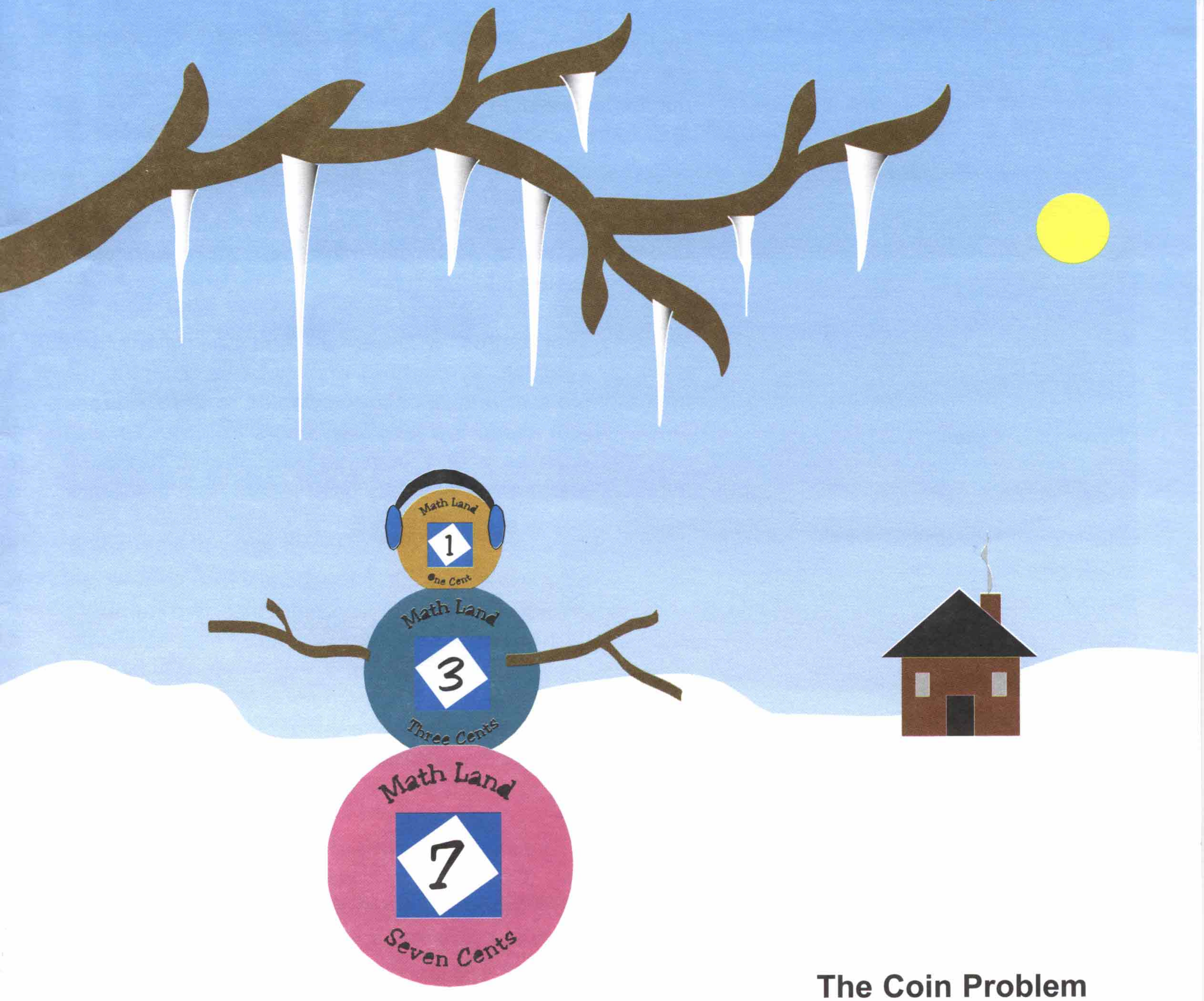
Math Reader

Volume 1 • Number 2
January 1999



The Coin Problem

see page 4

Math Reader

Contents

Math Reader (elementary) and *Math Explorer* (intermediate) are published 8 times a year by the Southwest Texas State University Math Institute for Talented Youth (MITY). An annual subscription is $8.00 for individuals, $6.00 for group purchases of 25 or more, and $4.00 for school purchases of 100 or more. See the back cover for an order form or contact *Math Reader* at the address or phone below.

