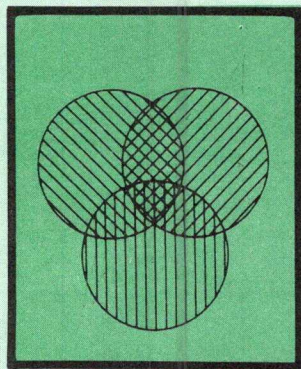


PERM



# Mathematics Council NEWSLETTER

The Alberta Teachers' Association

Volume 12

Number 1

October 1993

## From the Editor

**W**elcome to another year with all its challenges. We are always wondering how best to teach our students so they will not only learn mathematics but also enjoy it and see its practicality. One of the most important documents related to these issues developed in recent years is the *Curriculum and Evaluation Standards for School Mathematics*.

However, the document is not a panacea for all that is wrong with mathematics education. We as mathematics educators must familiarize ourselves with this document's goals and objectives so that we can use it for what it was intended.

David Whitin's article, taken from the *Arithmetic Teacher*, September 1992, speaks eloquently to this concern.

### The Dangers of Implementing the Standards; or, When Bad Things Happen to Good Ideas

Although I embrace the vision that the *Curriculum and Evaluation Standards for School Mathematics* (NCTM 1989) sets

for us in the field of mathematics education, I am already worried about the way many people have begun to interpret it. My concerns echo those in the field of language education who fear the same fate for the writing process and whole language movements. Bad things can happen to good ideas, including the curriculum and evaluation standards, unless we are clear about what that document *is* and *is not*. Let me clarify two misconceptions that have the potential to undermine the very heart of these standards:

1. The *Curriculum and Evaluation Standards* is not a methodology but a theory of learning. We can never begin to realize the vision of the *Standards* document by running around trying to collect the best activities we can find. If we consume ourselves in a methodology hunt, falsely assuming that if we search long and hard enough we will be able to secure the right set of activities for all learners,

then we are closing the very vision that we are trying to make possible. The kind of mathematical literacy advocated by the standards will never be found in a workbook, skill sheet or basal mathematics textbook. No publisher will ever be able to package it, contain it or sell it, despite their many claims to the contrary. True mathematical literacy must originate not from a methodology but from a theory of learning—one that views learning not as a series of enjoyable activities or problem-solving techniques but as a way of knowing and learning about the world (Whitin, Mills and O'Keefe 1990).

The *Standards* document is a theoretical statement about how people learn; it is based on a belief system that says, among other things, that learners construct their own knowledge; that learners grow by sharing and generating ideas with others; and that learners gain new



understandings by representing their ideas in different ways, such as through drawings, written narrative or oral discourse. From this perspective, it is not a static document to be implemented but a growing theory of learning to be tested, challenged and refined. It is a theoretical stance toward how people learn and, as such, can offer no fixed answers, only working hypotheses. If we see the *Standards* document as a series of commandments to be carried out without continual questioning and refining, then we are in trouble. The real danger lies in thinking we have all the answers. We will continue to grow as a profession only when we are asking new questions. The *Standards* document presents us with a vehicle for inquiry; it gives us a forum for testing out new questions about the learning process; it calls us to reflect and question, not to receive and accept.

2. The *Curriculum and Evaluation Standards* is not just for teachers but for all learners. If we view the document as a directive only to teachers, then we may not listen to the important contributions that our students can make to the teaching-learning process. However, if we see students as constructors of their own knowledge, and, if we value their unique background experiences and interests, then curriculum is not something we do *to* them but *with* them. We become avid kid watchers who celebrate

the strategies students employ and highlight the connections that they construct. We value all their interpretations, including their unexpected responses, because we know they are windows into the thinking process. Thus, the focus of the standards is not on teachers or students but on learning. The standards do not imply a hierarchical relationship between student and teacher but call for a collaborative stance toward the teaching-learning process. Inquiry learning is everybody's business—teachers, students and administrators alike. Each has a unique perspective on the learning process, and all their voices need to be heard.

The *Standards* document offers us an exciting vision for the field of mathematics education. However, we must view it as a theory of learning that invites continual questions by the inquiring voices of both students and teachers. Otherwise, bad things will happen to this good idea, and the vision that was will never be.

