THE ALBERTA TEACHERS' ASSOCIATION MATHEMATICS COUNCIL

delta-k

Volume XIII, Number 1, December 1973

News to You?

MATHEMATICS KITS

Due to the popularity of the two mathematics kits over the past two years, the executive of the Mathematics Council decided to expand the kit idea. Three separate kits will be compiled: one containing elementary materials, another junior high, and the third, senior high. If you have ideas for commercial or student materials that would be of value to circulate to our members, please write to Stu McCormick, 6428 - 84 Street, Edmonton, Alberta.

Another monograph will definitely be coming to members in the new year. One is in the beginning stages of production at Barnett House. Edited by Dr. Bruce Harrison, it deals mainly with mathematics activities. The second possibility contains the general interest sections as well as the general session addresses of the Math Council/National Council of Teachers of Mathematics Conference. Remember that the monographs are available to all Math Council members, and to new members who join before publication.

ANNUAL MEETING 1974

Our next meeting is already in the discussion stage. We have tentative dates of October 4-5, 1974. Our program is open to all suggestions you may want to make. Themes already mentioned are "Teaching of Application of Mathematics to Real Situations" and "Teaching Metric Measurements". What is your particular need that could be used to make our meeting more attractive and valuable to you? What contribution would you like to make?
Send your answers to these questions to Dennis Beaudoin, Rockyford, Alberta.

REGIONAL NEWS

The North Central Regional presented a list of their new executive to the directors at their recent meeting. Congratulations on acceptance of the responsibilities. We trust we will be able to present news of your 1973-74 plans and activities.

Other regionals may be activitated and/or originated with the Math Council

In this issue

giving counselling and financial assistance upon request to any member of the council executive as listed in each *Delta-K*. We will help obtain speakers for your meetings. (If you have need for resource personnel for any activity involving mathematics, we will assist whether you are a regional or a single school wanting to improve your knowledge and teaching ability in a problem area.)

FORMAT

This issue has been put together by a new editor utilizing a new philosophy as to what a newsletter should contain and what it should present to the membership. Is this better suited to your needs and desires? How would you change the format to better meet your needs? This publication is only as good as its useability. It costs all of us a portion of our membership dues and must justify the expense and time involved. Your editor can only make improvements as you react. Letters to the editor are solicited and will be published when the topic is addressed to all math teachers and used as a guideline for changes in publication where indicated and feasible. Manuscripts are desirable when you have a strong pertinent message that requires more than a letter for proper presentation. Long manuscripts will be considered for monographs. You have your chance to publish, and if you don't take it, others will.

NCTM Conference Report

J. F. Woloshchuk
Mathematics Department Head
Dr. E. P. Scarlett High School
Calgary

I. What is important in preparatory mathematics for university?

Jack Macki,
University of Alberta
Edmonton.

Entering students are faced with problems, such as:
- lack of good study habits,
- pace of programs, especially the beginning lectures,
- lack of supervision (often) of homework,
- required appointments for meetings with lectures,
- testing procedures: work for solutions must be shown,
- social and cultural shock,
- resistance by students to using proofs,
- student literacy, reasoning.

Results of a survey of approximately 700 students and professors demonstrated that, (a) high school curriculum covers various mathematical areas quite well, and (b) students' backgrounds are generally satisfactory. About 70 percent appear well prepared.

II. Process objectives in geometery and algebra teaching.

Sol E. Sigurdson,
University of Alberta,
Edmonton.

Why have process objectives?

- survival purpose in society,
- make mathematics a human endeavor,
- stimulate people to invent their own problems,
- demonstrate the power of definition and assumption,
- demonstrate applicability of mathematics.

Six processes were demonstrated by videotape:

- making a model,
- posing the question,
- perceiving the mathematics,
- establishing the theorem,
- generalizing the result, that is, inventing the formulae, symbols, and such,
- systematizing the result.

III. What is the nature of teaching a great lesson when no learning takes place?

Walter P. Krepak,
Mathematics Department Head,
Western Canada High School
Calgary.

I am going to get a copy of the entire speech which I will lend on request.

IV. Student needs and subject requirements

Wallace S. Manning,
School District #91,
Idaho Falls, Idaho.

1. Arrive at realistic objectives for the students in the classroom.
2. Use media in most effective ways.
3. Staff involvement is the key to program development.
4. Individualized instruction is not for everyone.
5. Have program make adjustment to the outside world.
6. Examine the traditional versus individualized intruction which is similar to the Bowness High School Program.

V. Self-correction feedback, or how not to make dependent students

Dr. Alton T. Olson,
University of Alberta,
Edmonton.

In essence, self-correcting feedback implies immediate knowledge of the worth of a course of action for the purpose of correcting that course of action in order to maximize its worth. A servo-mechanism would be the prime example of an object which had a self-correcting feedback capability.