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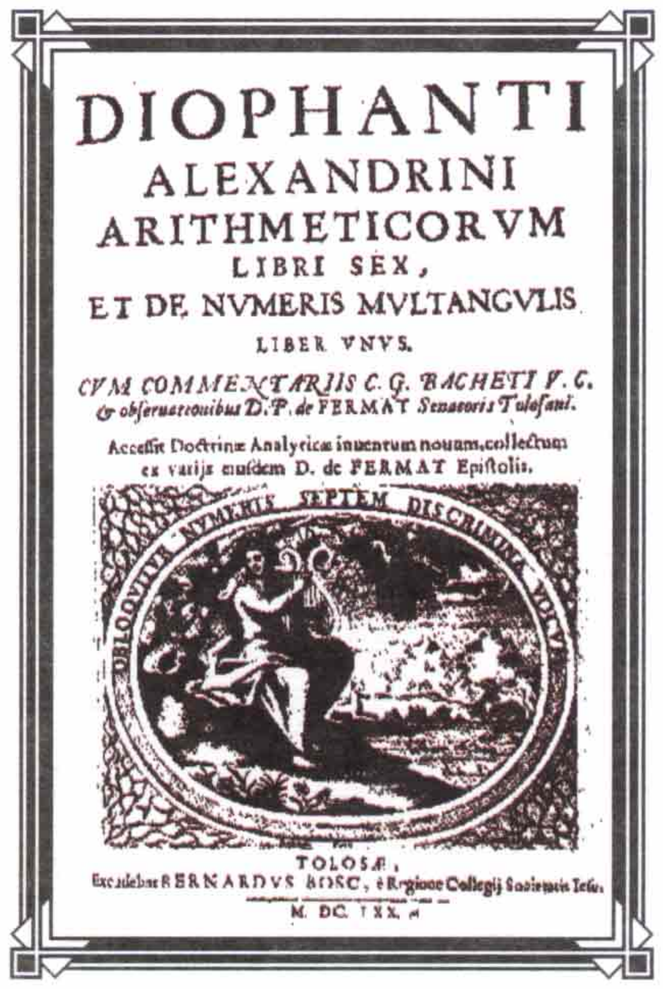
Diophantus

Hiroko Warshauer


DIOPHANTI
ALEXANDRINI
ARITHMETICORVM
LIBRI SEX,
ET DE NVMERIS MVLTANGVLIS
LIBER VNVS.
CVM COMMENTARIIS C. G. BACHETI V. C.
& observationibus D. P. de FERMAT Senatoris Tolosani.
Accessit Doctrinæ Analyticæ inventum nouum, collectum
ex variis eiusdem D. de FERMAT Epistolis.
TOLOSÆ,
M. DC. LXX.

Diophantus of Alexandria, known as the "Father of Higher Arithmetic" (or what we now call the theory of numbers), lived in the third and fourth century AD. He was a Greek mathematician who wrote a great body of work called *Arithmetica* that consisted of many volumes. Some of his works were written in Greek, and others were found translated into Arabic.

In Diophantus' writings, we find one of the first uses of algebraic symbols in mathematics. Diophantus used symbols or letters called variables to help express mathematical ideas. We now use letters from our English alphabet such as x or y or A, as variables, to represent numbers. Diophantus naturally used letters from the Greek alphabet, like α, β, γ.

Diophantus also studied equations which we now call "Diophantine equations. " The statement that "**two numbers added together equals 10**" can be written mathematically as an equation using variables: **x + y = 10.** We use the variables x and y to represent the numbers. Diophantus was first interested in finding positive integer solutions for x and y that would make the equation true. A positive integer is an everyday counting number like 1,2,3.

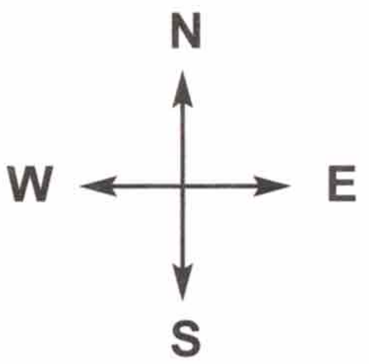
How many different pairs of solutions can you find for this equation, if both x and y are positive integers? For example, if x = 3 and y=7, then x + y = 3 + 7 = 10., so we say (3,7) is one solution. Diophantus later worked with noninteger numbers for x and y as well, such as x = 3.5 and y = 6.5. This is also a solution since 3.5 + 6.5 = 10. We'll look at some problems like this in the pages to come.

Hollingdale, Stuart, *Makers of Mathematics*, Penguin Books, New York, NY, 1989.
Bell, E. T., *Men of Mathematics*, Simon and Schuster, New York, NY, 1965.

