Write a Recipe

Work together at your table to write a "recipe" for a fun birthday party for a child.

What "ingredients" would you need?
What would you do with them?

Be creative!

Write your "recipe" on large paper and post it for all to see.

Examining Student Work in Subtraction:

1. Describe the step-by-step procedure this student used.

2. Try the procedure on the other three problems at the bottom of the example.

3. How is this method like/unlike the algorithm you were taught? How is it like/unlike the other algorithms in this session?

4. What might be some advantages to this student's method?

Student Algorithms for Subtraction

Steve's Method

$$\begin{array}{r} 74 \\ -\,26 \\ \hline \end{array}$$

$$\begin{array}{r} {\scriptstyle 6\ 14} \\ 7\cancel{4} \\ -\,26 \\ \hline 48 \end{array}$$

$$\begin{array}{r} 83 \\ -\,67 \\ \hline \end{array}$$

$$\begin{array}{r} 72 \\ -\,35 \\ \hline \end{array}$$

$$\begin{array}{r} 302 \\ -\,158 \\ \hline \end{array}$$

José's Method

$$\begin{array}{r} 74 \\ -\,26 \\ \hline \end{array} \longrightarrow \begin{array}{r} 78 \\ -\,30 \\ \hline 48 \end{array}$$

$$\begin{array}{r} 83 \\ -\,67 \\ \hline \end{array}$$

$$\begin{array}{r} 72 \\ -\,35 \\ \hline \end{array}$$

$$\begin{array}{r} 302 \\ -\,158 \\ \hline \end{array}$$

Evie's Method

$$\begin{array}{r} 74 \\ -\,26 \\ \hline \end{array}$$

$$\begin{array}{r} {\scriptstyle 14} \\ 7\cancel{4} \\ -\,{\scriptstyle 3}\cancel{2}6 \\ \hline 48 \end{array}$$

$$\begin{array}{r} 83 \\ -\,67 \\ \hline \end{array}$$

$$\begin{array}{r} 72 \\ -\,35 \\ \hline \end{array}$$

$$\begin{array}{r} 302 \\ -\,158 \\ \hline \end{array}$$

Amber's Method

$$\begin{array}{r} 74 \\ -\,26 \\ \hline \end{array}$$

$$\begin{array}{r} 78 \\ -\,30 \\ \hline 50 \\ -\ \ 2 \\ \hline 48 \end{array} \quad \text{(2 left to subtract)}$$

$$\begin{array}{r} 83 \\ -\,67 \\ \hline \end{array}$$

$$\begin{array}{r} 72 \\ -\,35 \\ \hline \end{array}$$

$$\begin{array}{r} 302 \\ -\,158 \\ \hline \end{array}$$

Examining Multiplication

Examining Student Work in Multiplication:

1. Describe the step-by-step procedure this student used.

2. How is this method like/unlike the algorithm you were taught? How is it like/unlike the other algorithms in this session?

3. What might be some advantages to this student's method?

U. S. Standard Algorithm

Find the product:

$$\begin{array}{r} 48 \\ \times\ 23 \\ \hline \end{array}$$

Step 1

$$\begin{array}{r} {\scriptstyle 1} \\ 48 \\ \times\ 23 \\ \hline 144 \end{array}$$

Step 2

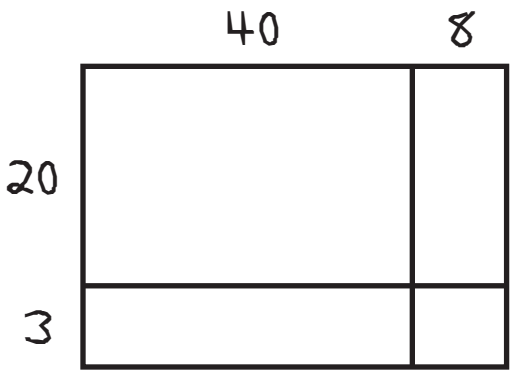
$$\begin{array}{r} {\scriptstyle 1} \\ 48 \\ \times\ 23 \\ \hline 144 \\ 960 \\ \hline 1104 \end{array}$$

