

Lesson 19 Connecting Arrays to Equations

Objective

Your student will learn to connect multiplication arrays to multiplication expressions and equations.

You Will Need

- ☐ *Flip into Math!* pages 175 to 178
- ☐ Connecting Cubes (optional)
- ☐ dry-erase board, pocket, and marker
- ☐ Number Cards 1 to 9, *Darby's Math Tools* pages 18 and 19 (2 sets, optional)
- ☐ blank sheet of paper
- ☐ Two-Color Counters

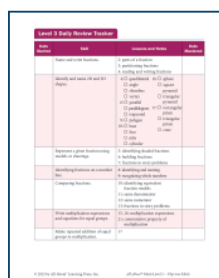
Before You Begin

Preview Arrays and Multiplication

In this lesson, your student will continue building on her understanding of multiplication by exploring the connection between arrays and multiplication. In previous lessons, she learned how repeated addition relates to multiplication, seeing how equal groups can be combined. Then, she used arrays to represent multiplication by organizing equal groups into rows and columns while connecting this to the language of “_ rows of _.” Now, she will bring all of this together by writing multiplication equations that match the arrays she creates.

This progression strengthens her conceptual understanding of multiplication and helps to lay a foundation for understanding division in the future.

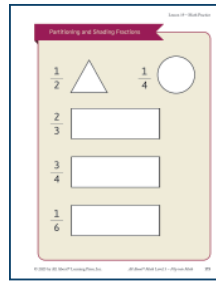
Review



Daily Review

As part of your math time each day, refer to your student's *Daily Review Tracker*. Choose one or two skills, and take a few minutes to practice.

Review (continued)

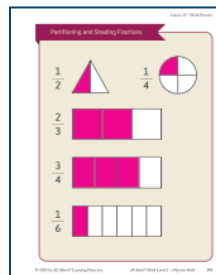


Math Practice

Turn to page 175 in the *Flip into Math!* activity book.

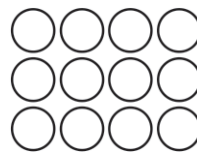
“Let’s review fractions by working with shapes. You will see five different fractions, each paired with a shape. Partition each shape into equal parts based on the fraction. Then, shade the correct number of parts.”

Answer Key



Reviewing Arrays

“Imagine that we are organizing buttons at a fabric store. Each row should have the same number of buttons. Let’s start by drawing an array to represent this. Draw three rows of four circles on the dry-erase board.”

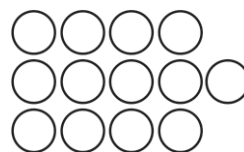


“Each of these circles represents a button.” Point to a row with your finger.

“How many rows are there?” *Three.*

“How many are in each row?” *Four.*

“This array shows three rows of four buttons.” Draw one more circle in the middle row.



“I just added another button to one of the rows. What kind of array is this now?” *It is not an array because an array needs to have rows of equal amounts.*

Review (continued)

“That’s right! This is no longer an array because one row has more buttons than the other rows. Let’s continue to learn how arrays are connected to multiplication.”

New Teaching

Creating Multiplication Expressions from Arrays

“Let’s continue to use arrays to help the fabric store organize their buttons and bolts of fabric so they are easier to see. Arrays give us a way to organize numbers, just like how fabric materials can be organized on a shelf. Let’s think of these two-color counters as buttons and fabric that need to be organized for a store.”

Place a blank sheet of paper into the dry-erase pocket. Then, place nine piles of five two-color counters in front of your student.

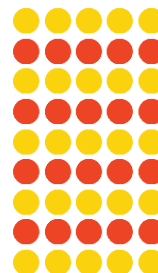


“Here, we have some buttons. Count how many buttons are in one group.” *Five buttons.*

“Yes! Now, how many groups do we have?” *Nine groups.*

“That’s right! We have nine groups of five. If we count them all, we can find the total number of buttons. Let’s count by fives together: 5, 10, 15, 20, 25, 30, 35, 40, 45. We have 45 buttons altogether!”