Backyard Bees and Grids

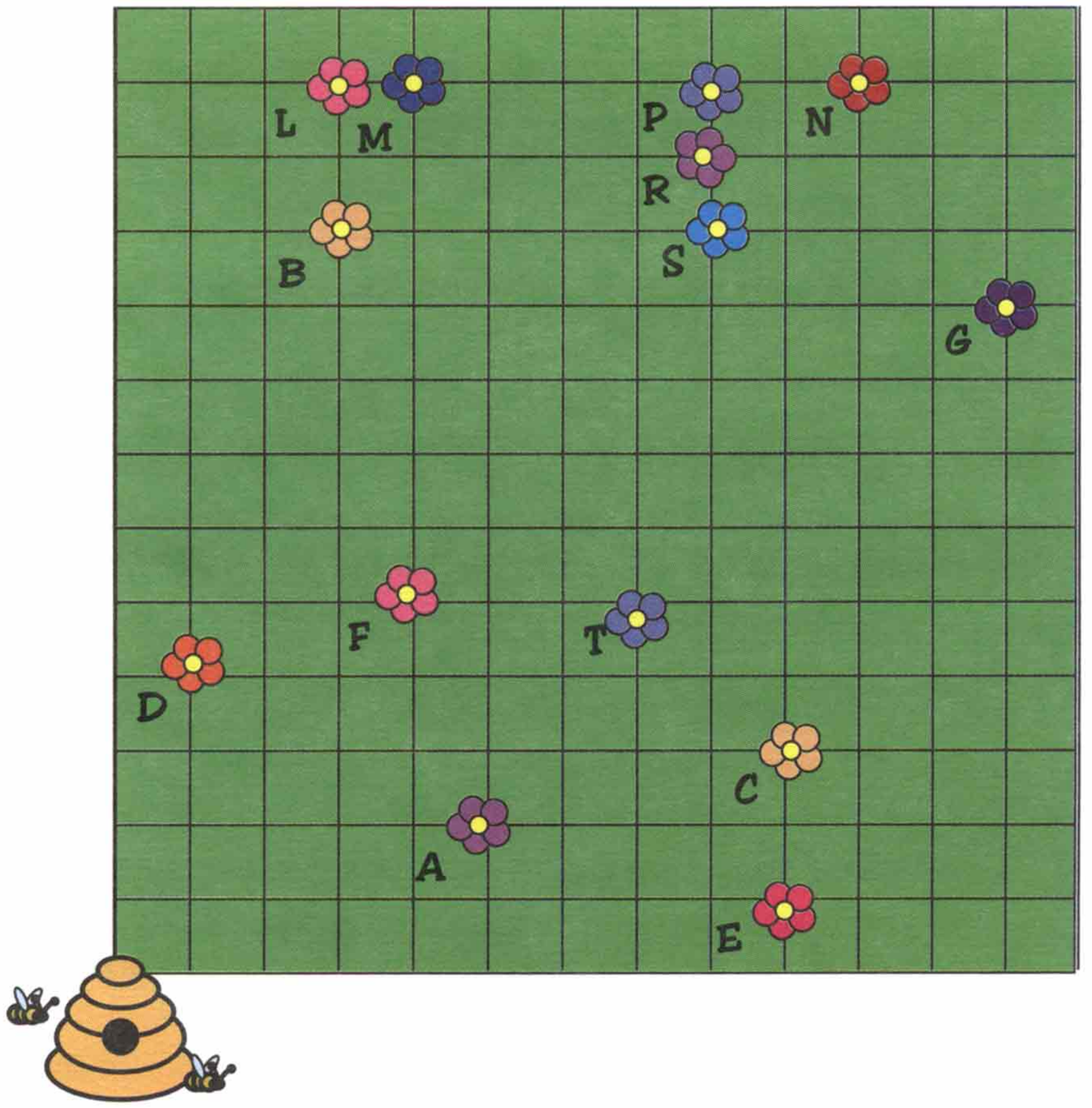
Terry McCabe

Suppose you are in charge of making a map of a flower garden in the back yard to help a hive of bees find pollen. One way to help the bees would be to draw a grid on paper, with the lower left hand corner being the location of the hive. (See the grid below.)



On this grid, north is up and east is to the right. The gardener was nice enough to plant flowers in rows so that the grid points are the locations of the flowers. How do we tell the bees the location of flower A? One way would be to tell the bee that flower A is 5 feet to the right (east) and 2 feet up (north). Or we could tell the bee to go 2 feet up (north) and 5 feet to the right (east).

To be consistent, we have to decide how to label point A. Usually, we use the first way, so that we describe point A by the directions, "5 units right and 2 units up." We then say that point A has coordinates (5,2). But we must always remember our convention that this means that we locate point A by going 5 units to the right and 2 units up. We call 5 the first coordinate of A, and 2 the second coordiante of A.



Help our bee friend by giving her the coordinates of the points B, C, D, E, F, G, and M.

Point	A	B	C	D	E	F	G	M
Coordinates	(5,2)							

If a bee flies from the flower at point B straight to the flower at point C, it makes a bee line. What points does she fly over? Would it help to use a ruler? Make a list of the points on your line.

What do your notice about the coordinates of the points P, R, and S? What do you notice about the points L, M, P, and N?

Find and label the following points: (3,2), (3,6), (2,3), and (5,5).

PROBLEMS OF THE MONTH

Directions

Send your solutions to ***Math Reader*** ! We will publish the best solutions each month, and send a free ***Math Reader*** Pen to everyone whose solution we publish.

1. Using nickels and dimes, how many ways can you make change for a quarter? thirty cents? thirty-five cents? forty cents? fifty cents? Let N=number of nickels and D=the number of dimes. Use the tables below, and make new tables of your own.

25 cents	

30 cents	

35 cents	

2. Using quarters and dimes, how many ways can you make fifty cents? a dollar? Make tables of your answers.

3. Using nickels and pennies, how many ways can you make twenty cents? twenty-five cents? thirty cents? Make a table of your answers.

