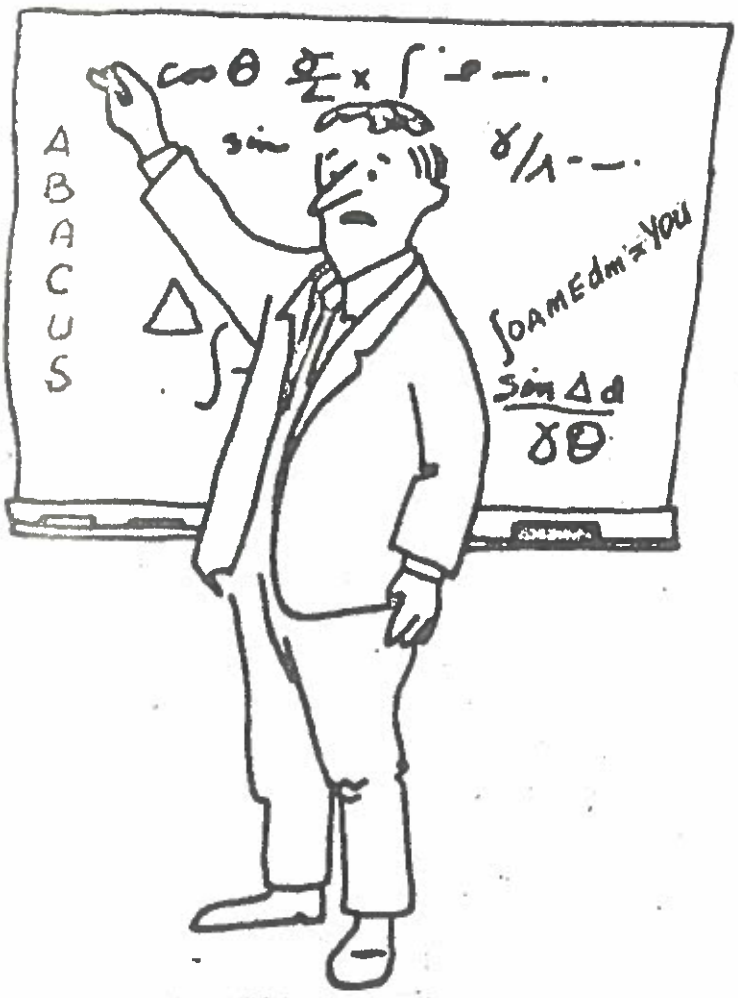
ABACUS

A PUBLICATION OF THE
ONTARIO ASSOCIATION for MATHEMATICS EDUCATION

Volume 3 Number 4

May 1976



The major objectives of the Ontario Association for Mathematics Education are to promote mathematics education, to share ideas and to involve in this task ALL mathematics educators at all levels: elementary, secondary, colleges, universities and all other institutions of learning.

Any person interested in mathematics education is more than welcome to join and to participate; to share, to contribute and to benefit. If you receive "Abacus", it is an indication that you are a member. Share this publication with your colleagues and encourage them to join OAME.

Display ybur MEMBERSHIP CERTIFICATE and promote membership in OAME.

YOUR MEMBERSHIP IN OAME INCLUDES THE ABACUS

YOU CAN COUNT ON IT!

WRITE TO THE SECRETARY TREASURER

1975 - 76 EXECUTIVE

Joan Routledge,
President,
Box 194,
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Tom Griffiths,
Vice-President,
N.L.S.S.
Forest, Ont., NON 1JO

Morley MacGregor,
Secretary Treasurer,
247 Bright St.,
Sarnia, Ont., N7T 4E9

"ABACUS", publication of the Ontario Association for Mathematics Education is published five times during the school year: mid-September, mid-November, mid-January, March and May. Unless otherwise indicated, the contents of "Abacus" are not copyrighted; its articles and information may be quoted or reprinted without formality other than the customary acknowledgment of the source. The deadline for submission of articles, ideas etc. is two weeks before publication date.