Area Method

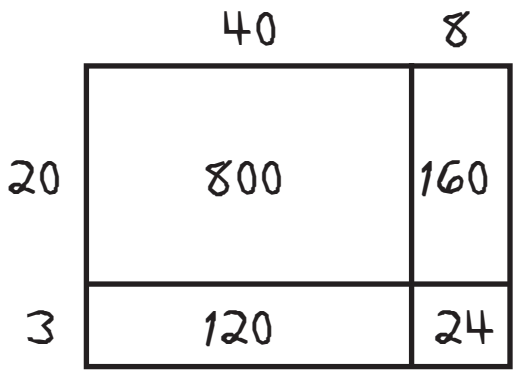
Find the product:

$$\begin{array}{r} 48 \\ \times\ 23 \\ \hline \end{array}$$

Step 1



Step 2



Step 3

800 (20 x 40)
160 (20 x 8)
120 (3 x 40)
+ 24 (3 x 8)
1104

Hint:

- Why there is a 40 and an 8 on top.
- Why is there a 24 in the lower corner?
- Why is it called an area method?

Try these:

a) 32 x 54 **b) 28 x 62**

Partial Products

Find the product:

$$\begin{array}{r} 48 \\ \times\ 23 \\ \hline \end{array}$$

Step 1	Step 2	Step 3	Step 4
48	48	48	48
x 23	x 23	x 23	x 23
24	24	24	24
	120	120	120
		160	160
			800
			1104

Try these:

a) 32 x 54

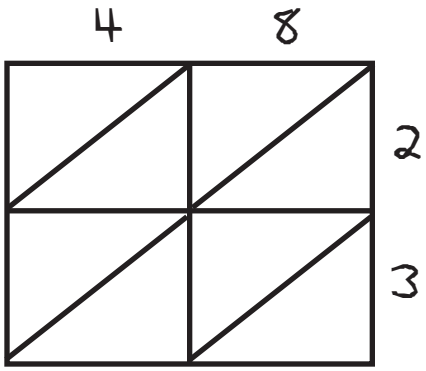
b) 28 x 62

Lattice Method

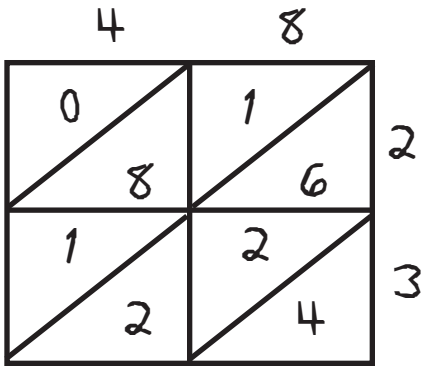
Find the product:

$$\begin{array}{r} 48 \\ \times\ 23 \\ \hline \end{array}$$

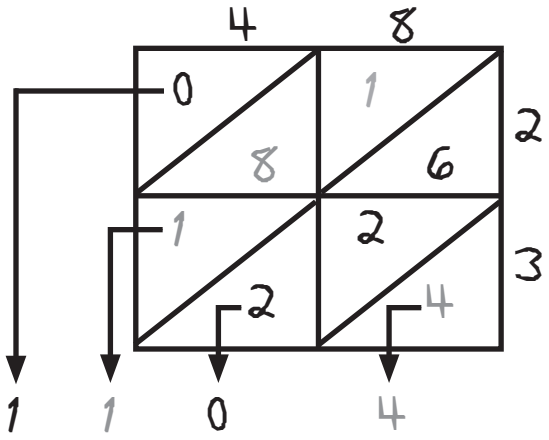
Step 1



Step 2



Step 3



Try these:

a) 32 x 54 **b) 28 x 62**

Common Questions

Directions:
Work with one or more partners. Use this sheet and the sheet titled "Experts' Responses". Match one or more expert response to each of the following questions. Write the letter or letters of the Experts' Responses in the box.