Why is this an important concept for me? What does it have to do with the teaching of high school mathematics? It is simply that I have seen far too much mathematics taught in such a way that a student had little recourse but to go to an answer book or a teacher for feedback. I am not denying that that is a viable source of feedback. However, I am proposing that we open up and explore other provisions for feedback. These provisions, I think, hold promise for more independence and more mathematical understanding for students. Furthermore, if one acknowledges that a significant amount of mathematics is learned by conditioning then positive reinforcement schedules demand a temporal contiguity of response and reinforcement. Self-correcting feedback can provide that contiguity.

Schematically, in very simple terms, feedback can be depicted as below:

With this picture in mind, consider the student who is given the problem $P - Q$ where P and Q are polynomials. He is told that $P - Q = P + (-Q)$. That prescribes a course of action. From this action, certain results are obtained. Where and how does the student obtain immediate feedback? If he depends on an answer book or a teacher the feedback may be long delayed which largely destroys its effectiveness. I would propose that the student be required to find R where $P = Q + R$, rather then $P - Q = P + (-Q)$. The feedback is obviously more immediate. Also, students always find that the addition of polynomials is easier than subtraction, and emphasizes the relational aspects of mathematics.

For the next example, consider the student who is introduced to complex numbers or ordered pairs of real numbers. Then multiplication is defined as follows: $(a,b) \cdot (c,d) = (ac-bd, ad+bc)$. This prescribes a course of action. Where does the student get feedback concerning the worth of his results? He is made dependent on external sources for feedback. I would propose that concurrently the multiplication of complex numbers should be taught as follows: $(a_1b) \cdot (c_1d) = (ac-bd, ad+bc)$ and $(a+bi) \cdot (c+di) = ac+bdi^2+bci+adi = (ac-bd) + (bc+ad)i$
In this way either one of these algorithms becomes a feedback channel for the other.

In the same manner, division of complex numbers is defined as follows:

$z_1 \div z_2 = z_1 \cdot \frac{1}{z_2}$ where $z_1 = (a,b)$, $z_2 = (c,d)$ and $\frac{1}{z_2} = \left(\frac{c}{c^2 + d^2} \quad \frac{-d}{c^2 + d^2}\right)$

Where does a student obtain feedback for this course of action? I propose that if a student has obtained a result (e,f) where $(a,b) \div (c,d) = (a,b) \cdot \frac{1}{(c,d)} = (e,f)$ then feedback should be sought as follows: $(a,b) \div (c,d) = (c,f) = (a,b) = (c,d) \cdot (e,f)$. In other words does $ce - df = a$ and does $cf + dc = b$?

Consider an example from the algebra of polynomials. A student squares a binomial and gets the following: $(x+3)^2 = x^2+6x+9$. In how many ways can he get feedback for his course of action? Let us consider them now:

1. relate it to reversing the distributive property, $x^2+6x+9 = x^2+3x+3x+9 = x(x+3)+3(x+3)$, etc.,

2. relate it to area,

	x	3
x	x^2	3x
3	3x	9

3. relate it to place value,

$$(x + 3) \cdot (x + 3) = x^2 + 6x + 9$$
$$(10+3) \cdot (10+3) = 100 + 60 + 9$$
$$13 \cdot 13 = 169$$

The statements above are true for other number bases as well. For instance, let x be 15 but write it in base 15 notation, then:

$(x+3)(x+3) = x^2 + 6x + 9$

$(10+3)(10+3) = 100+60+9$

$13 \cdot 13 = 169$

} base 15

$(x+3)(x+3) = x^2 + 6x + 9$

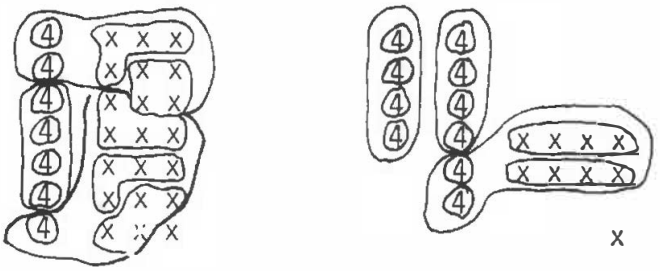
$(15+3)(15+3) = 15^2 + 6 \cdot 15 + 9$

$18 \cdot 18 = 225 + 90 + 9$

$324 = 324$

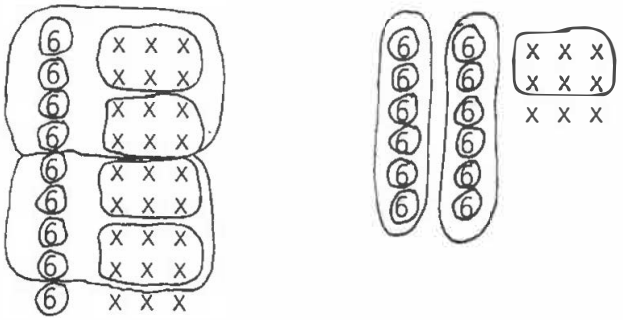
4. Relate it to grouping,
   This idea is very similar to that of place value but is perceptually different.

