Lesson 5: 3s and 7s

Lesson Objective

- Students will apply the distributive property of multiplication over addition to visually represent and solve multiplication problems.

Instructional Materials

Material	Quantity	Description
Timer	1	
How Am I Doing? graph	1 per student	
Fact Practice graph	1 per student	
Colored Pencils	1 per student	
Display Masters	1 each	• Preview: Key Idea: 3s and 7s • Demonstrate: Partially Completed Multiplication Table • Demonstrate: Take Apart 3 • Demonstrate: 3 x 8 Array A • Demonstrate: 3 x 8 Array B • Demonstrate: 3 x 8 Array C • Demonstrate: 3 x 8 Array D • Demonstrate: 3 x 8 Array E • Demonstrate: 8 x 3 Array A • Demonstrate: 8 x 3 Array B • Demonstrate: 3s Facts A • Demonstrate: 3s Facts B • Demonstrate: Taking Apart 3 into 1 and 2 A • Demonstrate: Taking Apart 3 into 1 and 2 B

Instructional Materials (cont.)

Material	Quantity	Description
		• Demonstrate: Take Apart 7 • Demonstrate: 6 x 7 Array A • Demonstrate: 6 x 7 Array B • Demonstrate: 6 x 7 Array C • Demonstrate: 6 x 7 Array D • Demonstrate: 6 x 7 Array E • Demonstrate: 7 x 6 Array A • Demonstrate: 7 x 6 Array B • Demonstrate: 7s Facts A • Demonstrate: 7s Facts B • Demonstrate: Taking Apart 7 into 2 and 5 A • Demonstrate: Taking Apart 7 into 2 and 5 B • Demonstrate: 3s and 7s
Handouts	1 per student	• Timed Fact Practice 5 • Cumulative Review • 3s Facts A • 3s Facts B • Taking Apart 3 into 1 and 2 • 3s and 7s (optional) • 7s Facts A • 7s Facts B • Taking Apart 7 into 2 and 5 • Practice 1 • Practice 2 • Independent Practice
Answer Keys	1 each	• Timed Fact Practice 5 • Cumulative Review • Practice 1 • Practice 2 • Independent Practice

Timed Fact Practice

Distribute the Timed Fact Practice 5 handout of the chosen set of facts; multiplication, division, or mixed. Remember to use the same set of facts throughout the module.

Say: *When I say, "begin," you will have one minute to complete the 20 multiplication/division/mixed facts. Start with the first one, going across the rows. If you make a mistake, cross out the wrong answer and write the correct answer next to it. When I say, "stop" or the timer goes off, put your pencil down.*

Say: *Ready? Begin.*

After the timer goes off, display the Timed Fact Practice 5 Answer Key and have the students use a colored pencil or marker to check their work and write the number correct on the score line on the Facts Practice Graph.

Then have students graph the number correct. As the lessons proceed, connect the new point with the previous lesson's point.

Cumulative Review

Have students answer the questions on the Cumulative Review handout. Go over the answers. Correct misconceptions. Have students use a colored pencil to make corrections as needed. Collect student papers to determine who needs additional instruction.

Preview

This lesson will build on students' conceptual knowledge of the easy facts, 1, 2, 5, 10 and 11. Students will apply the distributive property of multiplication over addition to find the unknown facts (3s and 7s). Students will use the knowledge

taught in this lesson to continue building fact fluency and develop alternate strategies for determining unknown multiplication facts.

Display and introduce through a brief explanation of the key idea for this lesson:

- Unknown facts can be found by taking apart an unknown fact into known facts.

Use the Key Idea: 3s and 7s DM display master as needed.

Engage Prior/Informal Knowledge

To open the lesson, present questions to activate students' background knowledge related to the content to be taught in this lesson. Ask students questions such as:

- What strategy can you use to find the answer to 5 x 4? (skip-counting by 5s)
- What strategy can you use to find the answer to 2 x 7? (skip-counting by 2s)
- What strategy can you use to find the answer to 10 x 6? (skip-counting by 10s)
- In the multiplication equation, 2 x 5 = 10, what numbers are the factors? (2, 5) What number is the product? (10)
- What is a sum? (the result of an addition problem)
- In the addition equation, 2 + 5 = 7, which number is the sum? (7)

If students cannot correctly answer these questions, stop and explicitly teach the material.

Demonstrate

1. Display the Partially Completed Multiplication Table DM display master that is filled in with all of the facts from the previous lessons.

Examine the table with students to identify the facts that remain to be solved.