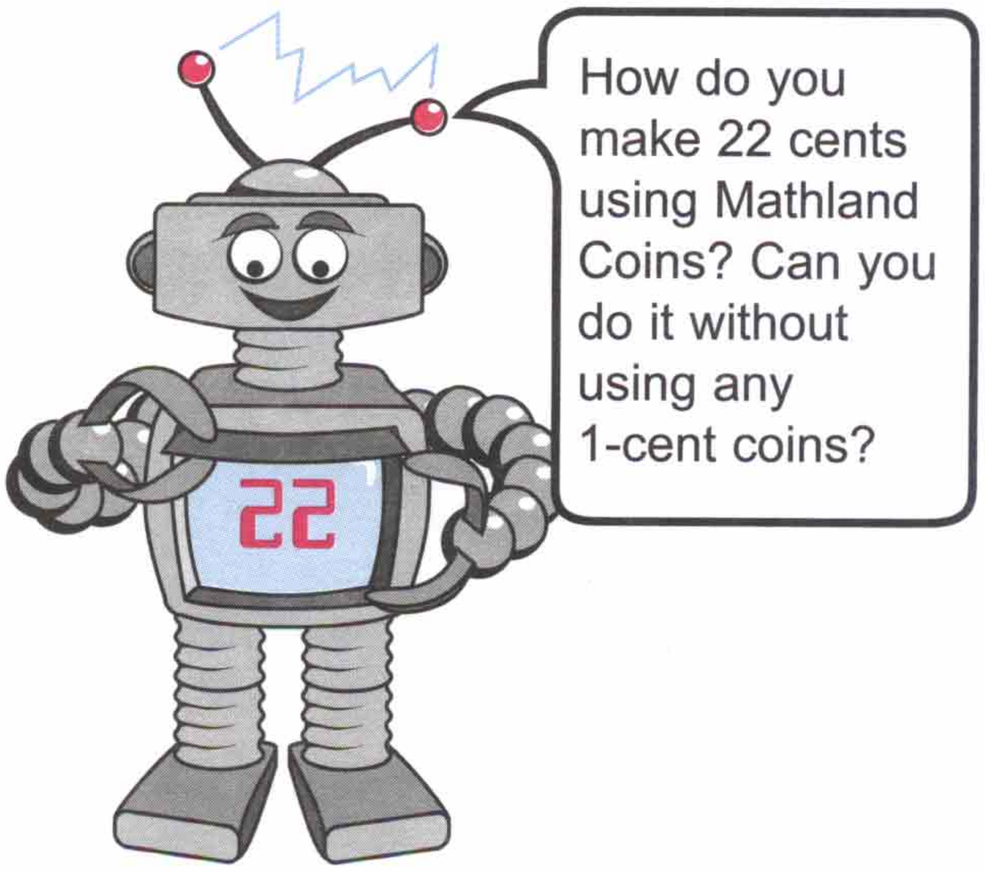
4. A post office sells only 2 cent and 3 cent stamps. How could you buy stamps for a letter that costs 12 cents? 14 cents? 16 cents? 18 cents? Do you see a pattern?

5. Rosa needs 36 pounds of honey. The store sells honey in 2 lb. and 3 lb. jars. What are the different ways to buy the 36 pounds of honey?

6. When I was 8 years old my father was 31. Now he is twice my age. How old am I?

7 **Ingenuity (The Coin Problem)**

In the country of "Mathland" the government makes 1-cent, 3-cent, and 7-cent coins. What is the highest price for which the people must use a 1-cent coin to pay the exact amount? Explain.