   For $(x+3)(x+3) = x^2 + 6x + 9$ let x be 4. Then we have:



An additional conclusion can be made here: $(x+3)(x+3)$ and $x^2 + 6x + 9$ are both equal to $3x^2 + 1$ when x=4.

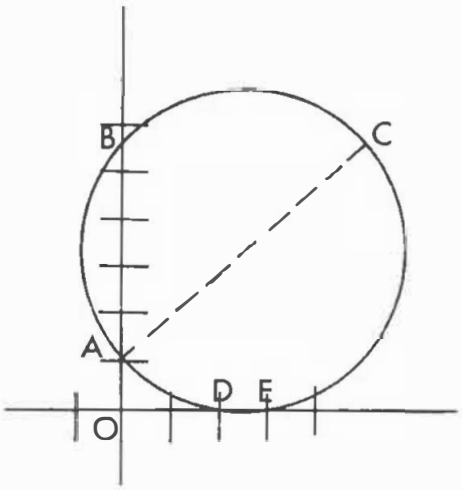
When x is 6 then we have:



We can then conclude that $(x+3)(x+3) = x^2 + 6x + 9 = 2x^2 + x + 3$ when x=6.

5. Relate it to the use of the following equations, $mx^2 + ax + p = (ax+b)(cx+d)$
   where $ac = m$
   $bc + ad = 6$
   $bd = 9$
   from which b and d must be 3 and 3 respectively, and a and c must each be 1, and so on.

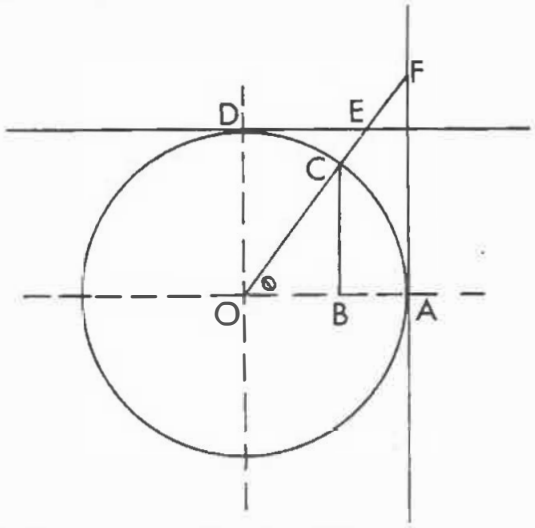
   In a topic related to factoring quadratics, consider the problem of finding the roots for the quadratic equation $x^2 - 5x + 6 = 0$. If the student obtains the roots 2 and 3 they can be substituted into this equation to obtain immediate feedback. In another method of obtaining feedback, an effective link between algebra and geometry can be exploited.



$m(\overline{OA}) = 1$
$m(\overline{OB}) = 6$
$m(\overline{BC}) = 5$
$m(\overline{OD}) = 2$
$m(\overline{OE}) = 3$

The measures of OD and OE must be the roots of $x^2 - 5x + 6 = 0$ for the sum of these measures must be 5 and their product must be 6.

A final example will be taken from trigonometry. For feedback purposes, the trigonometric functions can be related to the measures of certain lines on the unit circle.



$m(\overline{BC}) = \sin \theta$
$m(\overline{OB}) = \cos \theta$
$m(\overline{AF}) = \tan \theta$
$m(\overline{OE}) = \csc \theta$
$m(\overline{DF}) = \sec \theta$
$m(\overline{DE}) = \operatorname{ctn} \theta$

The procedure has the advantage of not requiring any quotients, and the behavior of the functions can be readily discerned.