Say: *Today we are going to learn a way to solve problems with products that are multiples of 3 and 7. We are going to take apart an unknown factor into two known factors.*

2. Take apart 3 using 1 and 2.

Say: *When I take apart a factor, I find two numbers whose sum is the factor. I want to choose factors whose facts I already know. Which facts do you know automatically? (1s, 2s, 5s, 10s, and 11s)*

Say: *For the 3s facts that I do not know automatically, I can take apart the 3. I want to find two numbers that equal 3 when added together. I already know the 1s and 2s facts, and 2 + 1 = 3 and 1 + 2 = 3, so I can take apart 3 into 1 and 2.*

Display the Take Apart 3 DM display master.

Draw attention to the ways an array of 3 can be taken apart into 2 groups and 1 group. Relate the diagrams to the commutative property of multiplication (orientation changes) and the commutative property of addition (2 + 1 = 1 + 2).

3. Visually model taking apart an unknown fact (3) into 2 known facts.

Display a 3 x 8 array. Use the 3 x 8 Array A DM display master as needed.

Say: *What multiplication problem is represented by the array? (3 x 8)*

TEACHER NOTE
Some students may experience confusion when relating the array model to the partial product expressions. If so, use colored markers to identify the relationship among each divided array section, its partial product, and the resulting product in the addition expression.

Say: *If I do not automatically know this fact, I can take apart the unknown factors into known factors. I do not know my 3s, but I know my 1s and 2s. I can take apart 3 into 2 and 1.*

Display a 3 x 8 array with a line drawn so that a 2 x 8 and 1 x 8 array are shown. Use the 3 x 8 Array B **DM** display master as needed.

Say: *I am going to draw a line to take apart the 3. First, I want to find the part of the array that represents 3. In this example, there are 3 rows. I want to take apart the 3 rows so that on one side of the line there are 2 rows and on the other side there is 1 row. The side with 2 rows represents 2 x 8, and the side with 1 row represents 1 x 8.*

Say: *The entire array represents 3 x 8, which is taken apart to represent 2 x 8 and 1 x 8.*

Display (2 x 8) and (1 x 8) next to the array they represent. Use the 3 x 8 Array C **DM** display master as needed.

Draw attention to the factor that changed (3 into 2 and 1) and did not change (8). As needed, think aloud to identify why 8 is the second factor.

Say: *Now I can write a new expression to show how the products can be added together to equal the original expression, 3 x 8.*

Display (2 x 8) + (1 x 8). Use the 3 x 8 Array D **DM** display master as needed.

Say: *The 3 was taken apart into the 2 and 1. Now, to solve 3 x 8, I need to find the products of the parts of the new expression and then add them together. What is 2 x 8? (16) What is 1 x 8? (8) What is 16 + 8? (24) So, 3 x 8 = 24.*

Display the addition problem. Use the 3 x 8 Array E DM display master as needed. 2

Say: *3 x 8 is 3 rows of 8, which can be taken apart into 2 rows of 8 and 1 row of 8.*

Relate the commutative property of multiplication to finding an unknown fact.

Say: *If I know 3 x 8, what other fact do I automatically know? (8 x 3) Why? (The commutative property states that when the order of the factors in a multiplication problem are reversed, the product does not change.)*

Display an 8 x 3 array. Use the 8 x 3 Array A DM display master as needed.

Say: *I can take apart this array in the same way I took apart the previous array. I will take apart 3 into 2 and 1. The 3 is in a different place in this example, so I am going to take it apart differently. There are 3 columns. I need to take apart the 3 columns into 2 columns and 1 column by drawing a line.*

Display the 8 x 3 array divided into an 8 x 2 and 8 x 1 array. Use the 8 x 3 Array B DM display master as needed.

Extend this problem, working through the detailed steps as needed.

Say: *Either way the array is shown, 3 x 8 or 8 x 3, I can solve the problem by taking apart the unknown fact, 3, into known facts, 2 and 1.*

2 **TEACHER NOTE**
Some students may have problems with whole number computations. For those students, a mini-lesson on this skill may be necessary.

TEACHER NOTE

For more advanced students, you may want to use the 3s and 7s handout instead of the Taking Apart 3 into 1 and 2 Handout, which is an adapted version of the multiplication table with additional scaffolding. Display 1 + 2 above the 3s column and to the left of the 3s row before performing the think aloud (Step 5). Students who use the 3s and 7s Handout to calculate the 3s should also use it to calculate the 7s. Use the 3s and 7s DM display master as needed.

Repeat with additional examples, emphasizing examples that have not yet been explicitly taught: 3 x 3, 3 x 4, 3 x 6, 3 x 7, 3 x 9, 3 x 11, and 3 x 12. Use the 3s Facts A and B DM display masters and handouts as needed.