“Arrange these buttons in rows so that they are easier to display in the store by moving the groups into a neat rectangle, creating an array.”



New Teaching

(continued)

“Now, we have organized our groups into rows. Our 9 groups of 5 is the same as 9 rows of 5. We still have the same total, 45 buttons.”

“We can also use repeated addition, where we add 5, 9 times: $5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 45$. Or, instead of adding repeatedly, we can use multiplication as a quicker way to find the total: $9 \times 5 = 45$.”

“We can write the multiplication expression 9×5 to represent this array.” Write the multiplication expression on the dry-erase board.

Clear the array and give your student 49 two-color counters. “Create an array showing 7 groups, with 7 counters in each group.”

When the array is formed, guide your student to describe it:

- “How many rows do you have?”
- “How many buttons are in each row?”

“Let’s find out how many two-color counters there are altogether. We can use repeated addition to help us count. How many two-color counters do you have altogether? How do you know?” *I have 49 because $7 + 7 + 7 + 7 + 7 + 7 + 7 = 49$.*

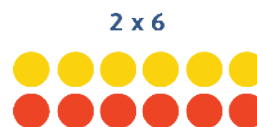
“Good. What multiplication expression can you write to represent your array?” 7×7 .

“Yes. So, 7×7 is 49.”

Creating an Array

“Now, let’s try to create an array from a multiplication expression.” Write the multiplication expression 2×6 on the dry-erase board.

“A fabric store needs two shelves with six bolts of fabric on each. Use the counters to create an array that represents this situation. Remember, the first number in our expression will always represent the number of rows.” (*Answer: two rows of six counters*)



“How many rows are there?” *Two.*

“How many are in each row?” *Six.*

“Yes, there are six in each row. Now, let’s add them all together: $6 + 6$ is 12. This array shows 12 fabric bolts in total.”

New Teaching

(continued)

“Let’s turn this expression into an equation. Write an equal sign after 2×6 on the dry-erase board.”

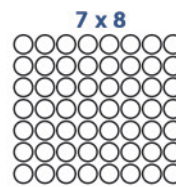
“Since our array shows a total of 12 fabric bolts, we can complete our equation. We started with 2×6 , and we just counted to find that the total is 12. That means $2 \times 6 = 12$. Write 12 after the equal sign to complete the equation on the board.”

“This equation tells us the total number of bolts when we have 2 rows of 6. Our array helped us see why $2 \times 6 = 12$.”

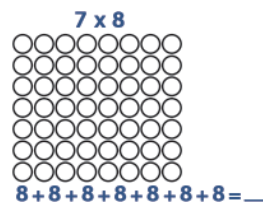
“Now, let’s make another array. This time, you will draw the array on your dry-erase board. Here is a new multiplication expression: 7×8 . Write 7×8 on the dry-erase board.”

Before your student begins to draw, ask the following questions:

- “How many rows do you need?” *Seven.*
- “How many should go in each row?” *Eight.*



“Use repeated addition to find out how many there are altogether.”
Have your student write the repeated addition below the array drawing.



“Repeated addition is just like skip counting. We can skip count by eights to find out how many there are altogether.”

Point to the first 8 as you begin to skip count with your student.

“8, 16, 24, 32, 40, 48, 56. This means that 7×8 is 56.”

“Now, let’s turn this expression into an equation. Write an equal sign after 7×8 on the dry-erase board.”

“Since our skip counting and repeated addition both show that the total is 56, we can complete our equation. We started with 7×8 , and we just found that the total is 56. That means $7 \times 8 = 56$. Write 56 after the equal sign to complete the equation on the board.”

New Teaching (continued)

“The array, repeated addition, and skip counting all helped us see why $7 \times 8 = 56$.”

“The fabric store just received a delivery of buttons. The multiplication expression is 3×8 . You can use two-color counters or a drawing to create your own array.”



