Abacus

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CONTENTS

FROM THE DESK OF THE ABACUS EDITOR ..... PAGE 1
LITERATURE IN MATHEMATICS ..... PAGE 1
CHOOSE A NUMBER ..... PAGE 2
EXPANDIBLES ..... PAGE 3
GRAND SUMS ..... PAGE 6

FROM THE DESK OF THE ABACUS EDITOR

Welcome to the Christmas, 1992 edition of the Abacus. Ron Sauer and I have tried to select a range of activities, spanning early Primary to late Junior.

In keeping with the recent emphasis on literature in mathematics, we are including activities drawn from two stories. Also, you will find a list of books we recommend for children.

"Expandibles", suitable for grades 2 to 4, is a contribution, via Gary Flewelling, of resource people at the Wellington County Board of Education.

The last issue featured Lorna Morrow's game, "Choose a Number", but failed to include a key diagram. We are reprinting this valuable activity in its entirety. Depending upon the operations and numbers used (for example, integers rather than whole numbers), this activity can be modified for any grade from 1 to 8.

From the Waterloo Board of Education resource people (in particular, Bill Proctor) comes "Grand Sums", which can be used with grades 3 to 8.

Ron and I have tried to include in this issue (and will endeavor to do so in the future) a range of activities which provide every teacher from K through 8 something of value for his or her classroom. ("Abacus like" activities for 9 through OAC will be included as part of the Gazette.) We encourage, beg, cajole, and respectfully request you to send in activities from your classroom. Submissions should include a paragraph indicating approximate grade levels, the activity's purpose, and its context in the curriculum. It should be designed for easy implementation by a classroom teacher.

We wish you a wonderful holiday season and all the best for 1993.

LITERATURE IN MATHEMATICS

THE DOORBELL RANG

Two children each have 6 cookies. However, somebody arrives at the door. How many cookies does each child have at the beginning of the story? How many children are there at the end of the story? Try it out with real cookies and real kids!

10 FOR DINNER

There are 10 children invited to the birthday party, but a lot of problems arise. Nine children arrive on time, but the tenth is late. Make up a story that you could present to the class about the tenth child.

See also...

Anno, M., **Anno's Counting House**, Philomel Books,1982
Bogart, Jo Ellen, **10 for Dinner**, Scholastic, 1989
Carle, Eric, **The Hungry Caterpillar**, Scholastic, 1989
de Paola, Tomie, **Pancakes**, Jovanich, 1978
Hoban, Tana, **26 Letters and 99 Cents**, Greenwillow Books, 1987
Hutchins, Pat, **The Doorbell Rang**, Mulberry Books, 1986
Johnston, Tony, **Whale Song**, G. P. Putnam, 1987
Lewis, Paul Owen, **P. Bear's New Year's Party**, Silvio Mattaccione & Co., 1989
Sendak, Maurice, **One was Johnny**, Harper and Row, 1962
Van Allsburg, Chris, **Jumanji**, Houghton Mifflin, 1981

CHOOSE A NUMBER

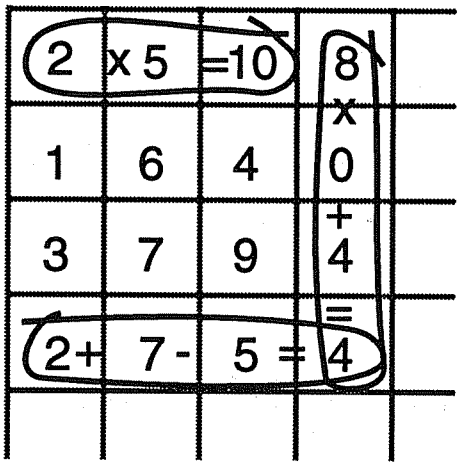
FOR: 2 to 6 players

SKILL: arithmetic operations, whole numbers

MATERIALS: 2 regular dice (marked 1 to 6), a 6 x 6 grid for each player

RULES:

1. Each player rolls the dice in turn and either adds, subtracts, multiplies, or divides to get a number he/she wants.
2. The player then places that number in one of the squares on his/her grid.
3. Play continues until each player's grid is filled.
4. Players then circle equations on their grids. equations may be horizontal, vertical, or oblique, but must be in a straight line. Equations may have from 3 to 6 numbers.