Editor: Andy Czempinski, P.O. Box 614, Iroquois Falls, Ontario, P0K 1E0

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From the Editor:

As this issue of "Abacus" goes out I am looking forward to meeting many of you in St. Cartharines at our 3rd Annual Conference in May. Among other things, I hope to hear your opinion of this publication and how to make it better. I know that I did enjoy being your editor, and I consider this function as an honour and priviledge of serving OAME. To be sure, there are some frustrations and difficulties, but at the end one derives a satisfaction that at least some ideas about mathematics education are communicated by this medium. My only complaint is the rather meagre contributions from readers: I am sure that many of you have a variety of excellent ideas and "tricks of the trade" (otherwise how would you survive and be successful in the "blackboard jungle"); DO SHARE YOUR IDEAS WITH ALL OF US.

This is also the last edition of "Abacus" in 1975-76 school year, and I believe that this is a good time to express my appreciation to all of you who took time from your busy schedules and contributed to "Abacus"; the encouragement given to me by the OAME Publication Committee certainly helped me to overcome the "editor's blues"; and without the help of Janet Richards (the silent assistant to the editor) from I.F.S.S. Dept. of Math. and Harold Child, A-V Technician at I.F.S.S., it would be simply impossible to edit and print "Abacus"; final thanks must go to Morley MacGregor, Secretary-Treasurer of OAME for his patience and huge work connected with the distribution of "Abacus"

In this edition, you will find a strong appeal for more of our attention to our top students, probably the most neglected students by our system, THEY are our future mathematicians, and as such, deserve more of our help and encouragement. There is also a large section referring to "Metric Week" as proposed by NCTM; many ideas could be incorporated in curriculum development.

Have a good and satisfactory final "push" in 1975-76, and a good summer satisfying your needs and wants.

Andy Czempinski

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"The moving power of mathematical invention is not reasoning but imagination." DeMorgan

SOME NOVEL APPROACHES TO EXAMINATIONS

#1. From the Globe and Mail, April 23, 1976. Questions in the examinations for Russian high school students will in future be read out over the radio just as the exam starts, in a move designed to stop attempted cheating and to assure that standards are maintained.

Editor's Note: Any takers for T.V. in Ontario...?

#2. From the Daily Telegraph, London, England. February 27, 1976. A new style GCE examination in which clues to the answers are hidden under tear-off strips to help candidates who get stuck during the test was announced yesterday. Candidates will lose marks for tearing off a "clue", but the examiners feel they will get more marks if they were stumped completely. The examination has been approved by the London GCE Examination Board and is available to schools as an "O" level paper in Applicable Mathematics. ... The examination is intended to be taken after a one or two year mathematics course and prepares youngsters for college courses in which they need a background of practical mathematics. ... Students who have used the new exam are reported to have found it much more enjoyable than conventional exams.

Editor's Note: ... thus a clueless student will turn out to be the best student ...

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OPPORTUNITY FOR OUTSTANDING MATHEMATICS STUDENTS

A summer programme for some fifty highly talented students of senior secondary school mathematics from across North America is to be held at the University of Chicago from June 20 to August 30, 1976. This project started some time ago, and this year there are a few openings available for Ontario students. Much has been said that we do not do enough for our high ability, highly motivated students, and that our greatest efforts (rightly or wrongly) are concentrated on average and mediocre students. The limitation of space in "Abacus" does not allow me to elaborate on this excellent project; it must be sufficient to say that the project gives a rare opportunity to our outstanding young mathematicians. A substantial part of the cost of this project has been guaranteed by the U. of C. and the National Science Foundation, i.e. the Foundation may provide funds to help meet the cost for participants who would otherwise be unable to attend. If you know of a student who you think might qualify for and benefit from this experience, please contact as soon as possible: Dr. Irvin Pressman, Dept of Mathematics, Carleton University, Ottawa, Ont.

DO NOT NEGLECT YOUR TOP STUDENTS

Applicants for admission may be asked to demonstrate the ability to deal with problems similar to those below ... and it isn't easy...

1. The integer 25 is a "perfect square" since it is a square of another integer 5. The least positive remainder of 25 upon division by 8 is 1. Find if possible, an integer which is a perfect square and which has the least positive remainder 3 upon division by 8.