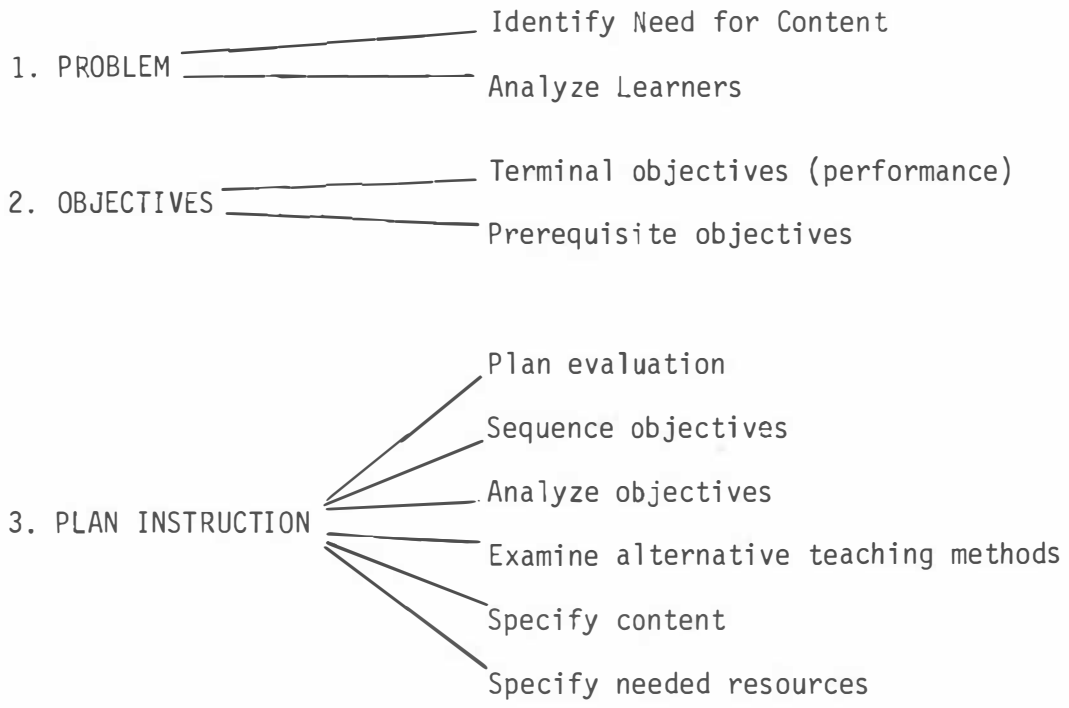
These are some of my thoughts concerning an alternate approach to self-correcting feedback. I hope that these ideas may be useful to you.

VI. A systematic approach to the design of units of instruction for a general mathematics course at high school level.

Barry Eshpeter,
Media Consultant
Calgary Public Schools
Calgary.

Discussion revolved around the systems model reproduced below.

A SYSTEMS MODEL



VII. Basic mathematical concepts and skills required by high school chemistry and physics.

William Tanasichuk,
Queen Elizabeth High School,
Edmonton.

The speaker identified the following mathematics skills and concepts required in the two sciences:

- significant digits
- rounding off
- exponents
- scientific notation
- fractions and decimals
- use of units
- metric units
- addition, subtraction, multiplication, division
- approximation and estimation
- formulae and equations
- ratio, proportion and variation
- trigonometric ratios
- vectors and scolars
- graphics

Note: Mr. Tanasichuk had also developed a 40-page unit entitled, "Math review for high school science". I have two copies available for anyone which I will lend on request.

Sources of Free and Inexpensive Materials

According to our most recent information, the following materials are available to teachers, one copy free, unless a price is specified. Asterisks denote a limited distribution policy. The number in parentheses following each item corresponds to the numbered addresses, beginning on p.13. NOTE: Neither the NCTM nor the Math Council, ATA, distribute the materials listed. Any and all must be ordered from the source keyed to the parenthetical numbers.

Books and Pamphlets

Accounting for Your Future (55)

The Actuarial Profession (53)

American Stock Exchange Market Data (10)

Annual Book of Street and Highway Accident Data (54)

Bank forms. Sets for teaching banking in Math 15. (71)

Bank of Montreal Business Review. Class sets (70)

Banking: A Student's Short History. Single copies at 30¢ each; quantity discounts available (2)

Banking, An Opportunity for you Single copies free, quantity rates available. (41)

**Can I Be a Scientist?* (30)

**Can I Be An Engineer?* (30)

Careers, Computers, and You (5)

Careers in Atomic Energy (56)

Careers in Statistics (9)

Car Insurance Explained (74)

*Chances Are...*An introduction to probability through programmed instruction. (40)

The Changing Picture in School Mathematics. 20¢ each (18)

**City Planning and Computers* and *Careers in Systems Analysis.* Available as a folder and also as a flat poster. (37)

Computers (56)

**Computers Are Going to Town* (37)

Consumers' Handbook-Consumer Credit (73)

Counterfeit? (25)

Counterfeiting and Forgery. (69)

Credit Unions - Self Study Program (69)

**Elementary Field Survey - An Enrichment Course for High School Students* (62)

Employment Outlook for Mathematics and Related Fields. 15¢ each, quantity discounts available. (58)

An Excursion in Numbers. Single copy free upon request; additional copies 20¢ each. (23)

Extra... Mathematics Activities for the the Classroom. Single copies only, available free. (35)

"Fact" Booklet Series:

1. *"Borrowing";*
2. *"Buying or Building a Home";*

3. *"Investment Companies";*
4. *"Life Insurance";*
5. *"Savings";*
6. *"Securities".*