Players should decide whether or not to allow overlapping of equations.

5. The player who identifies the most equations on his or her grid is the winner.

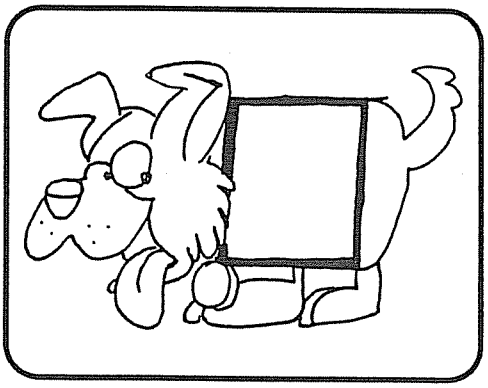
VARIATIONS

1. Each player must record, on his or her grid, every number decided on by any player. That is, if player A rolls 3 and 4 and decides to add them, then each player must record a 7 on his or her grid.
2. Change the size of the grid.

ANALYSIS

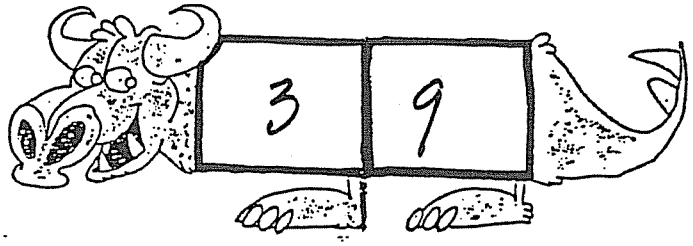
Compare the effects of different grid sizes.
Compare winning strategies between the original game and variation 1.

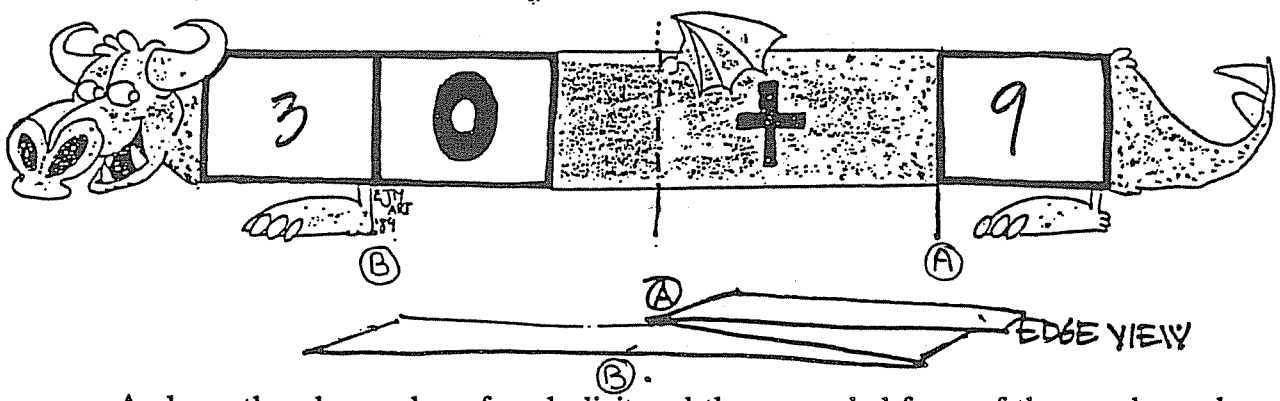
EXPAND-IBLES
AND EXPAND-IMALS



This fold-out book allows the student to see a 2, 3, 4 (or more) digit number when the book is closed.