2. Let A, B, C, D, and E be five towns such that the straight line distance between A and B is 30 miles, between B and C is 80 miles, between C and D is 236 miles, between D and E is 86 miles, and between E and A is 40 miles. Can you find the distance between C and E without a map?

3. In a very hotly fought battle, at least 70% of the combatants lost an eye; at least 75% an ear; at least 80% an arm; at least 85% a leg. How many lost all four members?

4. Nine students use a fraternity dining room which has four tables with three settings on each table. How should one vary the seating arrangement so that in four days each student would share a table with each other student?

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SUGGESTIONS FOR YOUR LESSONS

From: "VECTOR", Newsletter/Journal: B.C.A.M.T., Vol. 17, No. 2, Feb. 1976

Human Computer

Divide your class into teams of six to eight students. Each team represents one computer and each student on each team performs one step in the computer program. Their steps, for example, could be to add 17 or to divide by 2.

The same program is put into each computer - that is, the first student on each team performs the same operation (e.g. multiply input by 6). The second student on each team performs the same operation etc. Give each student a piece of paper saying what the operation is. Feed an input number into each computer (first student on each team). His/her answer is passed on to the second student who performs their process and passes it on to the third student, etc. The output is obtained from the last student on the team. The object of the game is to determine which computer is most efficient in processing input data.

Example: Computer Program

Person 1	2	3	4	5	6	7
x6	+(-4)	+12	if even: add 8 if odd: subtract 1	x(-3)	+50	+2

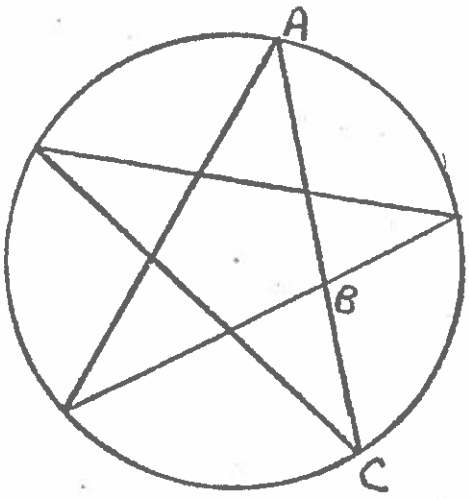
If the input number is 3 then
1. $3 \times 6 = 18$ 2. $18 + (-4) = 14$ 3. $14 + 12 = 26$
4. (even) $26 + 8 = 34$ 5. $34 \times (-3) = -102$ 6. $-102 + 50 = -52$
7. $-52 \div 2 = -26$

Output -26

Computer programs can be designed to develop skills other than simple arithmetic. However, as they become more complex, computers tend to malfunction.

The Golden Rectangle

Aim: (a) to draw a Golden Rectangle (b) to find the Golden Ratio.
Equipment: Compass, protractor, ruler, pencil.
Method: (a) construct as accurately as possible a pentagram in the space provided below. (hint: start by drawing a circle and marking off five positions on the circumference at 72 degree intervals from the centre of the circle.



Mark the points A,B, and C. Now construct a rectangle of length AC and width AB. You now should have what the Greeks considered to be the most pleasing and appealing of all geometric figures.

(b) Measure AC and AB

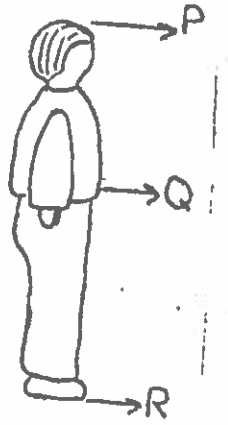
Calculate the value x, where

$x = AC/AB$.

The ratio of 1 to x is the Golden Ratio.

AC = cm, AB = cm

therefore x = and 1/x =



Is your body proportioned according to the Golden Ratio?

Find the length of PQ and QR (find Q holding a pencil at your belly button)

Now find the value of PR/QR or QR/PQ.

This value should equal the value x above (approximately 1.618)

Additional project: Investigate objects in your home as well as in nature: trees, plants, domestic and wild animals, etc. Are they proportioned according to the Golden Ratio?