Allow your student time to create her array, and then use the following questions and statement to guide her explanation:

- “How many rows did you make?”
- “How many are in each row?”
- “Let’s count by using repeated addition.”
- “How many do we have altogether?”

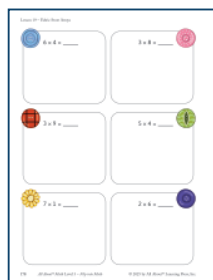
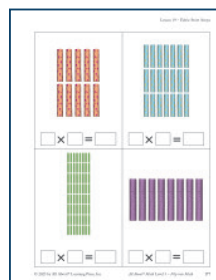
“Great job! Arrays help us see multiplication in action. They make it easier to count and to understand how multiplication works.”

Write these expressions on the dry-erase board one at a time. Continue having your student create arrays and rewriting each expression as an equation.

- 4×5 (Answer: $4 \times 5 = 20$)
- 2×7 (Answer: $2 \times 7 = 14$)
- 8×1 (Answer: $8 \times 1 = 8$)
- 3×6 (Answer: $3 \times 6 = 18$)
- 1×9 (Answer: $1 \times 9 = 9$)

Complete Activity Sheet

“Let’s make arrays.”



Fabric Store Arrays

Turn to pages 177 and 178 in the *Flip into Math!* activity book.

“Imagine that you are organizing bolts of fabric on shelves at a store. Look at each array, and think about

what multiplication equation can be written to show how the fabric is arranged.”

New Teaching (continued)

Have your student fill in the blanks to create multiplication equations to represent the arrays on page 177 (answers below).

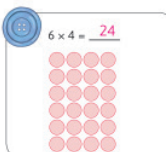
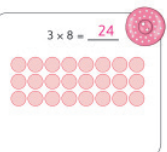
“Now, let’s think about how the store might make a display of the buttons they sell. Use your two-color counters to arrange the buttons into equal rows. Then, draw an array to match your model. Finally, count how many circles you have all together, and write the amount on the line to complete the equation.”

Have your student draw an array that corresponds to each multiplication expression on page 178.

Answer Key

- $2 \times 5 = 10$
- $3 \times 7 = 21$
- $8 \times 8 = 64$
- $1 \times 8 = 8$

Lesson 19 – Fabric Store Arrays

 $6 \times 4 = \underline{24}$	 $3 \times 8 = \underline{24}$
 $3 \times 9 = \underline{27}$	 $5 \times 4 = \underline{20}$
 $7 \times 1 = \underline{7}$	 $2 \times 6 = \underline{12}$

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Look For

Your student might mix up the number that represents rows with the number that represents columns, resulting in a reversed expression.

Here’s How to Help: Explain to your student that rows are like shelves. If there are four shelves with five bolts of fabric on each, it’s different from having five shelves with four bolts. That’s why we always count rows first. To read an array, start by counting the number of rows, and then count how many are in each row. Understanding that rows come first helps make multiplication easier to organize and solve.

Math Reflection

“Let’s Reflect!”

Ask some questions to guide your student’s reflection:

- “How can an array help you multiply two numbers?”
- “How does an array represent a multiplication equation?”
- “Why do you think arrays are helpful for understanding multiplication?”

Extended Practice (Optional)

If your student is not able to create arrays or multiplication equations, or she expressed the need for more practice, continue working on this skill.

Have your student use two sets of *Number Cards*, 1 to 9. She will draw two cards to determine the number of rows and columns for her array. Then, have her create an array using connecting cubes.

Ask the following guided questions:

- “How many rows do you have?”
- “How many are in each row?”
- “How many do you have altogether?”

Next, have her write the multiplication equation that represents the array. For example, if she created three rows of five, she would write $3 \times 5 = 15$.

Repeat the activity several times for more practice.

