

ACTIVITY 10

“X” Marks the Spot

Materials:

- paper
- transparency master
- activity master

Overview: The rules are so simple you can teach them without saying a word! Yet the math is rich and abundant. You can use these simple drills to reinforce basic addition, subtraction, multiplication, and division facts and develop number sense without boring your students. Fractions, decimals, and negative numbers can also be used. You can even factor polynomials using this simple method!

Vocabulary: product, difference, quotient, polynomial

PROCEDURE

Skills:

- Adding, subtracting, multiplying, and dividing integers, fractions, and decimals
- Problem solving
- Factoring polynomials

Tell the class that this game has only two simple rules...but you won't tell them what they are. They will have to figure out the rules by themselves. As soon as a student knows how to play, he or she can come up to the board and write down the answer.

Have them copy these five problems onto a piece of paper as you write them on the board.

$$\begin{array}{ccccc} \begin{array}{c} \diagup \\ 3 \end{array} & \begin{array}{c} \diagdown \\ 4 \end{array} & \begin{array}{c} \diagup \\ 2 \end{array} & \begin{array}{c} \diagdown \\ 8 \end{array} & \begin{array}{c} \diagup \\ 1 \end{array} & \begin{array}{c} \diagdown \\ 9 \end{array} & \begin{array}{c} \diagup \\ 5 \end{array} & \begin{array}{c} \diagdown \\ 5 \end{array} & \begin{array}{c} \diagup \\ 6 \end{array} & \begin{array}{c} \diagdown \\ 9 \end{array} \end{array}$$

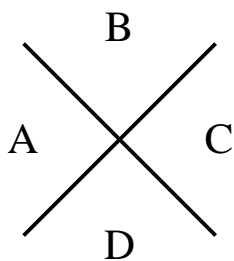
Then begin writing in the answers by *adding* the numbers on the left and right to get the bottom number and *multiplying* them to get the top number.

$$\begin{array}{ccccc} \begin{array}{c} 12 \\ \diagup \\ 3 \end{array} & \begin{array}{c} \diagdown \\ 4 \end{array} & \begin{array}{c} 16 \\ \diagup \\ 2 \end{array} & \begin{array}{c} \diagdown \\ 8 \end{array} & \begin{array}{c} 9 \\ \diagup \\ 1 \end{array} & \begin{array}{c} \diagdown \\ 9 \end{array} & \begin{array}{c} 25 \\ \diagup \\ 5 \end{array} & \begin{array}{c} \diagdown \\ 5 \end{array} & \begin{array}{c} 54 \\ \diagup \\ 6 \end{array} & \begin{array}{c} \diagdown \\ 9 \end{array} \\ \begin{array}{c} \diagdown \\ 7 \end{array} & & \begin{array}{c} \diagdown \\ 10 \end{array} & & \begin{array}{c} \diagdown \\ 10 \end{array} & & \begin{array}{c} \diagdown \\ 10 \end{array} & & \begin{array}{c} \diagdown \\ 15 \end{array} & \end{array}$$

If you work slowly, pausing as if to ponder before writing each answer, some of the students will soon catch on. After a majority of the class has discovered the rules of the game, allow a student to explain them.

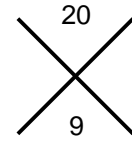
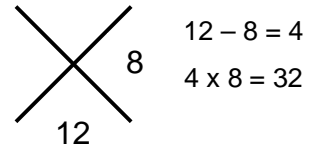
Then you can continue to play the game by varying the format.

- Placing numbers in sections A and B will require students to divide first, then add.



$$\begin{array}{c} 10 \\ \diagup \\ 5 \end{array} \quad \begin{array}{c} \diagdown \\ 2 \end{array} \quad \begin{array}{c} 10/5 = 2 \\ 5 + 2 = 7 \end{array}$$

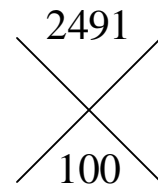
- Placing numbers in sections A and D or C and D will require students to subtract first, then multiply.
- Placing numbers in sections B and D will require students to study the various combinations of sums and products that satisfy the given answers.



1 Eventually, you may wish to increase the difficulty through examples like these.

				$1 \times 20 = 20$	$1 + 20 = 21$
				$2 \times 10 = 20$	$2 + 10 = 12$
				$4 \times 5 = 20$	$4 + 5 = 20$

2 You can also use the guess and check method to solve complex puzzles. Research has shown that the guess and check method is not only a valuable skill, it helps children transition to solving equations in algebra. Here is how to solve problems like the one on the right using this method.



Pick a pair of numbers that add up to 100 such as 50 and 50. Write them in columns *a* and *b*.

Then multiply them to find the product. In this case, it is 2500, which is too high. We mark our check with an "H" to signify that this is too high. This tells us that the number in column *a* is too high.

Let's adjust our guess by trying 40 and 60. Remember that our guesses must add to 100. *It is also very important to note that the smaller of the two numbers must go in column a.*

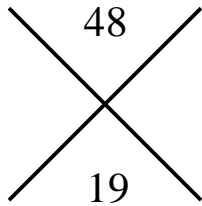
The product of these two numbers is 2400, which is too low. This is marked with an "L".

Our next guess for column *a* must be greater than 40 but less than 50. Let's try 45. This makes $b = 55$. Our new product, 2475 is too low also.

Our fourth guess will be 48. Now $b = 52$, and our product is 2496. Although this is too high, it is very close.

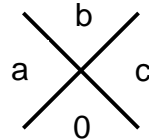
For our next guess, we try 47 for *a*, and 53 for *b*. This gives us the product we wanted.

<i>a</i>	<i>b</i>	check
50	50	2500 H
40	60	2400 L
45	55	2475 L
48	52	2496 H
47	53	2491 ☺

**Journal Prompts:**

Explain to a student how you would find the solution to the problem on the right.

What could you tell about the value of a and c in the example on the below? What can you tell about the value of b? Explain.

**Homework:**

Assign one of the accompanying activity masters.

You can make a homework worksheet by placing numbers in a copy of the blank activity master. Alternately, the students can copy down problems as you write them on the board.

Taking a Closer Look:

The difficulty of these drills can be varied by the numbers chosen and their placement. Using decimals, fractions, or negative numbers can also increase the complexity.

Algebra students can practice factoring polynomials this way too. For the polynomial $x^2 + 7x + 10 = 0$, students would construct the problem shown to find the solutions 2 and 5. The expression factors into the following binomials:

$$x^2 + 7x + 10 = (x + 2)(x + 5)$$

The solution to the equation then is $x = -2$ and $x = -5$.

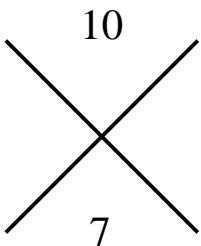
Assessment:

These drills can be spot checked for accuracy or students can exchange papers to check them.

You may also use the answer keys for the accompanying activity masters.

Good Tip!

These drills are a great way to practice number concepts throughout the year. Worksheets can be created on the spot to be used as homework or warm-ups. If you are studying fraction multiplication, simply have the students copy a set of these problems as you write them on the board.



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