Expert Response Letter(s)

	1. Is it important for all students to learn the same algorithm?
	2. Won't children be confused when multiple algorithms are presented?
	3. What's wrong with just teaching the standard algorithm the "old fashioned" way?

Experts' Responses

RESPONSE A:

There is no need for all students to do arithmetic calculations the same way, any more than it is necessary for all children to develop identical handwriting. No one particular algorithm is best. Situations and contexts should determine the choice of which procedure to use. (Burns, 1994)

RESPONSE B:

Presenting alternative algorithms helps students deepen their understanding of the mathematics behind computational procedures. Solving problems using multiple methods leads to deeper conceptual understanding. (Simsonsen, Teppo, 1999)

RESPONSE C:

Teaching children sequences of prescribed steps for computing focuses their attention on following the steps, rather than on making sense of numerical situations. It can give students the message that getting correct answers, with or without understanding, is the most important goal of their math learning. (Burns, 1994)

RESPONSE D:

Since an algorithm is simply a procedure for arriving at an answer for a particular situation, there would seem to be no reason to insist that everyone use the same one. (Morrow, 1998).

RESPONSE E:

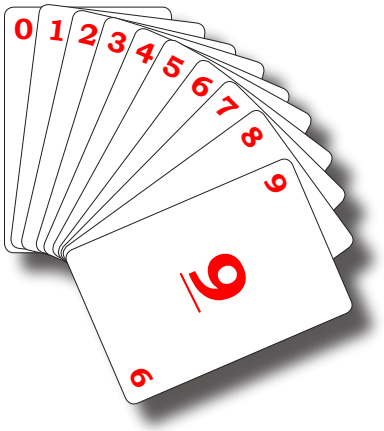
The early focus on memorization in the teaching of arithmetic can give children the false impression that mathematics is to be done without reasoning. (Kamii, Lewis, Livingston, 1993)

NCTM Communication Standard

Instructional programs from prekindergarten through grade 12 should enable all students to--

- **Communicate their mathematical thinking coherently and clearly to peers, teachers, and others**
- **Analyze and evaluate the mathematical thinking and strategies of others**

Got It!



Materials: Cards numbered from 0 to 9 (4 of each number)
Tally sheet (This can be drawn on paper.)

Purpose: Number sense; 2-digit multiplication with variations for subtraction

Players: 2 or more

Ages: 8+ for multiplication (younger for subtraction)

Directions:
The object of the game is to find the largest multiplication answer among the 6 cards drawn. The game goes for 5 rounds.

1. Shuffle the deck of cards and place them face down.

2. The first player removes 6 cards from the deck and places them face up.

3. The player chooses 4 of the cards to used for his/her turn and arranges these cards in a multiplication problem.

4. The answer to that multiplication problem is his/her first score of the game.

Example: Player 1 draws 2, 3, 5, 6, 8, 9
Player 1 chooses 5, 6, 8, and 9 as the 4 cards to use.
Player 1 may choose to multiply 96 x 85, 865 x 9, etc.
After multiplying the number, player one gets that answer as his/her points for the first round.

5. The next player gets a turn to draw 6 cards.

6. The game is over at the end of 5 rounds. The player with the largest total of points wins.

Variation 1: (For very young players) Players draw 6 cards and try to find a subtraction problem that produces the answer closest to 5. So if I drew 2, 3, 5, 6, 8, and 9, I might choose the problem 8 - 3 to get 5, or 63 - 58. After 5 rounds, the player that has found 5 the most times wins.

Variation 2: This version is played similarly to variation 1, except that the target is 15. Players draw 6 cards and try to find a subtraction problem that produces the answer closest to 15.