4. Calculate the 3s facts by taking apart 3 into 1 and 2.

Distribute the Taking Apart 3 into 1 and 2 handout.

As needed, explain to students that this handout has some of the characteristics of a multiplication table. One factor is shown in the left column, and the factors 1, 2, and 3 are shown on the top row. The column "1s + 2s" is to help students calculate the 3s by taking 3 apart into 1 + 2.

Have students complete the 1s, and 2s facts.

Display the Taking Apart 3 into 1 and 2 A DM display master with the cells completed that students know automatically.

5. Think aloud as you take apart 3 to complete the 1s + 2s and 3s columns.

Display 1 + 2 in the first column for the 1s + 2s column.

> **Say:** *1 + 2 = 3. 3 x 1 = 3. This verifies taking apart 3 into 1 and 2 is a strategy that works. If I already know the fact, then I do not need to take 3 apart.*

Repeat for each fact, selecting students to help complete the 3s column. Have students complete their table as you do. Use the Taking Apart 3 into 1 + 2 B DM display master as needed.

Remind students that if they can complete the 3s column on a multiplication table, they can also complete the 3s row on the

multiplication table.

6. Take apart 7 using 2 and 5.

Say: *When I take apart a factor, I find two numbers whose sum is equal to the factor. I want to choose factors whose facts I already know.*

Say: *I can take apart the 7 in a similar way to the 3. I want to find two numbers that I know automatically that add to 7. I automatically know the 2s and 5s and 2 + 5 = 7 and 5 + 2 = 7, so I can take apart 7 into 2 and 5.*

Display the Take Apart 7 DM display master.

Draw attention to the ways an array of 7 can be taken apart into 2 and 5. Relate the diagrams to the commutative property of multiplication (orientation changes) and the commutative property of addition (2 + 5 = 5 + 2).

7. Visually model taking apart an unknown fact (7) into 2 known numbers that sum to 7.

Repeat step 3, altering your language as needed to find the fact 6 x 7 using an array model. Use the 6 x 7 Array A–E and the 7 x 6 Array A and B DM display masters as needed.

When working with the 6 x 7 Array DM display masters, draw attention to being able to take apart either factor, not only the factor that comes first.

Repeat with additional examples, emphasizing examples that have not yet been explicitly taught: 7 x 4, 7 x 6, 7 x 7, 7 x 9, 7 x 11, and 7 x 12. Use the 7s Facts A and B DM display masters and

TEACHER NOTE

Students may recommend breaking down factors differently. For example, they may suggest 7 as 3 + 4 or 1 + 6. These combinations are correct and the distributive property of multiplication over addition can be used for these combinations. However, this lesson focuses on taking 7 apart into 2 + 5, which is a combination that is commonly known automatically by students. Address these differences and draw arrays to represent the equations as needed.

handouts as needed.

TEACHER NOTE
For students using the multiplication table, display 2 + 5 above the 7s column and to the left of the 7s row.

8. Calculate the 7s facts by taking apart 7 into 2 and 5.

Distribute one copy of the Taking Apart 7 into 2 and 5 handout to each student.

Repeat step 4, altering your language as needed. Use the Taking Apart 7 into 2 and 5 A and B DM display masters as needed.

Practice

For each practice activity, provide detailed feedback to students, highlighting what was done correctly and what needs improvement. Provide opportunities for students to correct their errors. Collect student work to review and monitor student progress.

Activity 1: Help students complete the activity on the Practice 1 handout. Select a few students to verbalize their reasoning and each step in the process.

Activity 2: Have students work in pairs or small groups to complete the activity on the Practice 2 handout. Have students verbalize their reasoning and each step in the process to their partners.

Circulate to monitor student progress. Randomly stop, draw attention to a completed cell, and ask: How did you get this answer? If you know this fact, what other fact do you know? Why?

Independent Practice

1. Have students work independently to complete the activity on the Independent Practice handout.

2. Go over the answers (students self-check and correct, using a colored pencil).

3. Have students record the number correct in the box and complete their How Am I Doing? graph.

4. Collect the papers to review and monitor student progress.

Closure

Review the key idea. Have students provide examples from the lesson.

Have students discuss their answers to the following questions.

- How can students solve 7 x 6 if the answer is not automatically known? (Accept reasonable solutions and include breaking apart 7.)
- What ways can an array be broken apart to show 7 x 4? 3 x 9? (Have students draw and share arrays to show the answers.)

Clear up any misconceptions. Students who believe the facts in rows and columns are not related need additional instruction.