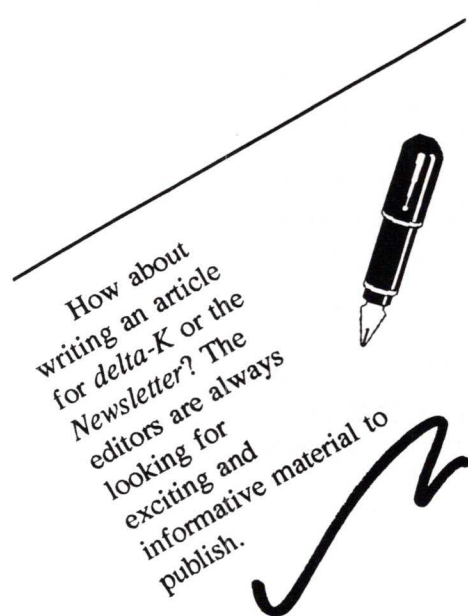
## References

- National Council of Teachers of Mathematics. *Curriculum and Evaluation Standards for School Mathematics*. Reston, Va.: The Council, 1989.
- Whitin, D.J., H. Mills and T. O'Keefe. *Living and Learning Mathematics*. Portsmouth, N.H.: Heinemann, 1990. ▲

## Thought for the Day

*Most widely used in school is the thinking required to solve problems for which there are definite answers. Although thinking of this kind is fairly well taught in the schools in mathematics, science and grammar, the answer itself or its form is too often more important than the logical steps to obtain it, thus downgrading the thought processes. Much less a part of most school programs is thinking that leads to ideas about problems for which there are no definite or right answers. We need thinking leading into inquiry about political, social, economic and even academic problems for which there are at best a series of alternatives, none perfect but some, we hope, better than others.*

—William Glasser,  
Schools Without Failure, 1969



How about writing an article for *delta-K* or the *Newsletter*? The editors are always looking for exciting and informative material to publish.



## From the President's Pen

**A**nother summer has raced by; a new school year is upon us. I hope that your holiday was restful and energizing, and that you are facing the new term with energy and enthusiasm.

This is the beginning of my two-year term, and I would like to tell you a little about myself. I have been a classroom teacher for more than a quarter century—the last sixteen years teaching junior high math. As a MCATA executive member, I have served as director-at-large, NCTM representative, secretary, vice-president and now look forward to the challenge of being president.

Two executive members have resigned: Diane Congdon, 1992 conference chair, and Alvin Johnston, membership director. Their participation in council activities is greatly appreciated, and they will be missed. I thank

them for contributing to the work of the Council. Welcome to three new executive members: Membership Director Daryl Chichak from Edmonton and Members-at-Large Betty Morris from Edmonton and Cindy Meagher from Grande Prairie. My goal as president is to get more members actively involved in Math Council activities. If you would like to become an executive or a committee member, please contact me.

During July, Richard Kopan, George Ditto and I attended an NCTM Leadership Conference in Ottawa. We met with delegates from across Canada to discuss common concerns and to share goals and activities. We left the conference with excellent ideas for improving the services we offer to members. In August, at the ATA Summer Conference, Art Jorgensen, Doug Weisbeck and I attended excellent sessions on the roles of editors, the treasurer and the president. I thank those executive members who gave up a part of their summer to attend these conferences.

Make it your priority to register for our 1993 conference, "Reflection: Congruent Beliefs and Practice" in Calgary on October 28 to 30. Registration information is enclosed with this newsletter. Share it with your colleagues and encourage them to attend. This will be one of our best conferences ever.

As well, a number of mini conferences are planned province-wide. Your school math contact person will receive information as it becomes available. If you would like a mini conference held in your area, contact Conference Director Bob Michie or me.

As a council, we will continue to promote the improvement of mathematics in Alberta by supporting and initiating programs and activities that strengthen the teaching and study of mathematics among students. You can help by informing us of your needs and by getting involved in council activities.

Have a good year! ▲

—Wendy Richards

### Conferences

MCATA Annual Conference  
October 28 to 30, 1993  
The Palliser, Calgary

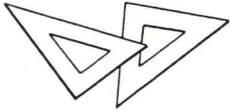
This is shaping up to be a super conference. Come and participate in many excellent sessions, meet some colleagues and have some fun. See the enclosed registration form.