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Mind Bogglers OR Oldies but Goldies *

1. One day three men went to a hotel and were charged $30 for their room. The desk clerk then realized that he had overcharged them $5, and he sent the refund up with the bellboy. Now the bellboy, being an amateur mathematician ., realized that it would be difficult to split the $5 three ways. Therefore he kept a $2 "tip" and gave the men only $3. Each man had originally paid $10 and was returned $1. Thus, it cost each man $9 for the room. This means that they spent $27 for the room plus $2 tip. What happened to the other dollar?

2. One day in a foreign country I met three politicians. Now, all of the politicians of this country belonged to one of two political parties. The first was the Veracious Party, consisting of persons who were chronic liars. I asked these politicians to which party they belonged. The first said something I did not hear. The second remarked "He said he belonged to the Veracious Party". The third said "you are a liar". To which party did the third politician belong?

3. A man is about to be electrocuted and is given a chance for his life. In the execution chamber are two chairs, labeled 1 and 2, and a jailer. One chair is electrified; the other is not. The prisoner must sit in one of the chairs, but, before doing so, he may ask the jailer one question, to which the jailer must answer yes or no. The jailer is a consistent liar or else a consistent truthteller, but the prisoner does not know which. Knowing that the jailer either deliberately lies or faithfully tells the truth, what question should the prisoner ask?

Hint 1: Let p be the proposition "Number one is a hot seat" and let q be the proposition "You are telling the truth".
Hint 2: Since I would like you to try working the problem without using this hint, I will make you read it backward:
"? hturt eht gnillet era uoy fi ylno dna fi taes toh eht si 1 rebmun taht eurt ti sI".

From: The Nature of Modern Mathematics, Karl J. Smith, Book/Cole Publishing Co., Monterey, Cal., 1973

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MORE ABOUT MAGIC SQUARES

46	55	44	19	58	9	22	7
43	18	47	56	21	6	59	10
54	45	20	41	12	57	8	23
17	42	53	48	5	24	11	60
52	3	32	13	40	61	34	25
31	16	49	4	33	28	37	62
2	51	14	29	64	39	26	35
15	30	1	50	27	36	63	38

Here is a problem that (to the best of this editor's knowledge) has never yet been solved, nor has its impossibility been demonstrated. Play the knight once to every square of the chessboard in a complete tour, numbering the squares in the order visited, so that when completed the square shall be magic, adding to 260 in every column, and each of the two long diagonals. The best answer that I have been able to find **) is shown to the left, however there is an error in the diagonals (It is not a perfect magic square, because diagonals are incorrect, one adding to 264 and the other to 256 - requiring only the transfer of 4 from one diagonal to the other). Can a perfect solution be found? A challenge to the masters of "magic squares".

**) Amusements in Mathematics, H.E. Dudeney, Dover Publications, Inc., New York. .958(70)

MONDAY MORNING EYE-OPENERS

1. Nine digits are so arranged that they form four square numbers

   9, 81, 324, 576

   Can you put them all together so as to form a single square number (i) the smallest possible, (ii) the largest possible?

2. On my recent bike trip I had gone at the rate of 10 mph, but I did better on the return trip (downhill and with the wind) over the same route, at the rate of 15 mph. What was my average speed? (Be careful there).

3. A man has a square-shaped estate. He bequeathed to his wife a quarter of it, the remainder was to be divided equally amongst his four sons: Ben, Chuck, Dave, and Al. Figure 1. below shows how this was done. However the sons were not very happy with the division. In the centre of the land was a well, and only Al had direct access to it. Now the estate is to be divided so that each son shall have land of the same shape and area, and each have access to the well without going off his own land. (Answer: Figure 2. below).