As an additional activity, have your student look for arrays in the home. Here are some that she might find:



- egg cartons (two rows of six)
- muffin tins (three rows of four)
- a calendar (five rows of seven boxes)
- a chocolate box (rows and columns may vary)
- water bottles in a carton (rows and columns may vary)
- spice jar organization (rows of jars on a rack)
- holes in a laundry basket (evenly spaced holes in rows and columns)
- numbers on a keyboard’s number pad (three rows of three)
- divided-light window panes (rows and columns of glass sections)

Your student will continue to practice connecting arrays to multiplication in the next two lessons. You can proceed to the next lesson without full mastery of this skill.

Darby's Math Fun!

Array Bingo

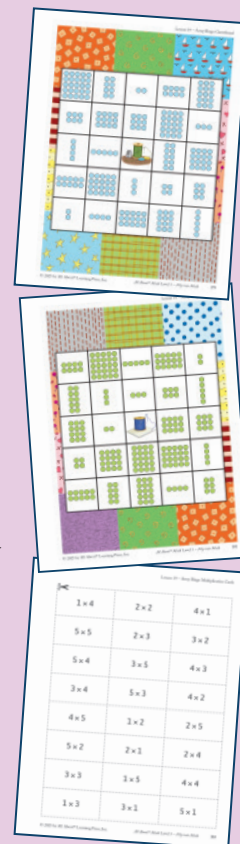
“Let’s practice our math skills!”

Materials

- Array Bingo Gameboards, *Flip into Math!* pages 179 to 182
- Array Bingo Multiplication Cards, *Flip into Math!* page 183
- Two-Color Counters

Directions

1. Cut out the *Array Bingo Multiplication* cards, mix them up, and place them face down (picture side up) in a pile.
2. Player 1 draws a card from the pile and reads the multiplication expression aloud. For example, if the card has 3×4 , she will say, “Three times four means three rows of four.”
3. Each player looks for the matching array on her *Array Bingo* gameboard and places a two-color counter on it.
4. Player 1 finds how many are in the matching array and reads the expression as an equation. For example, “Three times four equals twelve.”
5. The next player takes a turn, drawing a card and following the same process.
6. Play continues until a player gets Bingo by placing five counters in a row either horizontally, vertically, or diagonally.

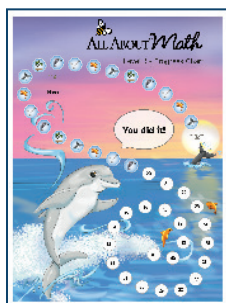


Game variations:

- Four Corners: A player wins by covering all four corners of the gameboard.
- Blackout Bingo: The game continues until a player covers all the arrays on the gameboard.

Track Your Progress

Mark the Progress Chart

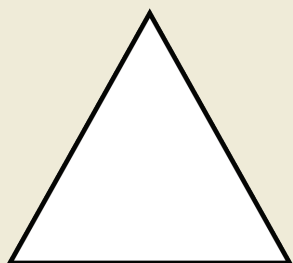


Have your student mark Lesson 19 on the Progress Chart.