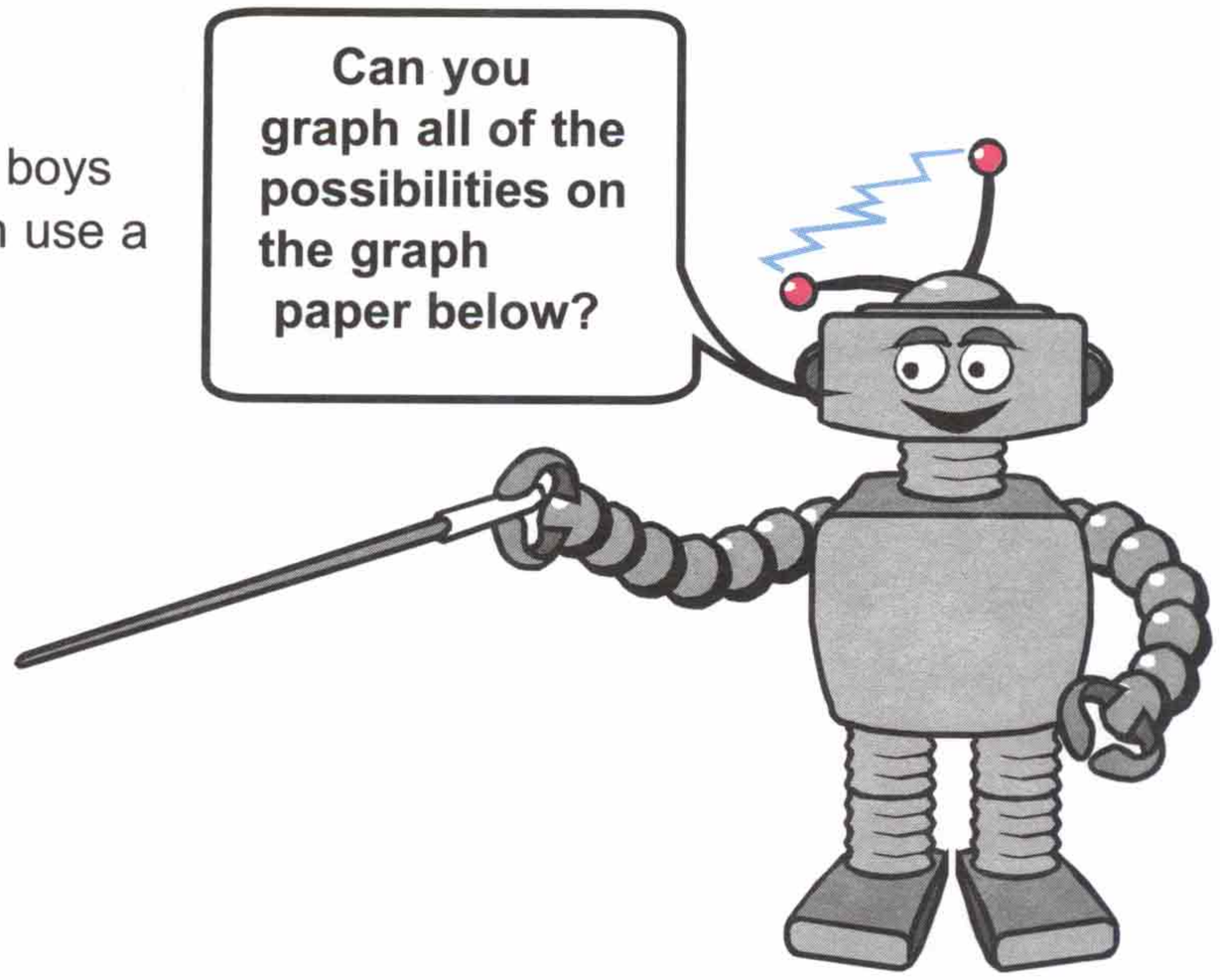


Just Graph It!

Hiroko Warshauer

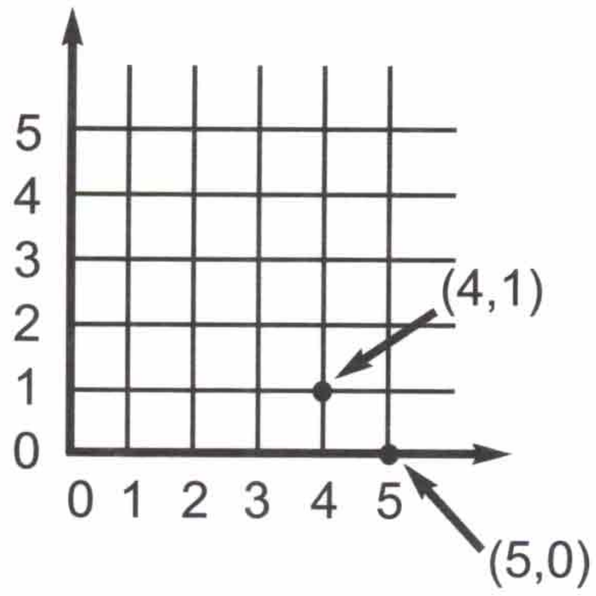
A basketball team has 5 players, How many boys and how many girls might be on the team? You can use a table to list all of the possibilities:

Number of Boys	Number of Girls
5	0
4	1



Can you complete the table?