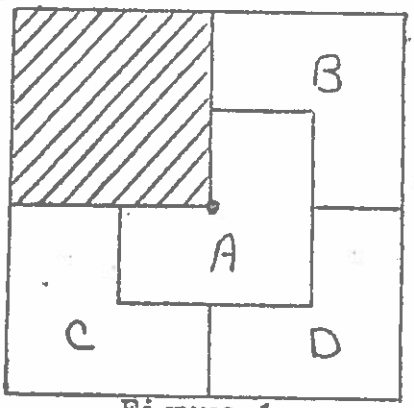


Figure 1

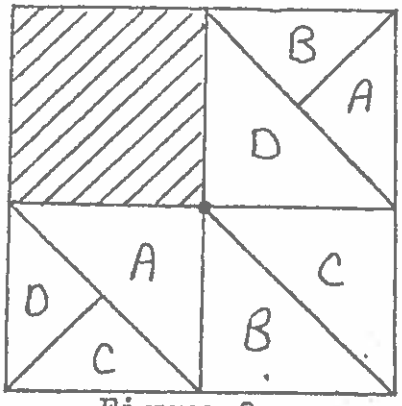


Figure 2

Shaded area wife's property

Heavy dot represents well

Answers: #1. (i) 139 854 276 i.e. 11826^2

(ii) 926 187 456 i.e. 30384^2

#2. 12 mph

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From Recommendations for a Return to Reality, Curriculum Series #15, O.I.S.E., 1973

"... some objectives of mathematics education are ... to motivate the desire to pursue further mathematical studies ... to stimulate an attitude of inquiry. For abler students, at least, greater encouragement should be given to exploring mathematical relations in some detail rather than just reaching the answer to a well-defined question concerning the relation".

National Metric Week

WHEREAS, The United States and Canada are now adopting the metric system of measurement; and
WHEREAS, Today's children, as adults, will live in a largely metric world; and
WHEREAS, It is the responsibility today of our schools to educate their students for the future; and
WHEREAS, Parents should have an awareness and an understanding of their schools' metric program;

Now, therefore, the National Council of Teachers of Mathematics declares that the week of 10-14 May shall be designated National Metric Week; and encourages each person to develop and maintain an awareness of the metric system; and admonishes all persons to use the metric system where applicable in all phases of daily life.

The following activities can be used to increase community awareness of National Metric Week and its goals:

1. Have a school open house or parent night sponsored by the mathematics department.

2. Devise a metric fair with all metric events, decorations, and prizes. This could be held in conjunction with local businesses, industries, and PTAs, and could include interesting booths, such as height and weight guessing booths; demonstration booths sponsored by Penney's, MacDonald's, Sears, IBM, and the calculator companies, and estimation booths that provide fun for all. Refreshments could be served, and the metric recipes used in making the cookies, punch, and so forth, could be given out. Door prizes might serve to attract participants if local companies would cooperate.

3. Have a metric field day, with track and field events using metric measures and with various measurement events using estimation and direct and indirect measurement.

4. Create a school or district metric newsletter to be issued regularly.

5. Create programs about the metric system and present them to local civic clubs, PTA, and various professional organizations.

6. Write articles for the school newspaper promoting the use of metric measurement.

7. Have the mathematics department plan a metric in-service session for the school faculty.

8. Do a project on metric cooking, working with the home economics deparment.

9. Have a bake-off and compile a metric cookbook, which will be published by the Mothers Club.

10. Make a map of the school locale using a metric scale.

11. Have students write and perform radio or TV scripts of commercials, playlets, and so on, involving metric usage.

12. Create a treasure or scavenger hunt using metric maps or directions with metric items to be found.

13. Put on a "Metric 500" car race using model cars, with solid fuel, CO_2 cartridges, or ramps as the source of power.

14. Provide parents with an opportunity to speak to classes on how they use the metric system or how the change to SI will affect their profession.

15. Encourage local corporations to conduct related programs for classes that demonstrate the need for metric measurement.

16. Devise a metric poster contest; seek the sponsorship of PTA, teacher groups, or local service clubs.

17. Plan field trips to places having a large amount of metric materials on display or applying metrication.

18. Arrange to give daily school announcements of temperature, precipitation, barometric pressure, and other items in metric.

19. Have an estimating contest, first in individual classes and then finding the school champion.

20. For metric week, advertise the events through radio, TV, and newspapers; invite the media to cover the activities.

21. Obtain a proclamation of a metric week from the school superintendent, the mayor, or the governor.

22. Agitate to convert city road signs to metric measures.

23. Promote a radio or TV or newspaper feature story on metric activities.

24. Present an award to the most innovative or future-looking (metric minded) person or segment of your local media, such as the local news or weather reporter.