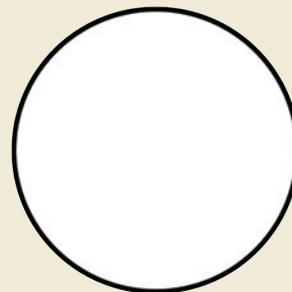


Partitioning and Shading Fractions

$$\frac{1}{2}$$



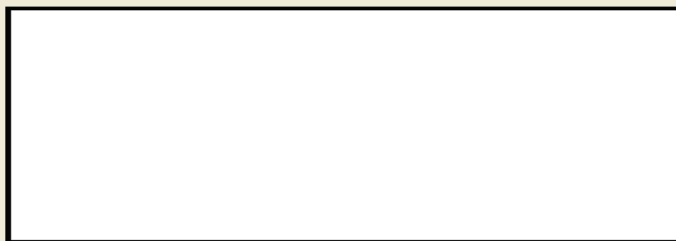
$$\frac{1}{4}$$



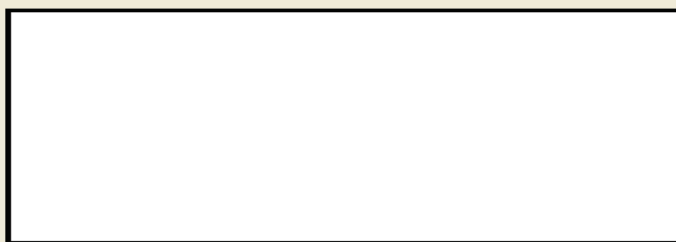
$$\frac{2}{3}$$

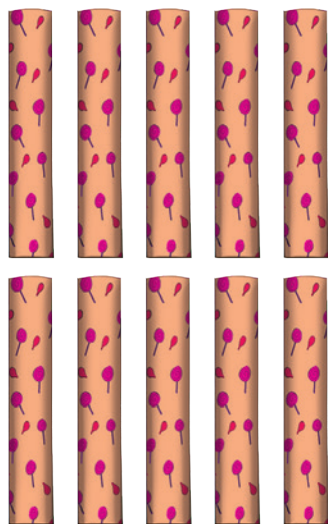


$$\frac{3}{4}$$

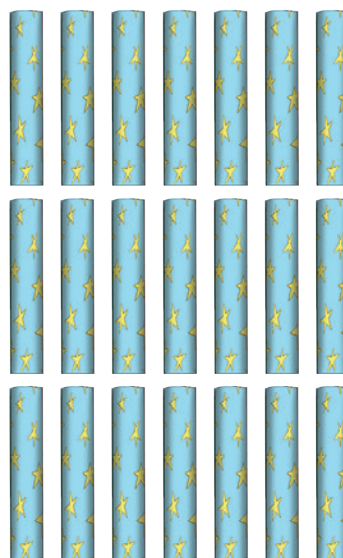


$$\frac{1}{6}$$

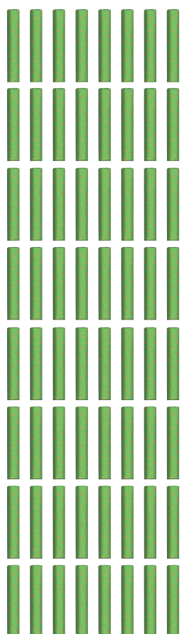




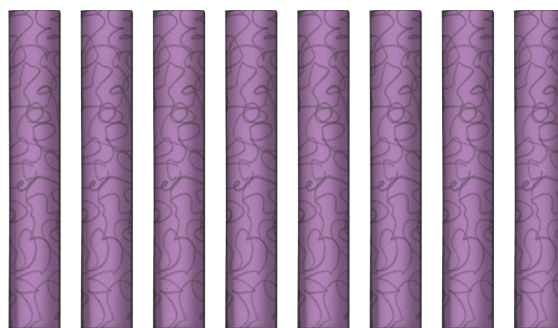
$$\square \times \square = \square$$



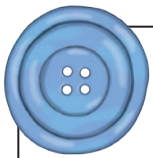
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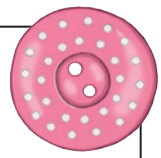
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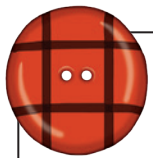
$$\square \times \square = \square$$