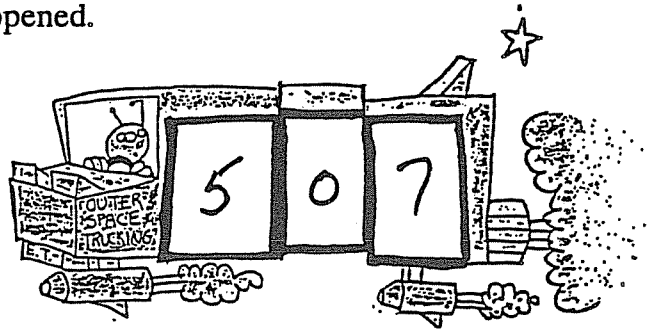
Example 1

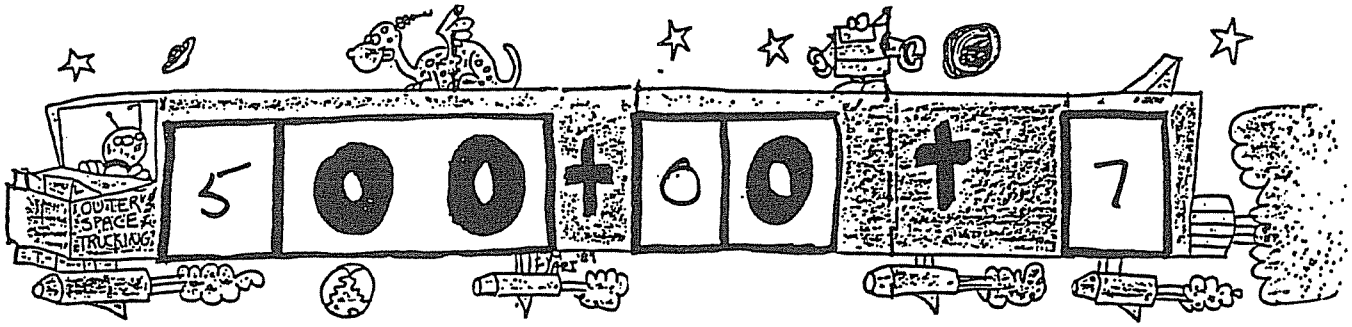




And see the place value of each digit and the expanded form of the number, when the book is opened.