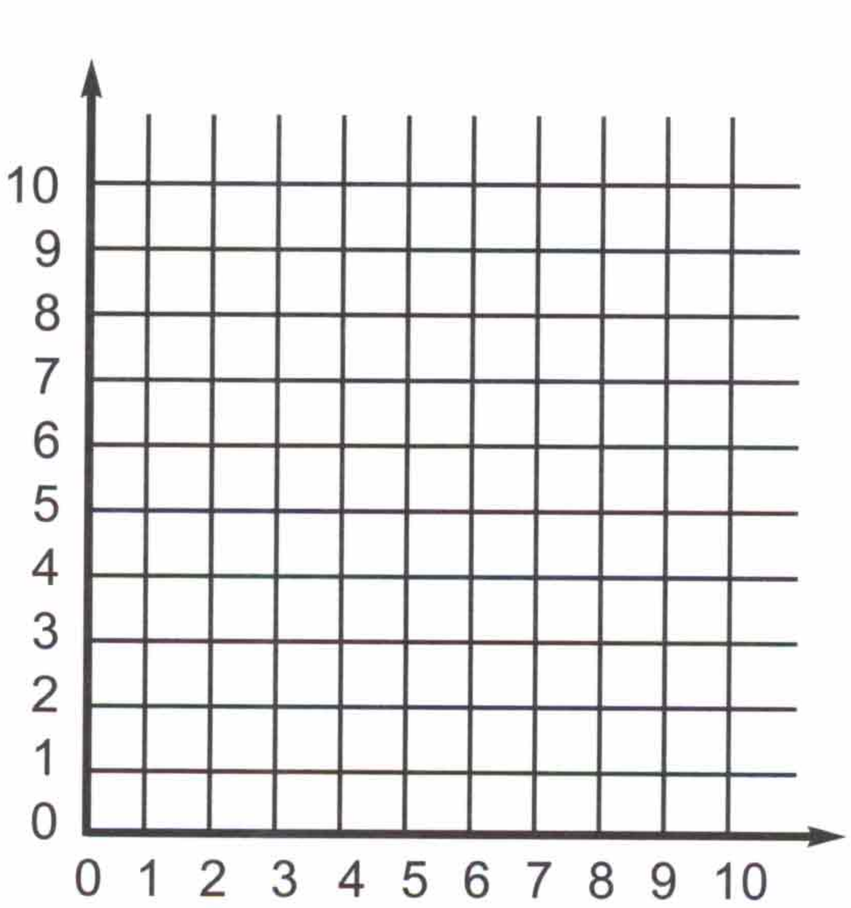
Notice that if we want to look at the pairs of numbers for the "number of boys" and the "number of girls," we can use a notation called **ordered pairs** and write (5,0) and (4,1). What are the other possible ordered pairs?



Another way to represent the composition of teams is more pictorial. We graph the ordered pairs on a **grid,** called the coordinate axes. We locate the points on the grid by looking at the coordinates. The point (4,1) is 4 units along the horizontal or x-axis, and 1 unit up along the vertical or y-axis. Finish plotting the points for the different combinations of basketball teams using the grid to the right.

We can also use graphing to visualize other problems. Use the grid to the right to graph the points representing nine-person boy-girl baseball teams.

Can you plot the nickel and dimes problems in the Problems of the Month? In each of these problems you made a table. Graph the points in your table. Does this help to see a pattern? You can use the coordinate axes here or make up your own grids.



Puzzle Page

Math Readers,

We want to print your work! Send us your own math games, puzzles, problems, and activities. If we print them, we'll send you and your math teacher free *Math Reader* pens.

WORD SEARCH

Forwards or backwards, up, slanted, or down. Where can the words in this puzzle be found?