Single copies of each available free; quantity rates available. (19)

Facts for Study. Up to 30 copies available free. (12)

The Failure Record Through 1970. A comprehensive study of business failures by location, industry, age, size, and cause. (22)

The Federal Reserve System (25)

Finance Facts. A monthly newsletter, with single subscriptions available to teachers without charge; bulk classroom subscription per student, per year, available at 25¢ each (48)

Finance Facts Yearbook (48)

**Flight and Computers* and *Careers in Programming.* Available as a folder and also as a flat poster (37)

Folder of the Duodecimal Society of America (23)

Fundamental Facts About United States Money (25)

Genuine or Counterfeit? (27)

Growth in Importance of the Credit Function (22)

How Can We teach Applications of Mathematics? (13)

How to Invest. What everybody ought to know about the stock and bond business (44)

How to Read a Financial Report (44)

How Your Tax Dollar is Spent 1973-74. Booklet which may assist the teaching of budgeting. (75)

Income Tax. This teacher's kit on income tax, includes copies of recent T1 Short Individual Income Tax Returns. Good for Mathematics 15 or 25. (65)

Information Theory (13)

Instructional Math Play (IMP) Kits: Simulations of Computer-Assisted Instruction Programs. $1 each, quantity discounts. (61)

It's Your Money. 3¢ each. (48)

Journey Through a Stock Exchange. Single copies free; 20 or more, 10¢ each, 50 percent discount to teachers ordering on school letterhead (10)

Keeping Our Money Healthy (27)

Key Business Ratios: Statistics from 125 Lines of Retailing, Wholesaling and Manufacturing and Construction (22)

Know Your Money. Single copy free, quantities available from Government Printing Office, 40¢ each. (59)

Life Insurance. A booklet and a teacher-student unit to assist in the teaching of life insurance in Mathematics 15. (67)

List of Mathematical Projects, Exhibits, Reports. Bibliography included; single copies free with stamped, self-addressed envelope; quantity requests at 10¢ per copy. (46)

The Making of a CPA (7)

Math and Your Career (58)

Mathematical Booklist for High School Libraries. Single copies free with stamped, self-addressed envelope, quantity requests at 10¢ per copy (46)

Mathematical Exercises. A set of mathematical exercises, suitable for Mathematics 15, 25. (63)

Mathematics as a Professional Occupation. Booklet. (68)

Mathematics at Work. Resource units for secondary school mathematics teachers in leaflet form. (30)

Mathematics News. Newsletter. (62)

Mathematics Tables for the High School. 12 sets of tables at 72¢ plus postage

or 96¢ postpaid. (31)

Metric Supplement to Science and Mathematics. $1 each, quantity discounts available. (45)

Metric Units of Measure. 15¢ per copy; 10 or more, 10¢ each. (45)

Money: Master or Servant? (27)

**More About Computers* (37)

New Directions in Elementary School Mathematics. Heath Professional Services Monograph #2, $1 (34)

On the Nature of Mathematical Research in Industry (13)

101 Ideas for a Mathematics Department Head. An idea bank for interesting math classes. (76)

Personal Money Management (4)

Planning Your Career (29)

**Precision: A Measure of Progress* (30)

Public Affairs Pamphlets:

1. *"The Balance of Payments Crisis",*
2. *"A Guide to Consumer Credit",*
3. *"How to Finance Your Home",*
4. *"Investing for Income and Security",*
5. *"Paying for a College Education",*
6. *"The Responsible Consumer".*

1-9 copies, 25¢ each; quantity discounts available (52)

The Pursuit of Accuracy. A brief history of 50 centuries of time-keeping. (15)

The Quiet Revolution: Computers Come of Age (5)

Ranger 'Rithmetic. For teacher in Grades I through VII. (57)

Scotia Bank Budget Book. This book should create interest in computers and computer programming. (64)

Sets, Probability and Statistics, the Mathematics of Life Insurance (39)

Short-Cut Statistics for Teacher-Made Tests (24)

So You're Good at Math...then Consider a Career as an Actuary (53)

**Space and Computers*, and *Careers as Customer Engineers* (37)

Stocks on the AMEX. Single copies free; quantity orders, 5¢ each. (10)

The Story of American Banking (4)

The Story of Checks (27)

The Story of Money. Single copies available. (16)

**Suddenly, Tomorrow Came* (37)

Teacher's Notebook in Elementary Mathematics. "Geometry in the Elementary School" and "Strategies Toward a Cognitive: Mathematics and the Inner Needs of the Child" (33)

Teacher's Notebook in Mathematics, "Motivating the Low Achiever in Algebra" (33)

Teaching Federal Income Taxes. "Program announcement" (publication 488) (41)

1. *"Understanding Taxes",* farm student test (publication 22);
2. *"Understanding Taxes",* general student text (publication 21);
3. *"Understanding Taxes",* teacher's guide (publication 19)

