CONSTRUCTION TASK: Making the "Hard" Facts Easy

Approximately 2 Days to complete

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.7 Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

STANDARDS FOR MATHEMATCIAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
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, page 113)

For multiplication, the ability to break numbers apart in flexible ways is even more important than in addition or subtraction. The distributive property is another concept that is important in multiplication computation. For example, to multiply 43 x 5, one might think about breaking 43 into 40 and 3, multiplying each by 5, and then adding the results. Children require ample opportunities to develop these concepts by making sense of their own ideas and those of their classmates.

Third grade students will not be required to use the distributive property for products greater than one hundred.

ESSENTIAL QUESTIONS

- How does understanding the distributive property help us multiply large numbers?
- What are strategies for leaning multiplication facts?

MATERIALS

- Connecting cubes (bags of 100)
- Graph paper
- Making the Hard Facts Easy Recording Sheet
- Crayons or colored pencils
- Scissors
- Glue

GROUPING

Small Group (Part 1)
Partners or Independent (Part 2)

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Part 1
(Students should be divided into small mixed ability groups)

Today we are going to make those "hard" multiplication facts easy. Before we tackle the hard facts. Who can tell me what the easy multiplication facts are? (Allow groups to discuss) Record or let students come up and record the "easy" multiplication facts on the board/overhead or smart board. Discuss why these are easy? ("Easy" multiplication facts consist of but are not limited to 1s, 2s, 5s, 10s). Understanding that this is an opinion question, allow this to be an open discussion for the students in a respectful environment.

Next, ask the class what are the "hard" facts or facts they haven't yet mastered? (Allow groups to discuss). List the numbers on the board. If there are too many, decide on the two "hardest" facts (generally 7s and 9s). With a quick show of hands, let the class decide which are the "hardest" facts. Use these facts to model for the class. (For this example, the 7s facts will be used, however you will use the facts the class decides upon)

Distribute bags of connecting cubes to each group. Instruct the groups to build seven rows of nine using the connecting cubes OR which ever "hardest fact" your class has chosen. Follow the example using 7 x 9. (But insert your factors) Arrange the seven rows of nine into an array and ask "From our knowledge of arrays, who can say the multiplication expression is represented in this array?" Correct response would be 7 x 9. Acknowledge that this is one of the "hard" facts. Can we break the number 7 into 5 + 2, agree or disagree? Separate two rows of nine from the array you have created. What are the two arrays you have now? (Answer: 5 rows of nine and 2 rows of nine) Using our knowledge of arrays, can you find the product of each array? (5 rows of 9 is 45 and 2 rows of 9 is 18). Now, push the two arrays back together and ask "What

is the total when we push together the two arrays? 45 + 18? Answer 63 so what would be the product of 7 x 9? This is called the Distributive Property. We can break down or distribute one factor in a multiplication problem to create two expressions, then add the products. You may repeat modeling this a second time with a different fact.

Finally, challenge the groups to use the distributive property on their own. Practice with these facts 7 x 8, 7 x 4 and 7 x 3. Circulate and check, asking groups how they distributed the one of the facts. Conclude with a class discussion about the distributive property. How does it work? Did you distribute one or both factors? What do you add together?

Part 2

Making the Hard Facts Easy recording sheet (Choose one or use the blank one to create a sheet specific to each student, or groups depending on level)

Today we are going to continue using the distributive property with the multiplication "hard" facts. Review one or two multiplication facts using the connecting cubes from Part 1. Discuss how the distributive property works. (Distribute one factor into two numbers from the easy facts, create the two arrays and add the products.) We are going to use this distributive strategy using graph paper and the Making the Hard Facts Easy recording sheet. Distribute these sheets to either partners or individuals. Model the first question. Circulate and check for comprehension of the directions. Continue to model the second question or students may complete with partners or individually.

FORMATIVE ASSESSMENT QUESTIONS

- How does the distributive property help us find the product of "hard" facts?
- When can you use the distributive property?