25. Provide the news media with metric fillers, puzzles, and so on.

26. Take National Metric Week and its activities to a local shopping center and display, perform, or demonstrate ideas by--

    a. putting on a metric-oriented puppet show or play;

    b. using "metric" clothes in a fashion show;

    c. having local industries put up metric displays;

    d. coordinating store displays by showing metric items related to their type of business;

    e. setting up an activity area where students can perform, demonstrate metrication, and involve the shopping public (some "metric fair" types of activities could be used);

    f. displaying metric posters, original creations, or items collected from magazine ads (display-poster contest winners could make presentations there);

    g. displaying the local map in metric scale;

    h. persuading the local radio station to broadcast from the metric area, using their booth or trailer;

    i. presenting a metric slide/tape show such as that of the National Bureau of Standards or one produced locally by the students;

    j. having a central display of metric items.

27. Have a culminating set of activities for one of the days of your week known as Metric Day.

PUBLICATIONS AVAILABLE

TO O.A.M.E. MEMBERS

	Regular Price	O.A.M.E. Member Price
Handbook of Trigonometry (1975)	$2.00	N/C
A Preparedness Test for Grade Nine Students (1973)	2.00	N/C
Sample Grade 13 Examinations	1.00	N/C
Grade 11 (Level S) Sample Examinations	1.00	N/C
Reprints of 1974 & 1975 Gauss Contest Papers	.10	N/C

To receive these please contact:

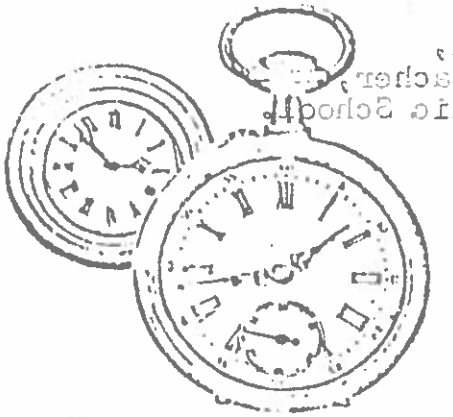
Mr. R. G. Scoins,
Faculty of Mathematics,
University of Waterloo,
WATERLOO, Ontario.

++++++++++++++++++++

...too much mathematics is taught in sterile, dull isolation... make YOUR lessons ...an expentancy of joy and challenge ... mathematize with joy...

CALCULATOR IDEAS SOLICITED

Have you discovered a unique way to use minicalculators in your mathematics classes? Have you found concerns or cautions that you would like to share with other teachers? The NCTM Instructional Affairs Committee (IAC) and the ERIC Center for Science, Mathematics, and Environmental Education are planning a joint publication to help share ideas and experiences with calculators. In particular we are seeking



1. descriptions (1000 words or less) of successful classroom activities using minicalculators;
2. work sheets, problem sheets, or other printed classroom materials that you use in connection with calculators;
3. brief descriptions (1000 words or less) of experiences you have had with calculators that might serve as guidelines for future use (or nonuse).

Descriptions and materials suitable for grades K-14 are welcomed. The best of the descriptions and materials submitted will be selected for publication by a joint IAC and ERIC committee.

Please send descriptions and materials, no later than 15 May 1976 to: Jon L. Higgins, Associate Director, Mathematics Education, ERIC Center for Science, Mathematics, and Environmental Education, The Ohio State University, 1200 Chambers Road--Third Floor, Columbus, Ohio 43212.

A SPECIAL NOTICE

To all holders of Membership Cards with expiry date August 31, 1976, OAME records indicate that 300 members purchased memberships prior to the closing of school in June 1975. All 1976-77 Members will receive a Membership Certificate 12" x 9" suitable for framing.

Be an Early Bird Member by using the form printed below and mail to:

Morley MacGregor
Secretary Treasurer OAME
247 Bright St., Sarnia, Ont.
N7T 4E9

ONTARIO ASSOCIATION FOR MATHEMATICS EDUCATION
MEMBERSHIP APPLICATION

DATE .....