A Teaching Guide for Slide Rule Instruction (51)

Trignometry Tables. Pocket-size booklet, 1 copy free; quantity discounts available. (38)

Understanding Digital Computers. This book should create interest in computers and computer programming. (64)

Using Bank Services (4)

Using Credit Wisely. 1-9 copies, 75¢ each; quantity discounts available. (20)

What's It Like to be an Accountant? (1)

What's It Like to be an Engineer? (29)

What's It Like to be a Scientist? (29)

What's It Like to be a Technician? (29)

What Truth in Lending Means to You (25)

What to Know about Credit in Canada (72)

The World's Telephones (11)

You and the Investment World (49)

Your Money and the Federal Reserve System (26)

Your Money Supply (28)

Catalogs

Education Cooperation Activities and Services of American Iron and Steel Institute. Catalog of free booklets, films, and filmstrips available to teachers. (8)

Free Educational Materials. Property and liability insurance (40)

**General Motors Educational Aids: Booklets, Charts, Films* (30)

Money and Credit Management Education. A descriptive catalogue of educational materials for the classroom teacher or counsellor. (48)

Money Management Program. A guide to inexpensive booklets, filmstrips, leaflets on money management. (36)

NASA Educational Publications (47)

Publications Catalog. Listing of free and inexpensive booklets, reports, and films. (10)

Science Information Available from the Atomic Energy Commission (56)

Teaching Aids and Educational Materials (50)

Teaching Aids on Life and Health Insurance and Money Management (39)

Three Dimension Models of the Basic Crystallographic Forms (32)

USAEC 16 mm Classroom Films on Nuclear Science (56)

Charts and Posters

**Decimal Equivalents Wall Chart.* 22" x 29" (14)

Minimum Stopping Distances (3)

Perpetual Calender. Free with self-addressed, stamped envelope. (43)

**Road Maps of Industry* (17)

Skid Marks Used to Estimate Speed (3)

University Prints: Mathematicians. 16 prints, 50¢. (60)

World Time Chart (42)

Miscellaneous

Cardiac. A Cardboard Illustrative Aid to Computation (13)

Celsius Thermometer. $1 for 2; $2 for 6. (45)

Decimal Equivalent Pocket Card (14)

Family Budget Slide Guide Kit. 11¢ each; 100 or more, 10¢ each. (48)

"Go Metric" Bumper Stickers. $1 for 10; 7.5¢ each for 100 or more. (45)

**Hexapawn: A Game You Play to Lose.* Gameboard and instructional brochure. (37)

How Your Gas Meter Works Kit (6)

1.5 m Flexible Measuring Tape. 50¢ each; 5 or more, 40¢ each. (45)

6" Beginners Slide Rule (order #27). 60¢ each, minimum order 6. (21)

Slide Rule Problems -- Answers Worksheet (51)

20 cm plastic ruler. 10¢ each, orders should be for 4 or more. (45)

Wooden Meterstick. 75¢ each; 5 or more, 50¢ each. (45)

Addresses

1. Accounting Careers Council National Distribution Center
   P. O. Box 650, Radio City Station
   New York, New York 10019
2. William F. Amelia Associates
   P. O. Box 195
   Baltimore, Maryland 21203
3. American Automobile Association
   1712 G Street, NW
   Washington, DC 20006
4. Public Relations Department
   The American Bankers Assoc.
   1120 Connecticut Avenue, NW
   Washington, DC 20036
5. Public Information Services
   American Federation of Information Processing Societies, Inc.
   210 Summit Avenue
   Montvale, New Jersey 07645
6. Educational Services
   American Gas Association
   1515 Wilson Boulevard
   Arlington, Virginia 22209
7. American Institute of Certified Public Accountants
   666 Fifth Avenue
   New York, New York 10019
8. American Iron and Steel Institute
   1000 - 16th Street, NW
   Washington, DC 20036
9. American Statistical Association
   806 - 15th Street, NW
   Washington, DC 20005
10. Publications Department
    Information Services Division
    American Stock Exchange, Inc.
    86 Trinity Place
    New York, New York 10006
11. Overseas Administration
    American Telephone & Telegraph Co.
    32 Avenue of the Americas
    New York, New York 10013
12. Automobile Manufacturers Assoc.
    Educational Services
    320 New Center Building
    Detroit, Michigan 48202
13. Bell Telephone Laboratories
    Public Relations and Publication Division
    Mountain Avenue
    Murray Hill, New Jersey 07974
14. Brown & Sharpe Mfg. Co.
    North Kingstown, Rhode Island
    02852

15. Bulova Watch Company, Inc.
630 Fifth Avenue
New York, New York 10020

16. Chase Manhattan Bank Money Museum
1254 Avenue of the Americas at
50th Street, Rockefeller Center
New York, New York 10020

17. Road Map Education Program
The Conference Board
845 Third Avenue
New York, New York 10022

(Single copies sent only to a school address, and available only to secondary school teachers and administrators, educators specializing in the training of teachers in colleges and universities, and professional staff members of county and local boards of education.)