NCTM Annual Conference  
April 13 to 16, 1994  
Indianapolis, Indiana

Plan now to attend this outstanding conference. Attending a NCTM annual conference has to be a highlight of an educational career.



## The Right Angle



### Mathematics 30 Diploma Examinations Update

A proposed formula sheet for the 1994 examinations was published in the *Mathematics Council Newsletter* in May 1993 and was shared with many school districts in the province and with markers at the July 1993 marking session. Based on comments that were received, the formula sheet was revised. The revisions and the 1994 Formula Sheet are attached to this newsletter. For more information, contact Florence Glanfield at 427-0010.

### Curriculum Branch Update

A resource all-call was done for new resources in Mathematics 31. A new resource will be authorized for this course in time for the second semester. The Mathematics 31 curriculum is also being reviewed.

Plans for reviewing curriculum and resources in junior high mathematics are under way. Tentative plans include a resource all-call later this fall, and the Secondary Mathematics Advisory Committee will review the content and standards of all secondary mathematics courses. For more information regarding both of these activities, contact Hugh Sanders at 427-2984. ▲

## High School Math Competition

This prestigious competition is held in two rounds, the first in November and the second the following February. The top 22 students in the latter competition will be nominated to write the Canadian Mathematics Olympiad (CMO), administered by the Canadian Mathematical Society. All three contests are written in the students' schools. Top performers in the CMO may earn a spot on the Canadian National Team to compete in the International Mathematics Olympiad in Moscow next summer. This competition is open to all students enrolled in a high school program in Alberta and the Northwest Territories. If you are interested in having your students participate in this competition, contact Board Chair Alvin Barager at 492-3398 or Secretary Helga Dmytruk at 492-0446.

## On the Lighter Side



*A warm smile is the universal language of kindness.*

*If you are patient in one moment of anger, you will escape a hundred days of sorrow.*

## CMASTE

The Centre for Mathematics, Science and Technology Education (CMASTE) promotes research and development in instruction and in curriculum throughout Canada. The Centre also seeks to advance interaction among science education (in particular, its science-technology-society aspects) and mathematics education through creating and maintaining a favorable environment for productive and significant collaborative work. CMASTE activities include initiating and facilitating research and development projects; establishing and maintaining a network of researchers, educators and other interest groups; and producing resource materials and publishing research findings.

CMASTE is interested in learning about innovative mathematics, science and technology programs, especially those related to such social issues as environmental awareness, the role of technology in society, and women in science and mathematics. For further information, contact Drs. Heidi Kass or Al Olson, Codirectors, Department of Secondary Education, 341 Education South, University of Alberta, Edmonton, AB T6G 2G5; phone 492-0195 (CMASTE), 492-3674 (Secondary Education), Fax 492-9402. ▲



## What Do You Want from MCATA?

Your executive would like to know what you would like from your MCATA membership. Currently, members receive copies of monographs and the *Newsletter* and *Journal*. Also, annual conferences are organized to meet your interests and needs. However, we are always looking for other ways to serve you. Do you want a mini conference in your area? Do you want to form a regional association? Just ask, and we will do our best to help you.

## MCATA Members on the Move

**R**ichard Kopan, former NCTM Regional Services Committee (RSC) representative for the Canadian region, has been appointed RSC chair for 1993–94. Kopan has served at all levels of Affiliated Group (AG) work throughout Canada, including president of, and NCTM representative for, the Mathematics Council.

Replacing Richard Kopan as the Regional Services Committee representative will be **Florence Glanfield**. Currently, Glanfield also serves as the Math Council's

1994 conference chair and Alberta Education representative.

Newly appointed RSC members are *Christine Comins*, Pueblo, Colorado, serving the Western region; *Leo Edwards*, Spring Lake, North Carolina, serving the Southern region; and *Florence Glanfield* of Edmonton, serving the Canadian region. Returning RSC members include Rita Janes, Canadian region; Mary Jo Aiken, Central region; Dwayne Cameron and Blanche S. Brownley, Eastern region; Ginnie Bolin, Southern region; Richard Brannan, Western region; and Dan Dolan, Board liaison, and Virginia Williams, NCTM staff liaison. AGs are categorized into one of five regions, depending on geographic location. Each region has two RSC representatives, who serve a three-year term.