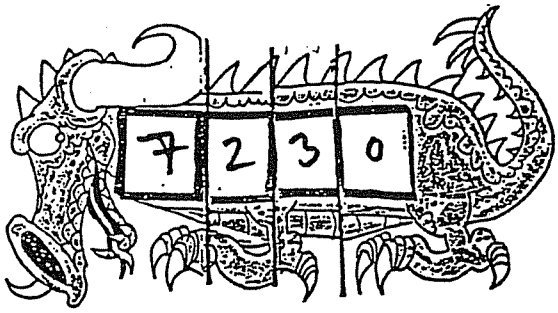
Example 2

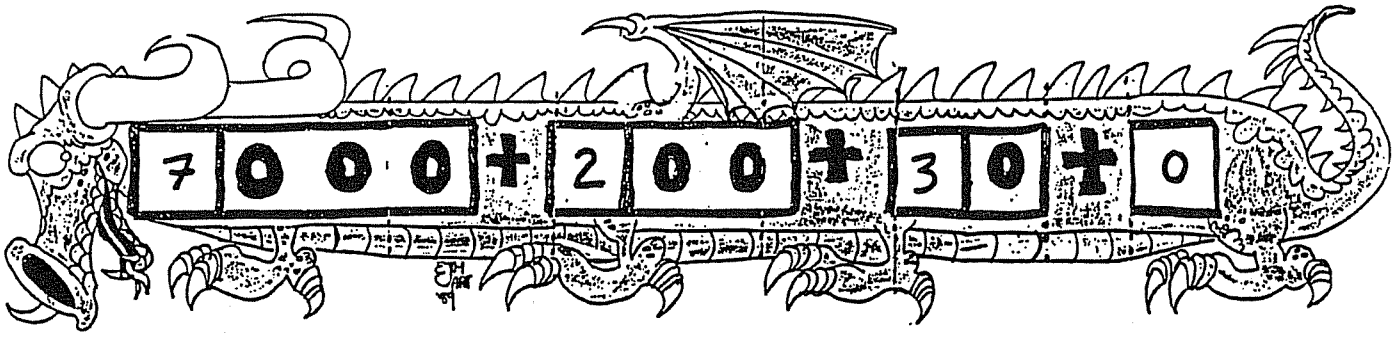




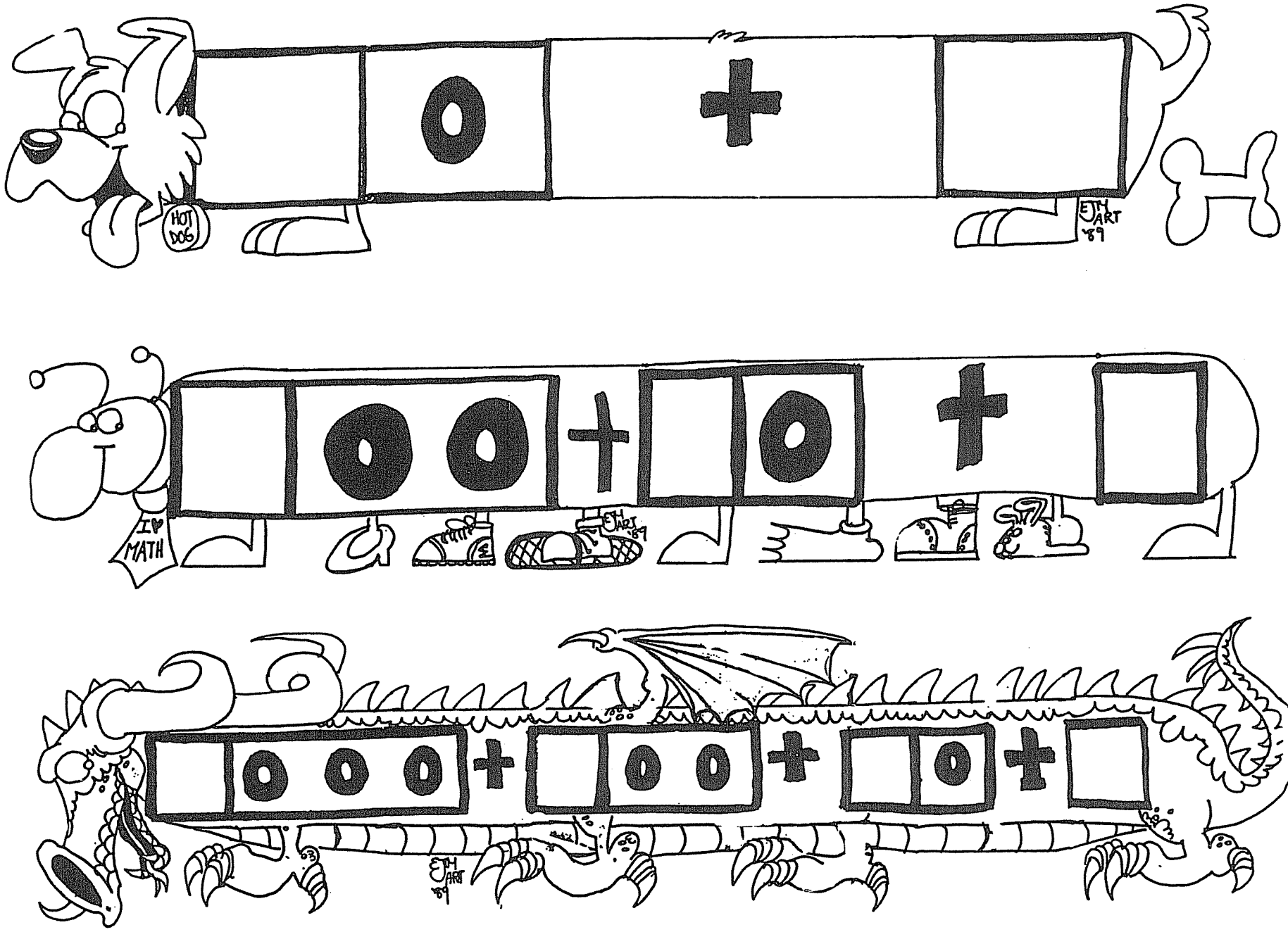
Expand-ibles (cont'd.)