18. Mailing Room
Building 7 - Research park
Cornell University
Ithaca, New York 14850

19. Council of Better Business Bureau, Inc.
845 Third Avenue
New York, New York 10022

20. Credit Union
National Association, Inc.
1617 Sherman Avenue
Box 431
Madison, Wisconsin 53701

21. The C-Thru Ruler Company
6 Britton Drive
Bloomfield, Connecticut 06002

22. Dun and Bradstreet, Inc.
Public Relations & Advertising
99 Church Street
New York, New York 10007

23. The Duodecimal Society of America
11561 Candy Lane
Garden Grove, California 92640

24. Educational Testing Service
Princeton, NJ 08540

25. Research Department
Federal Reserve Bank of Atlanta
104 Marietta Street, NW
Atlanta, Georgia 30303

26. Office of Public Information
Federal Reserve Bank of Minneapolis
Minneapolis, Minnesota 55480

27. Public Information Department
Federal Reserve Bank of New York
33 Liberty Street
New York, New York 10045

28. Library, Research Department
Federal Reserve Bank of St. Louis
P. O. Box 442
St. Louis, Missouri 63166

29. Public Relations Operation
General Electric Company
570 Lexington Avenue
New York, New York 10022

30. General Motors Corporation
Public Relations Staff
Room 1-101, General Motors Bldg.,
Detroit, Michigan 48202
(Address all correspondence on school stationery.)

31. Ginn and Company
125 Second Avenue
Waltham, Mass. 02154

32. Arthur J. Gude, 3rd
845 Dudley Street
Lakewood, Colorado 80215

33. Harcourt Brace Jovanovich, Inc.
757 Third Avenue
New York, New York 10017

34. Promotional Services
D.C. Heath and Company
125 Spring Street
Lexington, Mass. 02173

35. Houghton Mifflin Company
Department K.
110 Tremont Street
Boston, Mass. 02107

36. Household Finance Corporation
Money Management Institute
Prudential Plaza
Chicago, Illinois 60601

37. Corporate Literature
IBM Corporation
Armonk, New York 10504
(Materials offered in classroom quantities, without charge, to teachers of junior-high, high school, and college students.)

38. Illinois Tool Works, Inc.
Illinois/Eclipse Division
2501 North Keeler Avenue
Chicago, Illinois 60639

39. Educational Division
Institute of Life Insurance
Health Insurance Institute
277 Park Avenue
New York, New York 10017

40. Educational Division
Insurance Information Institute
110 William Street
New York, New York 10038

41. Internal Revenue Service
National Office
1111 Constitution Ave. N.W.
Washington, D.C.

42. Manufacturers Hanover Trust Co.
Publications Department
350 Park Avenue
New York, New York 10022

43. A. A. Merrill
Box 228
Chappaqua, New York 10514

44. Merrill Lynch, Royal Securities
480 - 7 Avenue SW
Calgary, Alberta

45. Metric Association, Inc.
2004 Ash Street
Waukegan, Illinois 60085

46. Mu Alpha Theta
National High School & Junior College Mathematics Club
The University of Oklahoma
1000 Asp Avenue, Room 215
Norman, Oklahoma 73069

47. Educational Programs Division
Office of Public Affairs
National Aeronautics and Space Administration
Washington, DC 20546

48. Educational Services Division
National Consumer Finance Assoc.
1000 Sixteenth Street, NW
Washington, DC 20036

49. New York Stock Exchange, Inc.
School and College Relations
11 Wall Street
New York, New York 10005

50. Olivetti Corporation of America
Education Marketing
500 Park Avenue
New York, New York 10022

51. Picket Industries
P. O. Box 1515
Santa Barbara, California 93102

52. Public Affairs Committee, Inc.
381 Park Avenue South
New York, New York 10016

53. Society of Actuaries
208 South LaSalle Street
Chicago, Illinois 60604

54. Marketing Services Department
The Travelers Insurance Companies
One Tower Square
Hartford, Connecticut 06115

55. United Business Schools Assoc.
1730 M Street, NW
Washington, DC 20036

56. U.S. Atomic Energy Commission
P. O. Box 62
Oak Ridge, Tennessee 37830

57. U.S. Department of Agriculture
Forest Service
Washington, DC 20250

58. U.S. Department of Labor
Bureau of Labor Statistics
Washington, DC 20212

59. U.S. Secret Service
Treasury Department
Washington, DC 20220

60. The University Prints
15 Brattle Street
Harvard Square
Cambridge, Mass. 02138

61. Wff 'N Proof Learning Games Associates
Research and Development Office
1490 South Boulevard
Ann Arbor, Michigan 48104