DIFFERENTIATION

Extension:

- Students can create their own multiplication problems to solve using the distributive strategy. (Product does not need to be greater than 100)

Intervention:

- Students can continue to use manipulatives or repeated addition

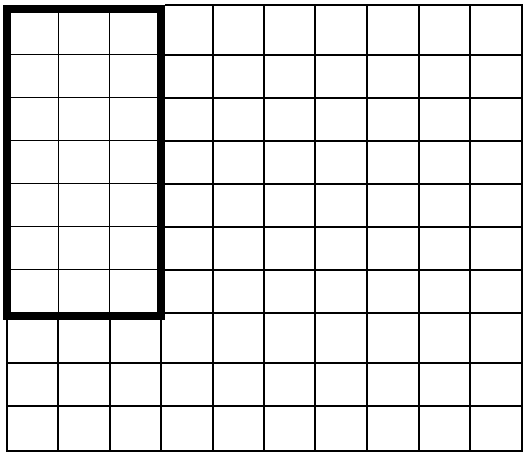
Name __**Sample**_____ Date _____

Making the "Hard" Facts Easy

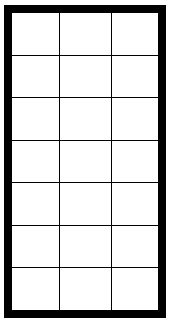
Student Recording Sheet

Example: 7 x 3

1. Outline 7 rows of 3 on graph paper

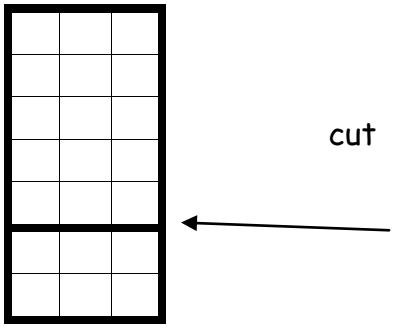


2. Cut out 7 rows of 3 from graph paper



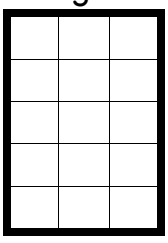
3. Record what two numbers 7 can distribute to _**5**__+ _**2**___= 7

4. Cut 7 rows of 3 to be two arrays, 5 rows of 3 and 2 rows of 3

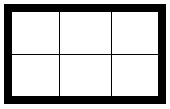


5. Paste both arrays and label.

3

5  = 15

3

2  = 6

6. Record multiplication sentences

5 x 3 = 15
2 x 3 = 6

15 + 6 = 21 so 7 x 3 = 21

Name _____ Date _____

Making the "Hard" Facts Easy

Student Recording Sheet

"Hard" 7s facts

Hard fact _____

1. Outline the array on graph paper.
2. Cut out the array from graph paper.
3. Record the two numbers 7 can distribute to **_5__**+ **_2___**= 7.
4. Cut ___ rows of ___ to be two arrays, __ rows of __ and __ rows of __
5. Paste both arrays and label.
6. Record multiplication sentences.

Name _____ Date _____

Making the "Hard" Facts Easy

Student Recording Sheet

"Hard" 9s facts

Hard fact _____

1. Outline the array on graph paper.
2. Cut out the array from graph paper.
3. Record the two numbers 9 can distribute to ___+ ____= 9.
4. Cut ___ rows of ___ to be two arrays, __ rows of __ and __ rows of __
5. Paste both arrays and label.
6. Record multiplication sentences.

Name _____ Date _____

Making the "Hard" Facts Easy

Student Recording Sheet

My "Hard" facts

Hard fact _____

1. Outline the array on graph paper.
2. Cut out the array from graph paper.
3. Record the two numbers __ can distribute to _____+ _____= __.
4. Cut ___ rows of ___ to be two arrays, __ rows of __ and __ rows of __.
5. Paste both arrays and label.
6. Record multiplication sentences.