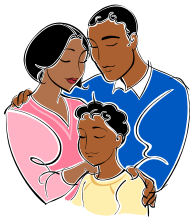
PRACTICE TASK: Array-nging Our Fact Families
1 Day



STANDARDS FOR MATHEMATCIAL CONTENT

MCC.3.OA.5. Apply properties of operations as strategies to multiply and divide.
Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.)
Use arrays, area models, and manipulatives to develop understanding of properties.

MCC.3.OA.6. Understand division as an unknown-factor problem.
For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.
Conversations should also include connections between division and subtraction.

STANDARDS FOR MATHEMATCIAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

*****Mathematical Practices 1 and 6 should be evident in EVERY lesson. *****

BACKGROUND KNOWLEDGE

(Information quoted from Van de Walle and Lovin, Teaching Student-Centered Mathematics: Grades 3-5, pages 62-63)

"Students can benefit from a few activities with models and no context. The purpose of such activities is to focus the meaning of the operation and the associated symbolism.

Make sure to draw students' attention to the dimension of the rectangles (length and width). You want students to make the connection that the factors in the multiplication expression they have written indicate the number of rows and columns (the dimensions) in a rectangle that consist of the given number of squares."

ESSENTIAL QUESTIONS

- How are multiplication and division related?
- How can the same array represent both multiplication and division?

MATERIALS

- Grid paper
- Colored pencils or markers
- "Array-nging Our Fact Families" recording sheet

GROUPING

Individual/Partner Task

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

In this task, students will make models on grid paper of arrays that show both multiplication and division number sentences. This task makes important connections between multiplication and division. Students will become familiar with division as the inverse operation of multiplication as they learn that the numbers in a multiplication sentence can also be used in a related division sentence.

PART 1
Give students 12 blocks that represent the total area of an array. Have them arrange the blocks in an array and identify the dimensions of their array, noting different arrays are possible for 12. Then ask if there is a way they can make a division sentence with the dividend represented by the total area of the array. For example, a student may make a 4 x 3 array. The dividend (area of 12) can be divided by 4 or 3, both factors of 12. Both dimensions are utilized, one as the divisor and the other as the quotient.

PART 2
Task Directions

Students will follow the directions below from the "Array-nging Our Fact Families" recording sheet.

1. Draw the following arrays:
   6 by 3
   4 by 8
   2 by 7
2. Use the example to complete the following for each array:
   - Label the dimensions and total area.
   - Write a multiplication sentence and tell the factors and the product.
   - Write a division sentence and indicate the divisor, dividend, and quotient.
3. Select one of your arrays and write two story problems that can be modeled with the array, one for multiplication and one for division.

FORMATIVE ASSESSMENT QUESTIONS

- How can you describe your array?
- How does the array show both multiplication and division?
- What does the word "by" mean in the directions (i.e. 6 by 3)?

- What is the difference between a factor and a product? With what operation would you use these words?
- Explain the meaning of the divisor, dividend, and quotient in a division sentence?

DIFFERENTIATION

Extension

- Have students build an array of their choice and have a partner describe the dimensions and area of the array and all related vocabulary relating to both multiplication and division.
- Have students build arrays for multiplication and division that involve larger numbers. Limit the dimensions to a three-digit number times a one-digit number.

Intervention

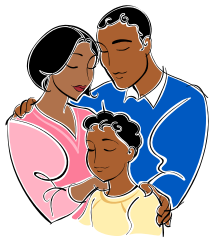
- If students are not ready to transition to grid paper without the use of the base-ten blocks, allow the use of these manipulatives to guide student work.

TECHNOLOGY CONNECTION

http://www.eduplace.com/math/mw/background/3/08/te_3_08_overview.html Provides background information on the relationship between multiplication and division.

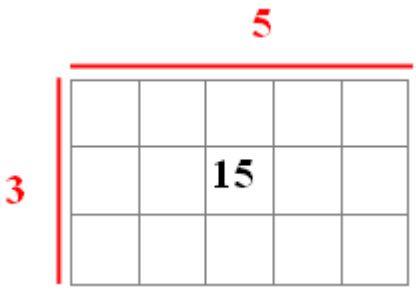
Name _____ Date _____

Array-nging Our Fact Families



This 3 by 5 array has a total of 15 square units.
3 x 5 = 15.

3 and 5 are **factors**.
15 is the **product**.



Fifteen divided by three equals five.
15 ÷ 3 = 5
15 is the **dividend.**
3 is the **divisor.**
5 is the **quotient.**

1. Draw the following arrays listed in the table below.
2. Following the example above, complete the following for each array:
   - ☑ Label the dimensions and total area.
   - ☑ Write a multiplication sentence and label the factors and the product.
   - ☑ Write a division sentence and label the divisor, dividend, and quotient.

6 by 3	4 by 8	2 by 7

3. Select one of your arrays. On the back of this paper, write two story problems that can be modeled with the array, one for multiplication and one for division.