62. Yoder Instruments
East Palestine, Ohio 44413
(Materials sent only to a school address.)

63. W. Horner
Chief of Excise Duty Operations
Department of National Revenue
Federal Government
Ottawa, Ontario K1A 0L5

64. Alberta Government Telephones
Box 2411
Edmonton, Alberta

65. T. Chaney
Public Information Officer
Calgary Public Building
205 - 8 Avenue SE
Calgary, Alberta

66. Bank of Nova Scotia
526 Lougheed Building
Calgary, Alberta

67. Educational Division
The Canadian Life Insurance Assoc.
44 King Street, West
Toronto 1, Ontario

68. Department of Mathematics and Computing Science
University of Calgary,
Calgary, Alberta

69. Credit Union Federation of Alberta Ltd.
1410 - 1st Street SW
Calgary, Alberta

70. Bank of Montreal
P. O. Box 6042
Montreal 101, Canada

71. Canadian Imperial Bank of Commerce
3rd Floor, 309 - 8 Avenue SW
Calgary, Alberta

72. Credit Granters' Association of Canada and Associated Credit Bureau of Canada
185 Bloor Street, East
Toronto, Ontario

73. Department of Consumer and Corporate Affairs
1411 - 1st. Street SE
Calgary, Alberta

74. Insurance Bureau of Canada
580 Granville Street
Vancouver, B.C.

75. Information Canada
c/o Federal Government of Canada
Ottawa, Ontario

76. J. W. Woloschuk
936 Cannell Road SW
Calgary, Alberta T2W 1T4

NCTM would appreciate your assistance in maintaining the accuracy of the Free and Inexpensive Materials List. If you know of changes, deletions, or additions which effect any of the items appearing on this resource, please complete the form below and return it to the National Council of Teachers of Mathematics.

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National Council of Teachers of Mathematics
1201 - 16th Street NW
Washington, D.C. 20036
U.S.A.

Mathematics Council Constitution

as amended to October 5, 1973.

NAME - The name of this organization shall be Mathematics Council of The Alberta Teachers' Association. (MCATA)

OBJECT - The object of this organization shall be to promote and advance the teaching of mathematics throughout the province, especially in elementary and secondary schools.

MEMBERSHIP - (a) Any member of The Alberta Teachers' Association, or non-member covered by the Teachers' Retirement Fund.
(b) Any certificated teacher in private schools.
(c) Any member of a university in Alberta or Department of Education.
(d) Anyone interested in the teaching of mathematics.

FEES - Membership fees may be established by resolution at the annual general meeting of this council.

FINANCES - The Executive Committee shall have power to collect fees and to make expenditures. A financial statement shall be submitted to the annual general meeting.

OFFICERS - The officers of this council shall consist of a president, a vice-president, a past president, a secretary and a treasurer, to be elected for a term of one year, by distributed ballot, and a member appointed by the Executive Council of The Alberta Teachers' Association.

EXECUTIVE COMMITTEE - The Executive Committee shall consist of the officers, one member from the faculty of education from a university in Alberta, one member from the Department of Mathematics of a university in Alberta, one member from the Department of Education and six directors to be appointed by the officers from the following: editor of the annual, editor of the newsletter, the chairmen of committees, the presidents of regional councils, members at large, provided that each university representative be appointed for a two-year term and also that the two university representatives not be from the same university and provided that the directors be appointed to ensure that the executive committee includes at least two representatives of each elementary, junior high and senior high school teachers. One member of the executive committee shall be designated as NCTM representative.

COMMITTEES - The Executive may appoint from time to time such committees as are necessary to carry on work of the council.

LIAISON - Any communication policy which this council wishes to make with any organization, government department, or other agency, within or without the province, shall be conducted through the Executive of The Alberta Teachers' Association or other regular channels of the Association.

REGIONAL COUNCILS - The Executive Committee of this council shall encourage the establishment of regional councils and shall have authority to determine regional boundaries and to establish regulations governing the organization of regional councils, consistent with this constitution.

REPORTS - The Executive Committee shall submit annually a written report of its activities to The Alberta Teachers' Association, prior to December 31. The activities reported shall be for the preceding school year.

AMENDMENTS - After three months notice of motion to amend the constitution has been given to each member, this constitution may be amended by two-thirds majority vote of the members present at any annual general meeting of this council, subject to ratification by the Executive Council of The Alberta Teachers' Association.

GENERAL MEETINGS - The Mathematics Council shall hold an annual general meeting each year. At least thirty days' notice shall be given for all general meetings.

DISSOLUTION - In the event of dissolution of the Mathematics Council all funds will be turned over to the ATA.

Mathematics Council Executive – 1973-74

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