GRAPH
LINE
GRID
VARIABLE
POINT
NUMBER
POSITIVE
NEGATIVE
TABLE

```
F R E N T A N G L E H Z M B
W E R A U B E L B A I R A V
A M B T S R I E N D L S D R
X L O M M U B A T I V E A I
E Q U A O G A E H S I R K R
O B A B G R A P H T E A E N
V M R F T I I C E R A B R E
T L E O M D L U Q I M Q B G
K P A T E R P O S U G S D A
P O S I T I V E N U L H T T
E U S S A B T S W T E J N I
T N I A N G L E O I M P I V
Z O I A J E U N R V A T O E
M A X L L U M P R E K U P L
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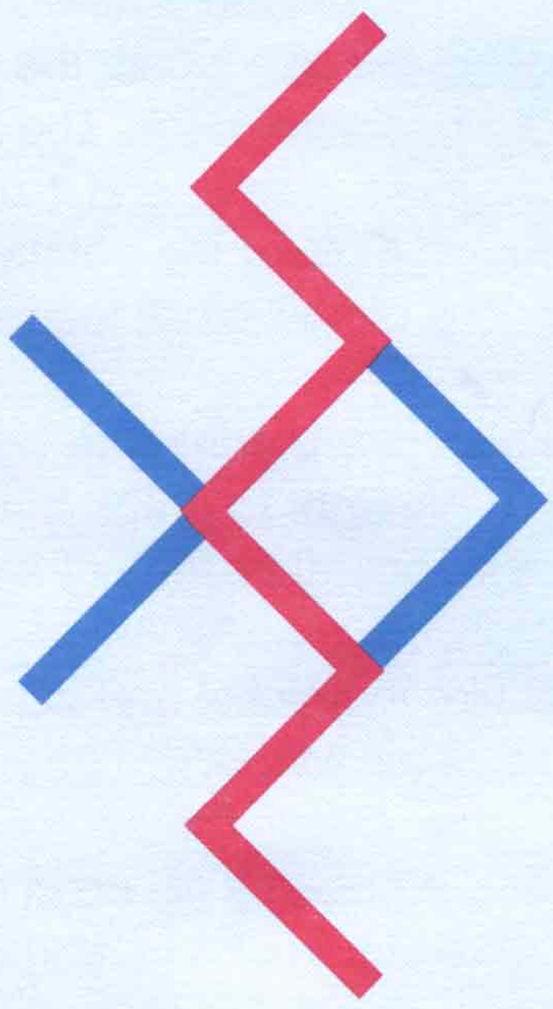
$1.00 IN CHANGE

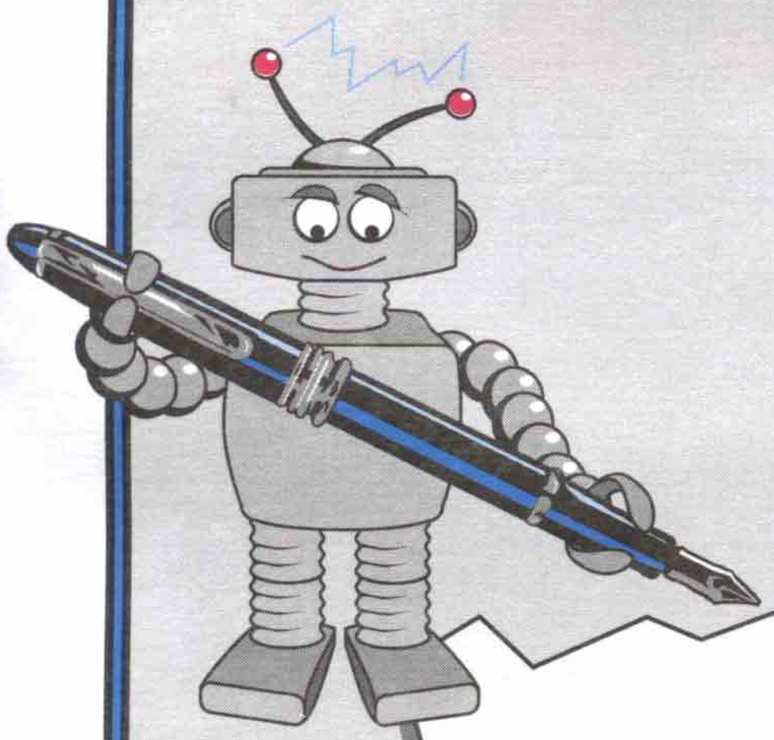
Make $1.00 in change using exactly 50 coins? How many ways can you do it?

THE FLYING BUG

Make the bug fly in the opposite direction by moving just three of the ten sticks!



BULLETIN BOARD



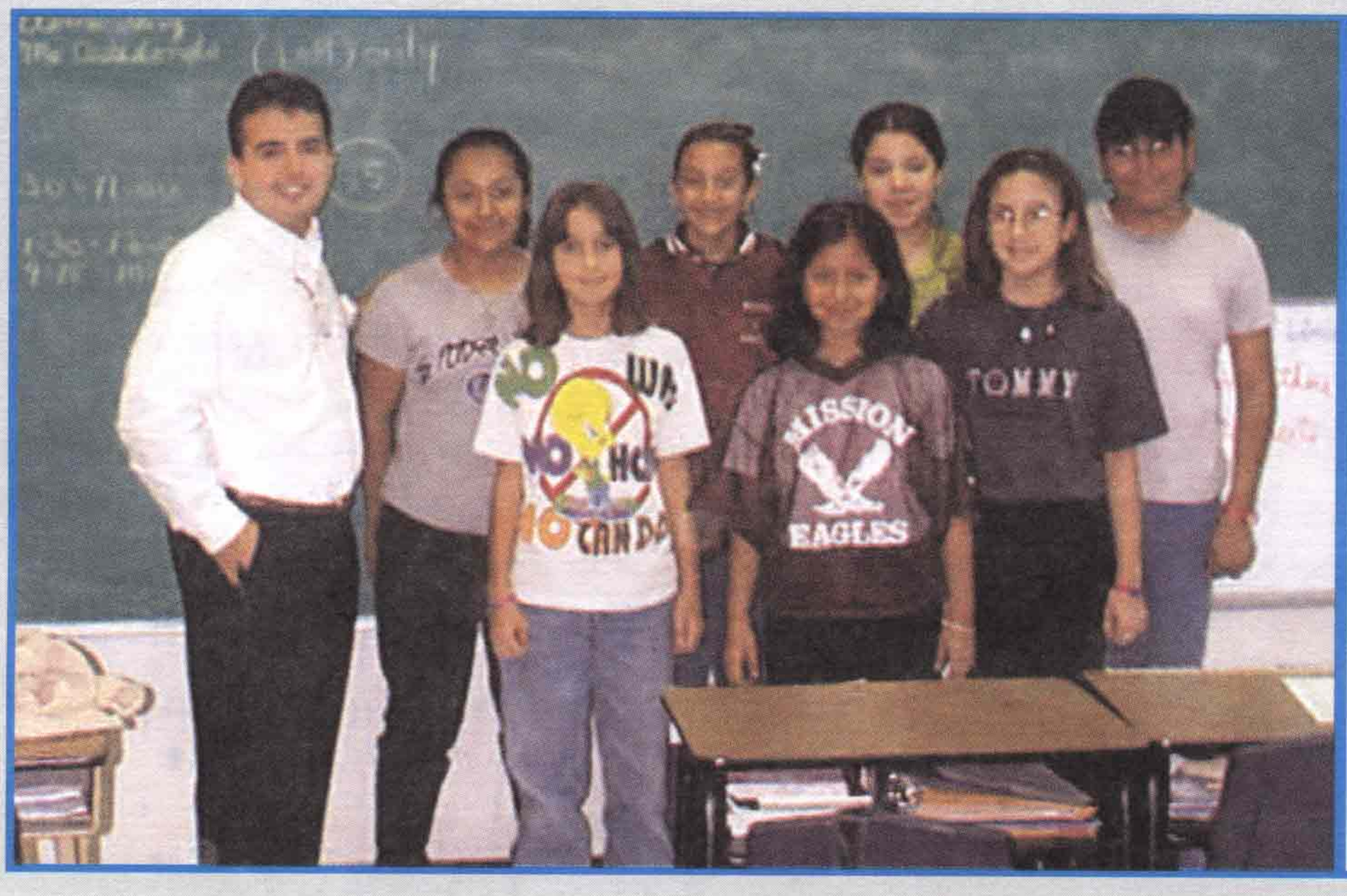
Hey Math Readers

Our new robot has just arrived from the factory, and we need to find a name for him! Send your ideas to the address on page 2. The deadline for sending in names is January 30. Whoever thinks of the best name will win a Math Reader Pen.

MATH COMPETITIONS

Math Counts is a local, state, and national math competition. For more information, write to:
Texas Society of Professional Engineers