RSC is a primary link with NCTM's members and AG members. Additional information about the committee and its work and contact information for its current members are included in the "Regional Services Committee 1993–94" brochure sent to each AG. ▲

(From *NCTM Regional Services Committee Update*, Vol. 2, Issue 1, Summer 1993.)

## Call for Articles

The *Mathematics Teacher* is always seeking quality articles for publication. Many readers of this newsletter have good ideas that they might be willing to share in the *Mathematics*

*Teacher*. Of particular interest are articles dealing with mathematical themes appropriate for a core curriculum, teaching mathematics to historically underrepresented students, teaching algebra or geometry to all students.

We are interested in classroom-tried strategies that also incorporate technology, alternative assessment or connections to other subjects. Manuscripts should encourage students' interaction with each other and with the teacher. For more information, write to or call Dr. Harry Tunis, Managing Editor, NCTM, 1906 Association Drive, Reston, VA 22091-1593; (703) 620-9840. ▲

## What's New



*Fraction Sense*, by Mary Kay Bouck, Elizabeth M. Jones and Linda Pierce. Monograph No. 24 of the Michigan Council of Teachers of Mathematics (MCTM), 145 pp., 1991, \$10.

"This book emphasizes teaching for understanding and furnishing students with a conceptually sound background in fractions. It . . . helps to develop discourse between teacher and students as recommended in the NCTM's *Professional Standards for Teaching Mathematics*. . . . Reproducible student materials are included." (From the *Arithmetic Teacher*, March 1993.)

Order from MCTM, Box 16124, Lansing, MI 48901.



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## Mathematics 30 Formula Sheet

The following information may be useful in writing this examination.

- The roots of the quadratic equation  $ax^2 + bx + c = 0$  are

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

- The distance between two points  $(x_1, y_1)$  and  $(x_2, y_2)$  is

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

### Quadratic Relations

- $$e = \frac{|PF|}{|PD|}$$

### Trigonometry

- arc length  $a = r\theta$
- $\sin^2 A + \cos^2 A = 1$
- $1 + \tan^2 A = \sec^2 A$
- $1 + \cot^2 A = \csc^2 A$
- $\sin(A + B) = \sin A \cos B + \cos A \sin B$
- $\sin(A - B) = \sin A \cos B - \cos A \sin B$
- $\csc A = \frac{1}{\sin A}$
- $\sec A = \frac{1}{\cos A}$
- $\cot A = \frac{\cos A}{\sin A}$
- $\cos(A + B) = \cos A \cos B - \sin A \sin B$
- $\cos(A - B) = \cos A \cos B + \sin A \sin B$

### Permutations and Combinations

- $${}_n P_r = \frac{n!}{(n-r)!}$$
- $${}_n C_r = \frac{n!}{r!(n-r)!}$$
- In the expansion of  $(x + y)^n$ , the general term is  $t_{k+1} = {}_n C_k x^{n-k} y^k$ .

### Sequences and Series

- $t_n = a + (n-1)d$
- $$S_n = \frac{n[2a + (n-1)d]}{2}$$
- $$S_n = n\left(\frac{a + t_n}{2}\right)$$
- $t_n = ar^{n-1}$
- $$S_n = \frac{a(r^n - 1)}{r - 1}, r \neq 1$$
- $$S_n = \frac{rt_n - a}{r - 1}, r \neq 1$$

### Exponential and Logarithmic Functions

- $\log_a mn = \log_a m + \log_a n$
- $\log_a \frac{m}{n} = \log_a m - \log_a n$
- $\log_a m^n = n \log_a m$

## Mathematics 30 Formula Sheet Revisions

Added:

- definition of both the quadratic formula and the distance formula
- $S_n = \frac{rt_n - a}{r - 1}$ ,  $r \neq 1$  in **Sequences and Series**
- logarithmic laws from the *Mathematics 30 Course of Studies*

Removed:

- $P(x) = D(x)Q(x) + R$  from **Polynomial Functions**
- $y = mx + b$  from **Statistics**
- $Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0$  from **Quadratic Relations**
- “where  $F$  = focus,  $D$  = directrix, and  $P$  = point on the conic” from **Quadratic Relations**
- $n! = n(n - 1)(n - 2) \dots (3)(2)(1)$  from **Permutations and Combinations**

Moved:

- $z = \frac{x - \mu}{\sigma}$  from **Statistics** on Formula Sheet to the top of the z-score page
- $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$  from **Polynomial Functions** to the top of the page



# NCTM LAUNCHES

First Issue of

## *Mathematics and the Middle Grades*

April 1994

### **Let's Make History Together**

NCTM is proud to announce a new resource for students, teachers, and mathematics educators. This journal will address the learning needs of all middle school students, the demands these needs place on their teachers, and issues that capture the vitality of mathematics and the characteristics of the middle-grades student. The new journal will focus on intuitive, exploratory investigations that help students develop a strong, conceptual mathematical base. Such a foundation leads to greater mathematical abstraction, as appropriate for middle school grades.

### **Call for Manuscripts**

#### *Sharing ideas about middle-grades mathematics teaching*

- What kinds of specific challenges do teachers in the middle grades face in teaching mathematics and how have they met these challenges?
- What are some creative ways to open and close lessons?
- What does research suggest about teaching in the middle grades?
- What preliminary mathematics experiences are essential for students before they are exposed to the more formal investigations of algebra or geometry?
- How do remediation or acceleration approaches become barriers that hinder the conceptual development of a full mathematics curriculum and access to mathematical power for students? What are some effective alternatives available to teachers?
- Which of your ideas could be included in a bulletin board or monthly calendar

to highlight puzzles, problems, games, activities, or projects?

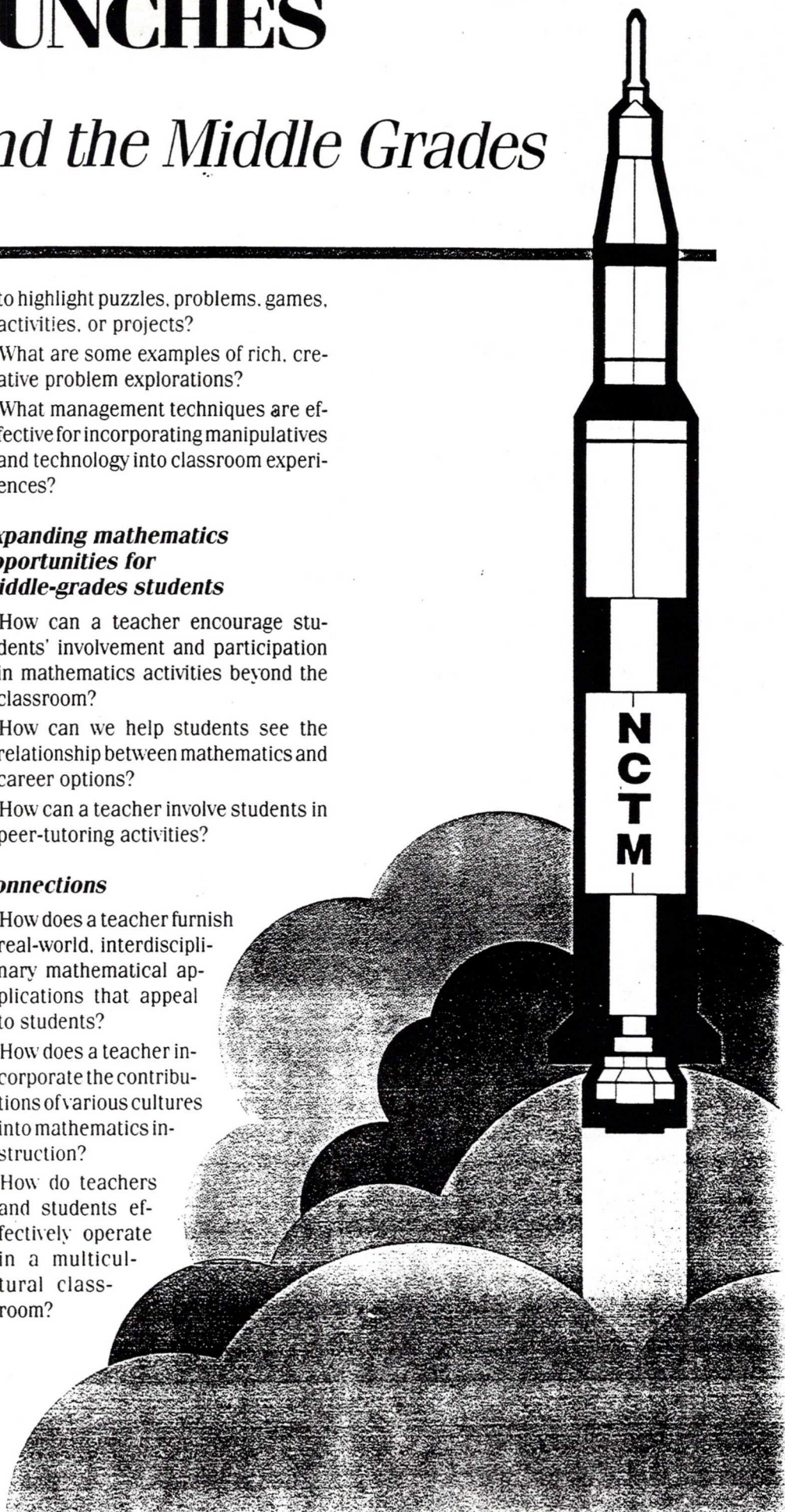
- What are some examples of rich, creative problem explorations?
- What management techniques are effective for incorporating manipulatives and technology into classroom experiences?

