
Topics in mathematics education. Any interested group.

Guy, R.K., head of Mathematics Department, The University of Calgary, Calgary.
Number theory - for example, "Primes", "Unsolved Problems". Combinatorics - for example, "Graph Theory". Game theory - for example, "Nim-like Games", "Fibonacci Numbers", "Problems in the Teaching of Mathematics". Secondary teachers and/or students.

Harrison, D.B., Faculty of Education, University of Alberta, Edmonton.
Contemporary learning theories and math (secondary) learning (Piaget, Bruner, Dienes, Skemp). Reflective intelligence and mathematics learning. Secondary teachers.

Holland, A.S.B., Department of Mathematics, The University of Calgary, Calgary.
Topics in Geometry and Calculus. "Geometry in the High School System", "Geometry in the University". Teachers of mathematics.

Jagoe, Olive, head, Mathematics Department, Henry Wise Wood High School, Calgary.
Topics in secondary school mathematics curriculum and instruction. Secondary school teachers.

Keeping, E.S., Department of Mathematics, University of Alberta, Edmonton.
Topics in mathematics - for example, "Taking a Chance." Secondary teachers and/or students.

Kieren, T.E., Faculty of Education, University of Alberta, Edmonton.
"The Computer in Mathematics Learning and Teaching", "Creative Problems in Mathematics", "Very Elementary Functions", or "Functions - How and Why?"

Lancaster, Peter, Department of Mathematics, The University of Calgary, Calgary.
Topics in mathematics - for example, "Can it be Calculated?" Secondary school students and/or teachers.

Lindstedt, S.A., head, Education Curriculum and Instruction, Faculty of Education, The University of Calgary, Calgary.
Topics in mathematics education. Any interested group.

Macki, J.W., Department of Mathematics, University of Alberta, Edmonton.
Topics in mathematics as arranged.

Milner, E.C., Department of Mathematics, The University of Calgary, Calgary.
Topics in set theory or graph theory - for example, "Arithmetic of Infinite Numbers". Grade XII students or high school teachers.

Naimpally, S.A., Department of Mathematics, University of Alberta, Edmonton.
Topics in mathematics - for example, "Light-hearted Approach to Topology". Secondary school mathematics students.

Nelson, L.D., Faculty of Education, University of Alberta, Edmonton.
Topics in mathematics education - for example, "Concept Development in Primary Mathematics". Elementary school teachers.

Neufeld, K.A., Faculty of Education, University of Alberta, Edmonton.
Topics in mathematics education - for example, "Structured Math Teaching - Bruner and Bloom". Secondary school mathematics teachers.

Peck, J.E.L., Department of Mathematics, The University of Calgary, Calgary.
Topics in computer science - for example, "Computer Languages", "Training for a Career in Computer Science". Secondary school mathematics students.

Phibbs, E., Department of Mathematics, University of Alberta, Edmonton.
Topics in mathematics as arranged. Secondary school students and/or teachers.

Radomsky, Ron, Ernest Manning High School, Calgary.
Administrative problems related to secondary school mathematics. Mathematics for the low achiever. Secondary teachers and/or administrators.

Rogers, T., Department of Mathematics, University of Alberta, Edmonton.
Topics in mathematics - for example, "Inequalities", "Group Theory", "Basic Calculus", "Elementary Game Theory", "Elementary Optimization Problems". Grade XII mathematics students and/or mathematics teachers.

Sagney, B.N., Department of Mathematics, The University of Calgary, Calgary.
Topics in convergence of series - for example, "Series Expansion and Their Convergence". Grade XII mathematics students and/or mathematics teachers.

Sawada D., Faculty of Education, University of Alberta, Edmonton.
"Computers in Elementary School Mathematics". Teachers (and/or administrators).

Sigurdson, S.E., Department of Secondary Education, Faculty of Education, University of Alberta, Edmonton.
"Secondary School Mathematics Curriculum", "Discovery Teaching". Mathematics teachers.

Strickland, Roy, elementary consultant, Calgary Public School Board, Calgary.
Topics in Teaching Elementary Mathematics". Elementary teachers.

Ursell, H.D., Department of Mathematics, The University of Calgary, Calgary.
Topics of interest to teachers of mathematics - for example, "Complex Numbers and Trigonometry", "Cardinals (and Ordinals)". Teachers of mathematics.

Williams, Royce, Harold Panabaker Jr. High School, Calgary.
Topics in junior high school mathematics curriculum. Junior high school teachers.