P. O. Box 2145
Austin, TX 78768
or call 1-800-580-8973.
The deadline for this year is January 8.

Math Explorer is another kids magazines published by the SWT Math Institute for Talented Youth for intermediate students. It also has problems and activities you might enjoy. Check it out!



Students at Mims Elementary in Mission, Texas are enjoying exploring math problems. Pictured on the left are Ruben Arredondo and some of his students. Ruben and Robert Weeces began a Junior Summer Math Camp in Mission in 1998, sponsored by the Eisenhower program, and plan to expand the program this summer.

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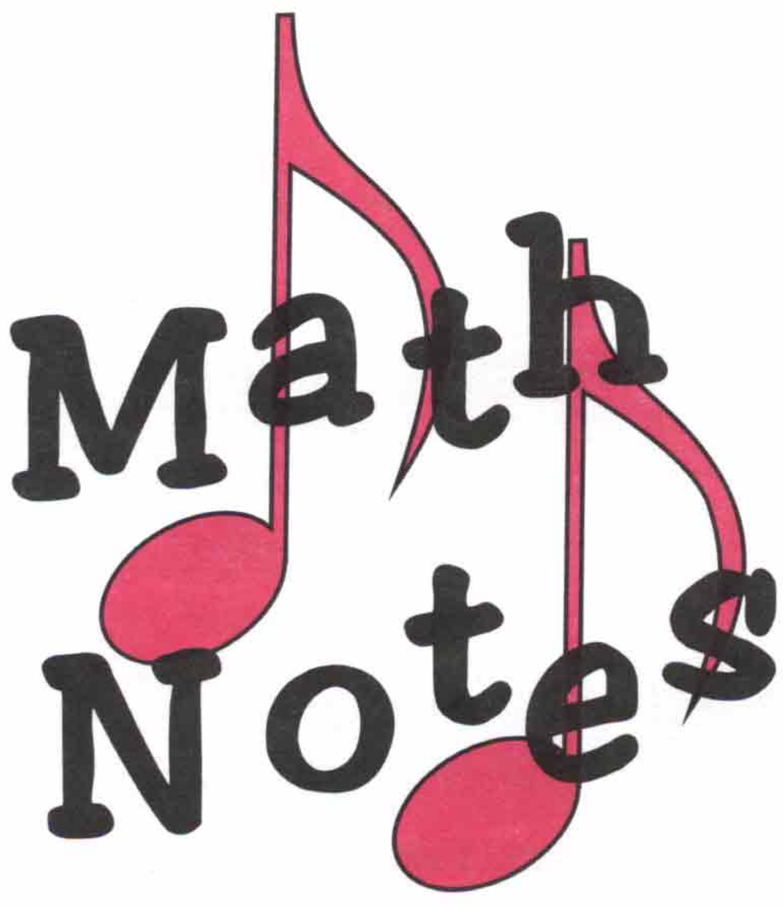

Dear Reader,

Welcome to our new magazine! Math Reader is a magazine designed for elementary students. I hope you'll have an exciting time exploring new math problems and sharing ideas with each other.

Math Notes is our Reader's Showcase. Write us with news from your school; about math events you've enjoyed; or with your own puzzles, activities, and problems. Please include:

• Your name • Your teacher's name • Any related pictures.

We'll publish as many letters as we can each month. I hope to hear from you soon.

Sincerely,

Max Warshauer

Max Warshauer