#### *Expanding mathematics opportunities for middle-grades students*

- How can a teacher encourage students' involvement and participation in mathematics activities beyond the classroom?
- How can we help students see the relationship between mathematics and career options?
- How can a teacher involve students in peer-tutoring activities?

#### *Connections*

- How does a teacher furnish real-world, interdisciplinary mathematical applications that appeal to students?
- How does a teacher incorporate the contributions of various cultures into mathematics instruction?
- How do teachers and students effectively operate in a multicultural classroom?





- How does a teacher help students establish and maintain a broad perspective of mathematics topics as interconnected?

**Assessment in middle-grades mathematics programs**

- How can teachers use assessment to enhance learning?
- How can teachers assess their own teaching and determine possible directions for continuous professional development?
- How can teachers communicate about students' progress with students, parents, and administrators?

**Professional development for middle-grades teachers**

- What approaches are successful for preservice and in-service teacher education?
- How can teachers' empowerment be facilitated by in-service training?
- How can we help teachers translate positive workshop experiences into effective, ongoing classroom practices?
- How can peer coaching, mentoring, and leadership-development models be used effectively?

To contribute to this historic event, please select one of the following two options:

- Submit five copies of a completed manuscript for review to *Mathematics and the Middle Grades*, NCTM, 1906 Association Drive, Reston, VA 22091-1593. No author identification should appear in the text of the manuscript.

- If you have an idea for an article (or a series of problems, classroom experiences, etc.) but do not feel ready to complete a manuscript, please send a self-addressed, stamped envelope requesting the *Manuscript Proposal Guide* that is designed to offer first-time authors assistance in organizing and describing their work.

**Middle-Grades Educators, Don't Miss This Unique Opportunity**

In April 1994, the National Council of Teachers of Mathematics will begin pub-

lishing a new journal for mathematics and the middle grades. This resource for middle-grades educators and their students will promote a curriculum that captures both the vitality of mathematics and the characteristics of students in the middle grades. Recognizing how middle-grades students learn, this journal will focus on intuitive, exploratory investigations using informal reasoning intended to help students develop a strong conceptual basis leading to greater mathematical abstraction. Share your special strengths! Join this network of educators as this new venture begins! You can make a difference in many ways. Complete the form below and send it in today!

**Count me in!** I would like to be involved in the new middle school journal in the following ways:

I would like to develop a manuscript. Please send me additional information to get started.

I am willing to serve as a referee of manuscripts submitted for potential publication.