Dr. ☐ Mrs. ☐ .....
Mr. ☐ Miss ☐ (Please print) NEW MEMBER ☐
APARTMENT No. _____ RENEWAL ☐

STREET or R.R. _____

TOWN OR CITY _____ POSTAL CODE _____

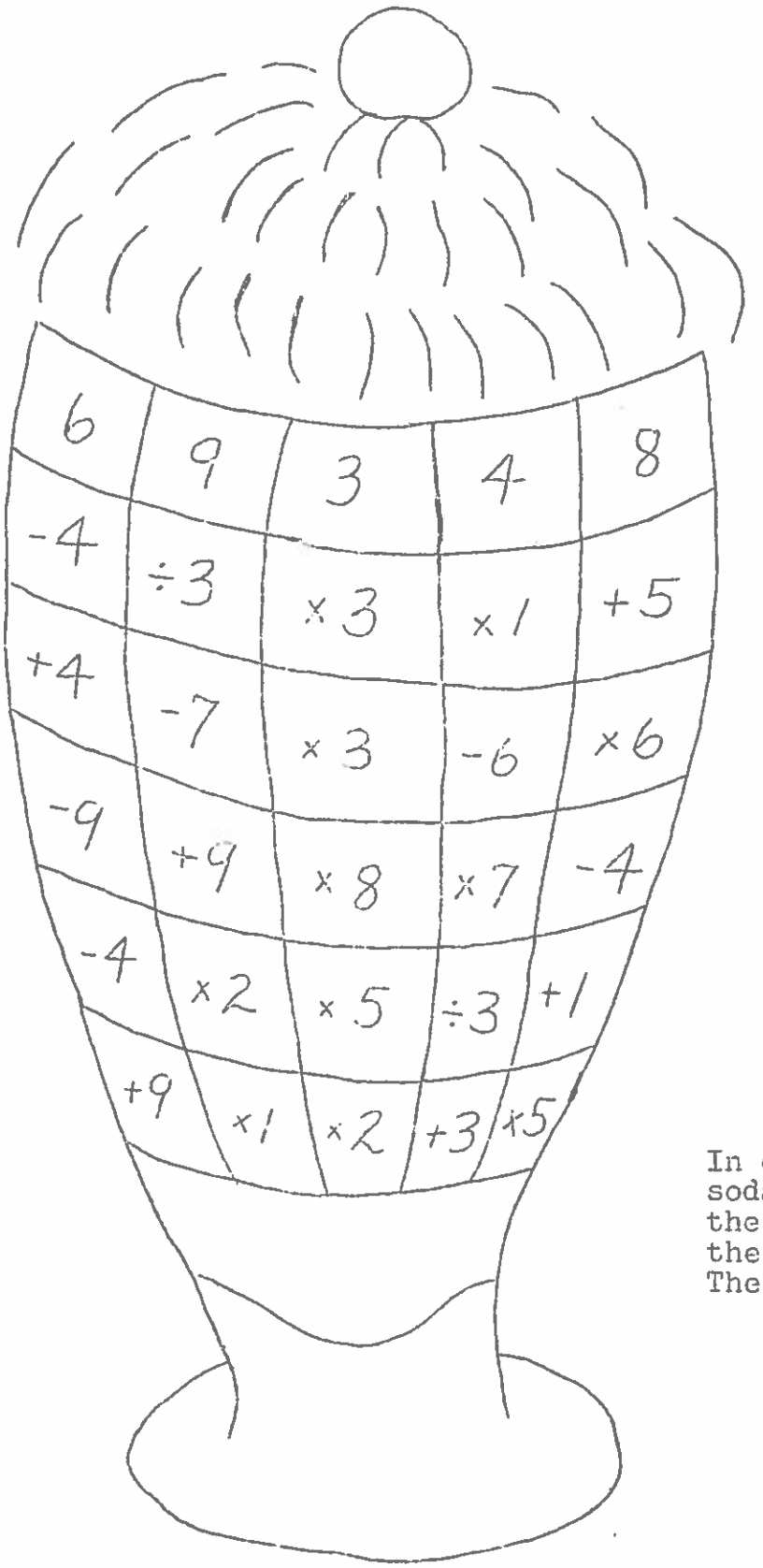
SCHOOL _____

Chapter Affiliation
(if applicable) _____

PLEASE ENCLOSE CHEQUE OR MONEY ORDER
FOR $10.00, PAYABLE TO OAME

Submitted by:
Dorothy Shea
Grade 4-5 Teacher
Watford Public School

WIN A SODA

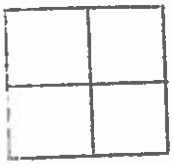


In order to win the soda, find a path from the whipped cream to the bottom of the glass. The path must equal 31.