Example 3





- Consider making a laminated class set of EXPAND-IBLES. They can then be shared by teachers in your school (or in a division of the school).
- Encourage students to draw their own EXPAND-IBLES.


HOT DOG
I ♥ MATH

Grand Sums

OBJECTIVE: To combine addition and multiplication in a self-checking drill activity.

ACKNOWLEDGEMENTS:
The idea of using a matrix to combine addition and multiplication has been around for a good many years. This particular form of the matrix, however, was developed by Bill Proctor, former mathematics consultant, and is used here with his permission.

INSTRUCTIONS:
1. Use the main portion of the matrix as you would with a normal multiplication table. For example, in blackline master **Grand Sums 1**, multiply the numbers 8, 5, and 9 along the top row by the numbers 3, 7 and 4 respectively, recording the products in the proper cells of the grid.

2. Add each **row** of the recorded products, placing the sums in the cells under Sum Across.

3. Add each **column** of recorded products, placing the sums in the cells beside Sum Down.

4. Calculate the total of the outside column and the outside row, recording the sums in their respective boxes labelled Grand Sum Across and Grand Sum Down. If no mechanical errors have been made, the two final sums should be the same.

ACTIVITIES:
1. Demonstrate the procedures for completing blackline master **Grand Sums 1**. When the matrix has been completed, ask students to describe the results (both sums should be the same). If the sums are different , a student should go back and check the computation.

2. Have students select and enter their own 1-digit factors in blackline master **Grand Sums 2**. Encourage them to compare results with classmates. Help them to generalize the fact that while individual students may have different answers, each student's pair of sums will always match (assuming there are no computational errors).

3. Have the students predict whether this feature of the grid will work with blackline master **Grand Sums 3**, where four factors can be entered across and down.

EVALUATION:
The activities are self-checking. Observe those children whos two final sums are different. Encourage them to go back and check their work. If a problem still exists, determine whether the difficulty is related to problems with addition and/or multiplication facts, or whether the student does not understand the procedures. Remediate using appropriate strategies.

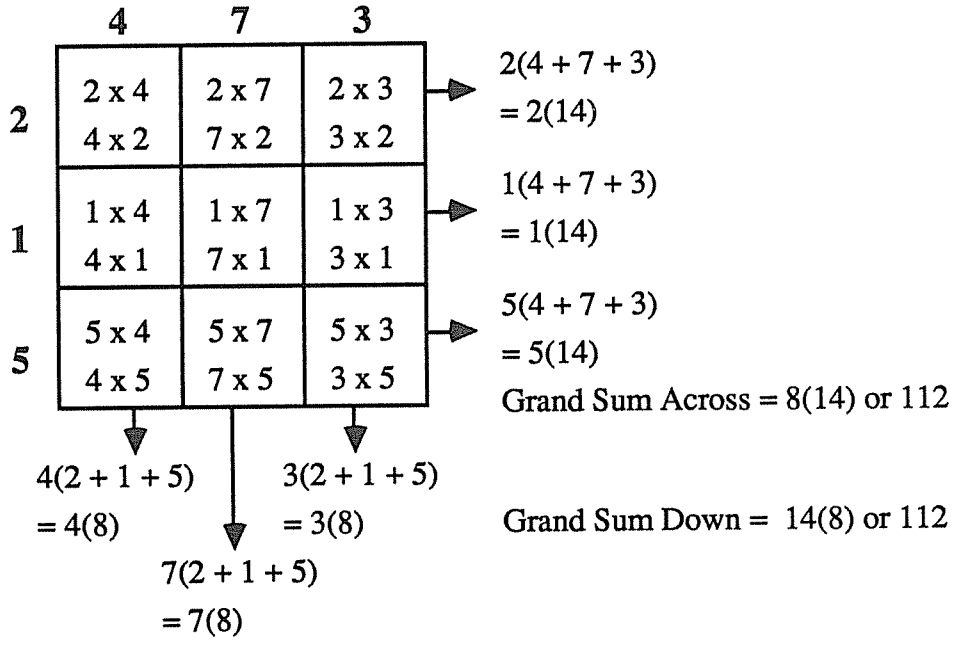
EXTENSIONS:
Challenge your students to:

• determine whether 2-digit factors will work with any of the grids. (The intent of this particular extension is not so much to practice multiplication and addition, but rather to have students compare the results of the experiment with their predictions. Consequently, it is recommended that calulators be made available to students);

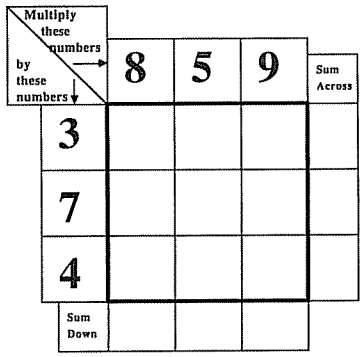
- design a Grand Sums matrix that uses five or six factors across and down;
- determine whether subtraction can be used in place of multiplication;
- determine why the pattern of matching sums always occurs. (You might want to reserve this challenge for those of your students who have shown exceptional insight into mathematics. On the other hand you might draw the diagram below on the chalkboard, and encourage all students to look for and identify patterns).

As shown below in Figure 1, the product in each cell is added twice; once across and once down. Going across, a product is expressed by two factors such as $2 \times 4 = 8$. Going down, the product is expressed by the same two factors in reverse order, such as $4 \times 2 = 8$. (This is an excellent application of the commutative property). Thus, while the outside vertical and horizontal addends are different, they ultimately lead to the same sum.

Fig. 1

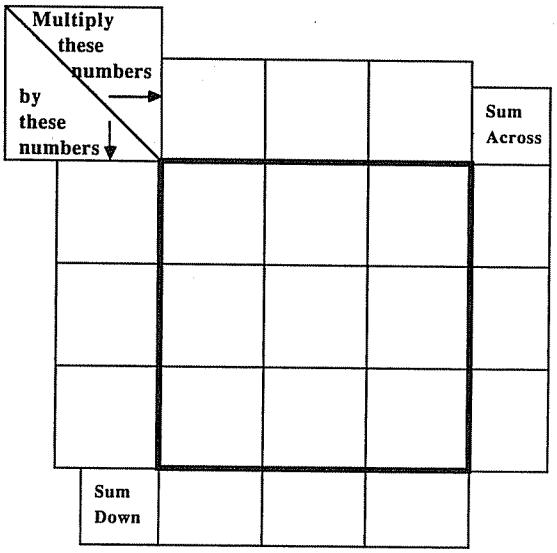


Grand Sums 1



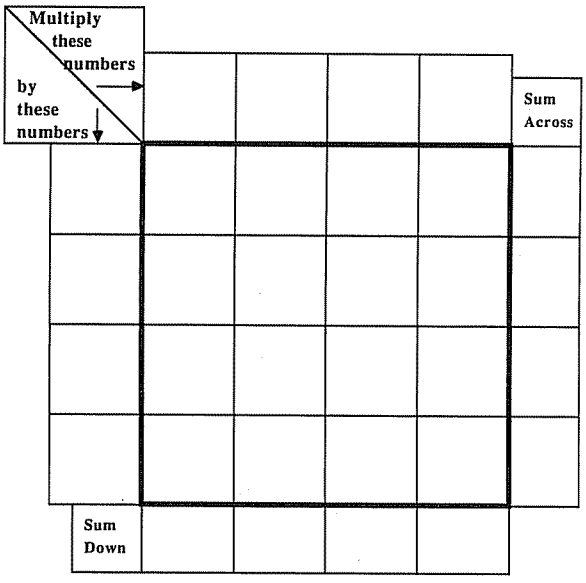
Grand Sum Across	Grand Sum Down

Grand Sums 2



Grand Sum Across	Grand Sum Down

Grand Sums 3



Grand Sum Across	Grand Sum Down