My idea for a regular department or series for the journal is \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

I suggest the following valuable topics for this journal: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

I suggest the following potential authors (include address):

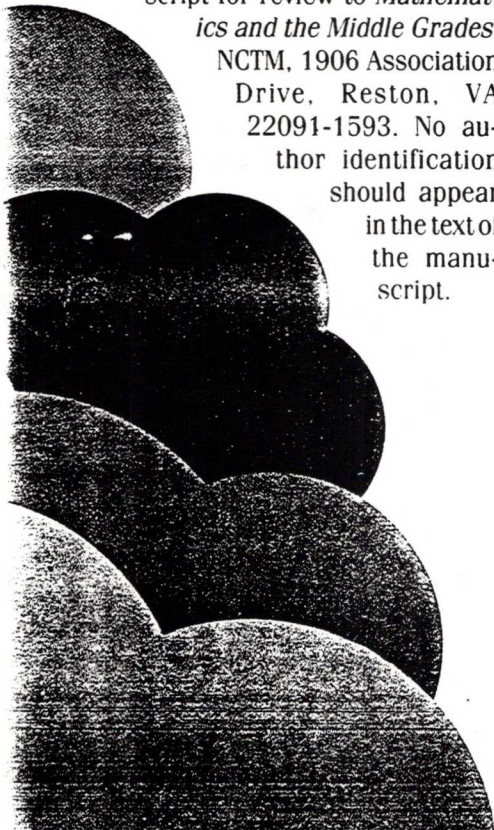
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| Name    | Name    |
| _____   | _____   |
| Address | Address |
| _____   | _____   |
| Topic   | Topic   |

My name \_\_\_\_\_

Address \_\_\_\_\_

Present position \_\_\_\_\_

Please send this completed form to NCTM, *Mathematics and the Middle Grades*, 1906 Association Drive, Reston, VA 22091-1593.





# FROM THE FILE

## Miscellaneous

### 31 DIVERFUL WAYS TO USE MATH AT HALLOWEEN

Teachers can use their imaginations to alter or extend the following activities for elementary school students. Some activities are particularly suitable for laboratories or work centers.

#### *Pumpkin activities*

*Materials:* a pumpkin, tape measure, knife, and spoon. Optional: parent volunteer to help students roast pumpkin seeds

1. Measure the diameter of the pumpkin.
2. Measure the height of the pumpkin.
3. Count the ribs on the pumpkin.
4. Calculate the volume of the pumpkin by immersing it.
5. Describe geometrically the shape of the pumpkin.
6. Estimate the number of seeds inside the pumpkin.
7. Count the number of seeds from the pumpkin.
8. Divide the number of seeds evenly among the students.



#### *Jelly-bean activities*

*Materials:* a bag of orange and black jelly beans, glass jar, and scale

9. Estimate the number of jelly beans in a jar.
10. Estimate the fractional part of the beans that are orange.
11. Count the number of jelly beans in the jar.
12. State the ratio of orange beans to black beans.
13. State the ratio of orange beans to total beans.
14. Find the percent of orange beans to total beans.
15. Estimate the weight of a jelly bean.
16. Weigh a jelly bean on your scale (you may want to weigh ten candies and then divide the total weight by 10).



17. Find the total weight of all the jelly beans.

#### *Costumes*

18. Poll your classmates to determine the types of costumes they will wear for Halloween, then decide on categories of costumes.
19. Make a frequency table for the types of costumes.
20. Construct a bar graph of costume choices.
21. Find the percent of each type of costume chosen.
22. Construct a circle graph of percents of costume choices.



#### *Countdown*

*Materials:* a calendar

23. Count the number of days until Halloween.
24. Name the last year that Halloween fell on the same day as it does this year.
25. List as many different sets of numbers as you can of which Halloween's date is a member.
26. On what day will Halloween fall during the next leap year?
27. Predict the temperature on Halloween night by using library resources.

#### *Trick or treat*

28. Estimate the number of trick-or-treaters who will come to your house.
29. Decide how you will tally the exact number of trick-or-treaters who will come to your house.
30. Predict the number of pieces of candy you will get on Halloween.
31. Before you eat any of your candy on Halloween night, count the number of pieces you have collected. Tomorrow in mathematics class, find the average number of pieces collected by the students in your class.

From the file of Cathy A. Barkley, Mesa State College, De Beque, CO 81630