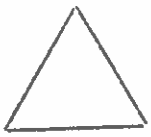
Submitted by:
Dorothy Shea
Grade 4-5 Teacher
Watford Public School

WEIRD PIES

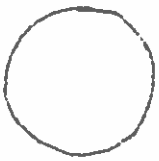
Pies are baked at a local bakery in the following shapes and put on sale at the stated prices.



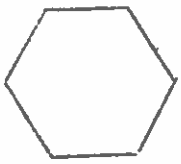
80¢



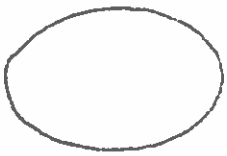
33¢



60¢

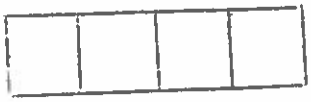


66¢



$1.00

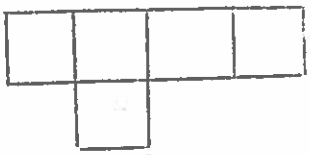
How much would each figure (pie) as shaped below cost?

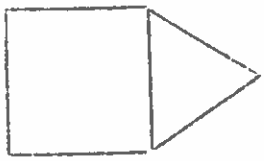


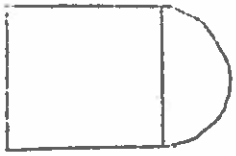


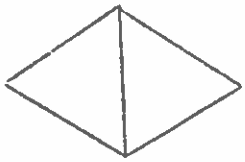


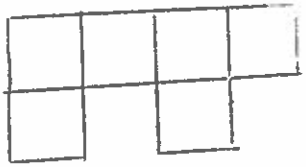


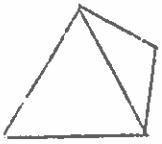


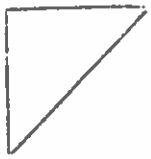


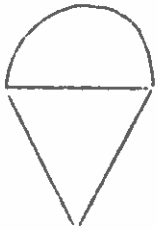






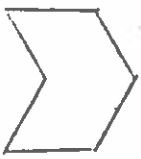




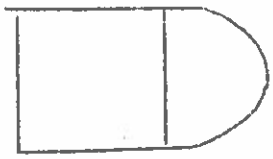


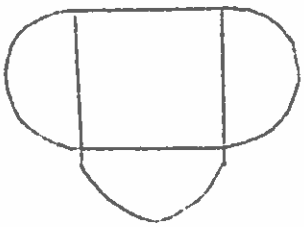


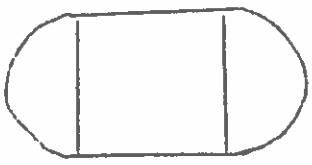


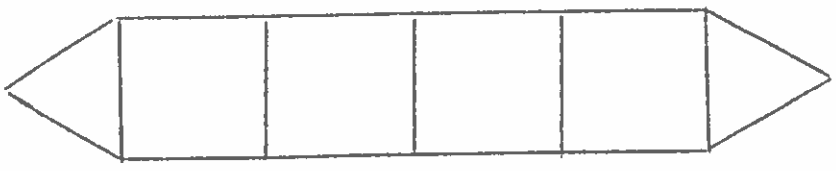












COMING EVENTS
ST. CATHARINES CONFERENCE May 14, 15,16/76
OTTAWA CONFERENCE May 13,14,15/77
LEADERSHIP SEMINAR Oct. 20-23/76
NOMA CONFERENCE Oct./76
SWOAME CONFERENCE Nov. /76

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