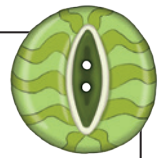
$$6 \times 4 = \underline{\quad}$$



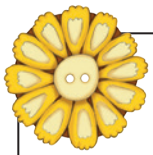
$$3 \times 8 = \underline{\quad}$$



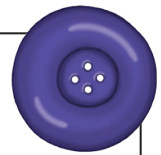
$$3 \times 9 = \underline{\quad}$$



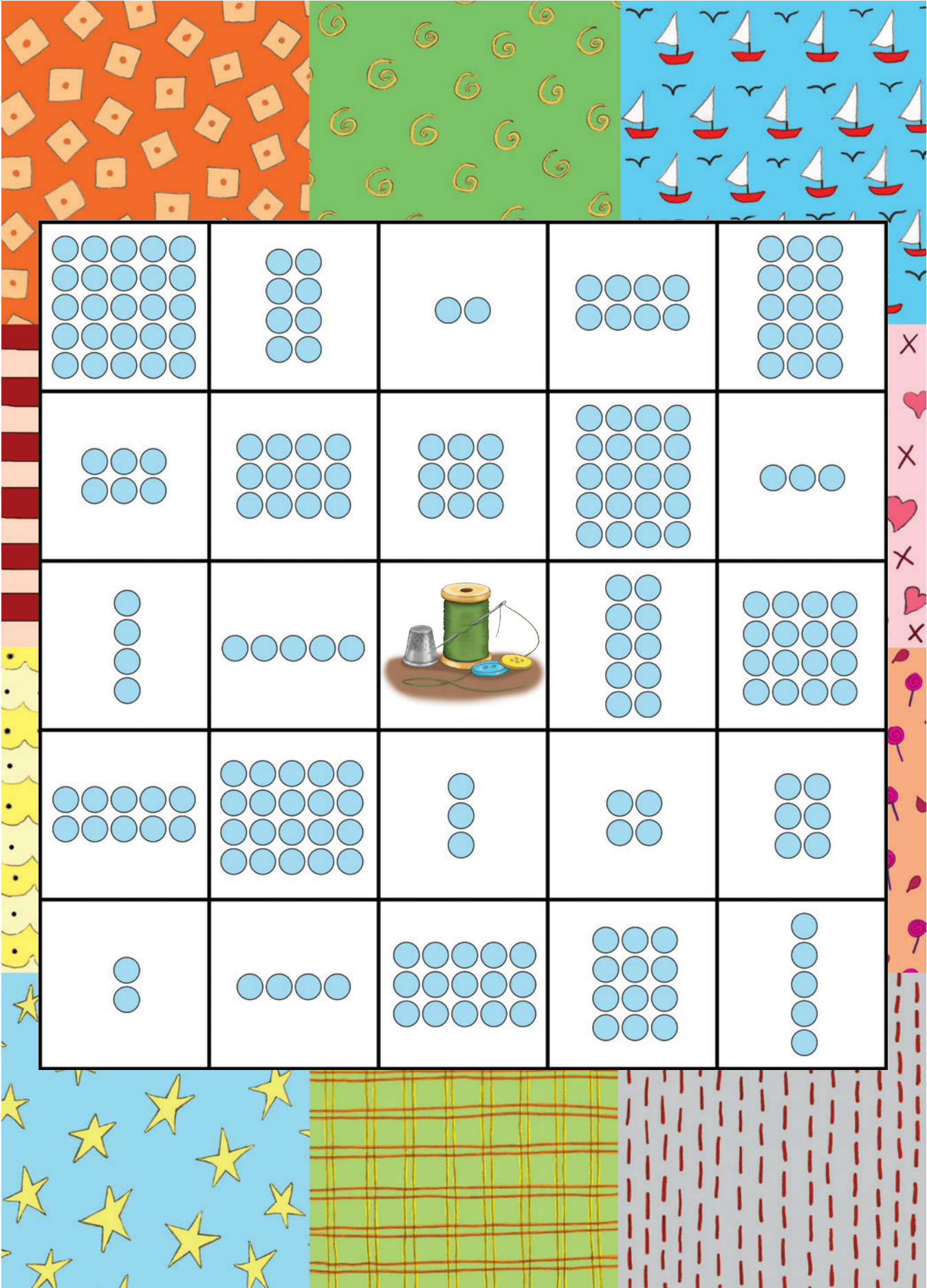
$$5 \times 4 = \underline{\quad}$$

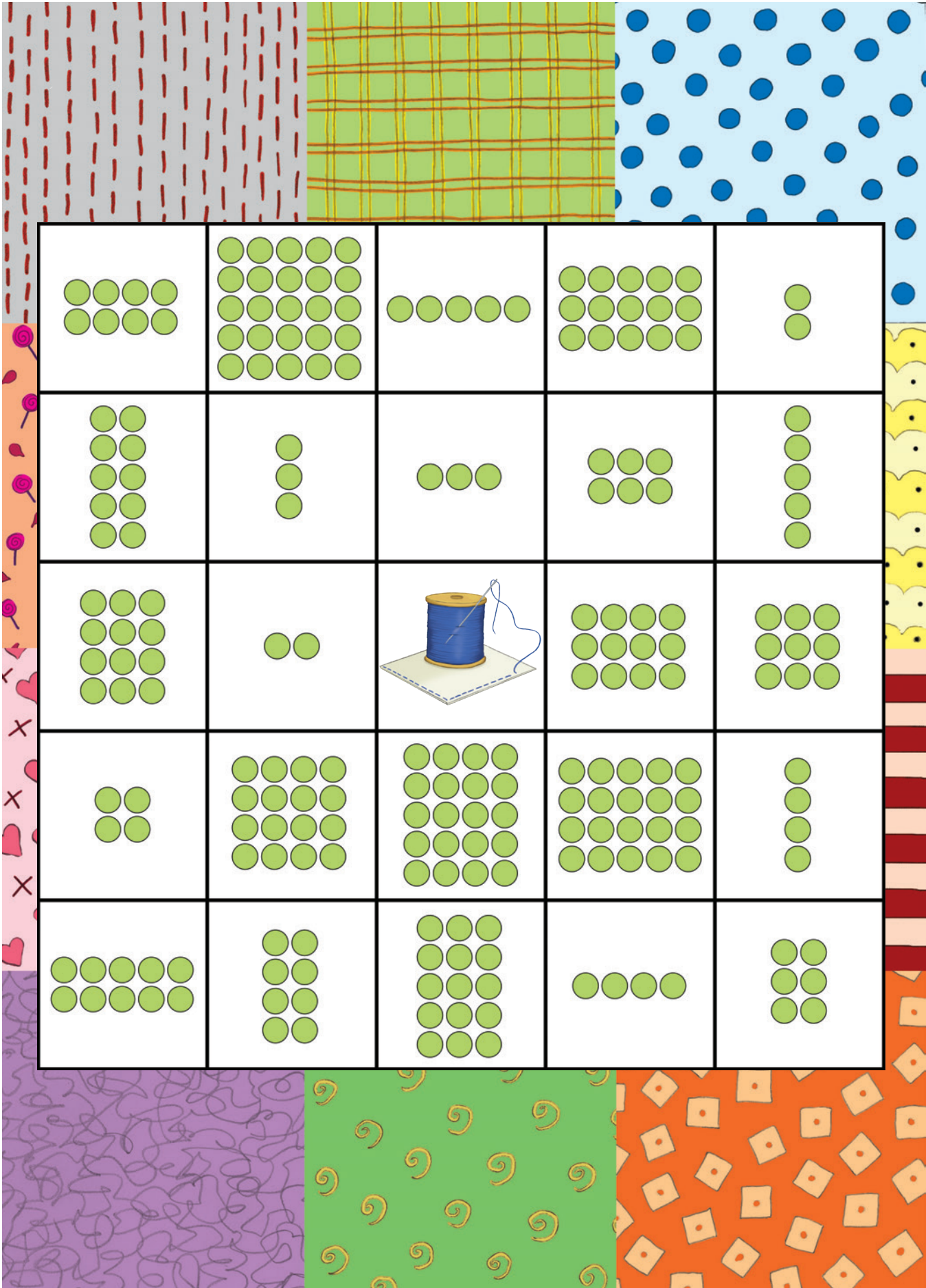


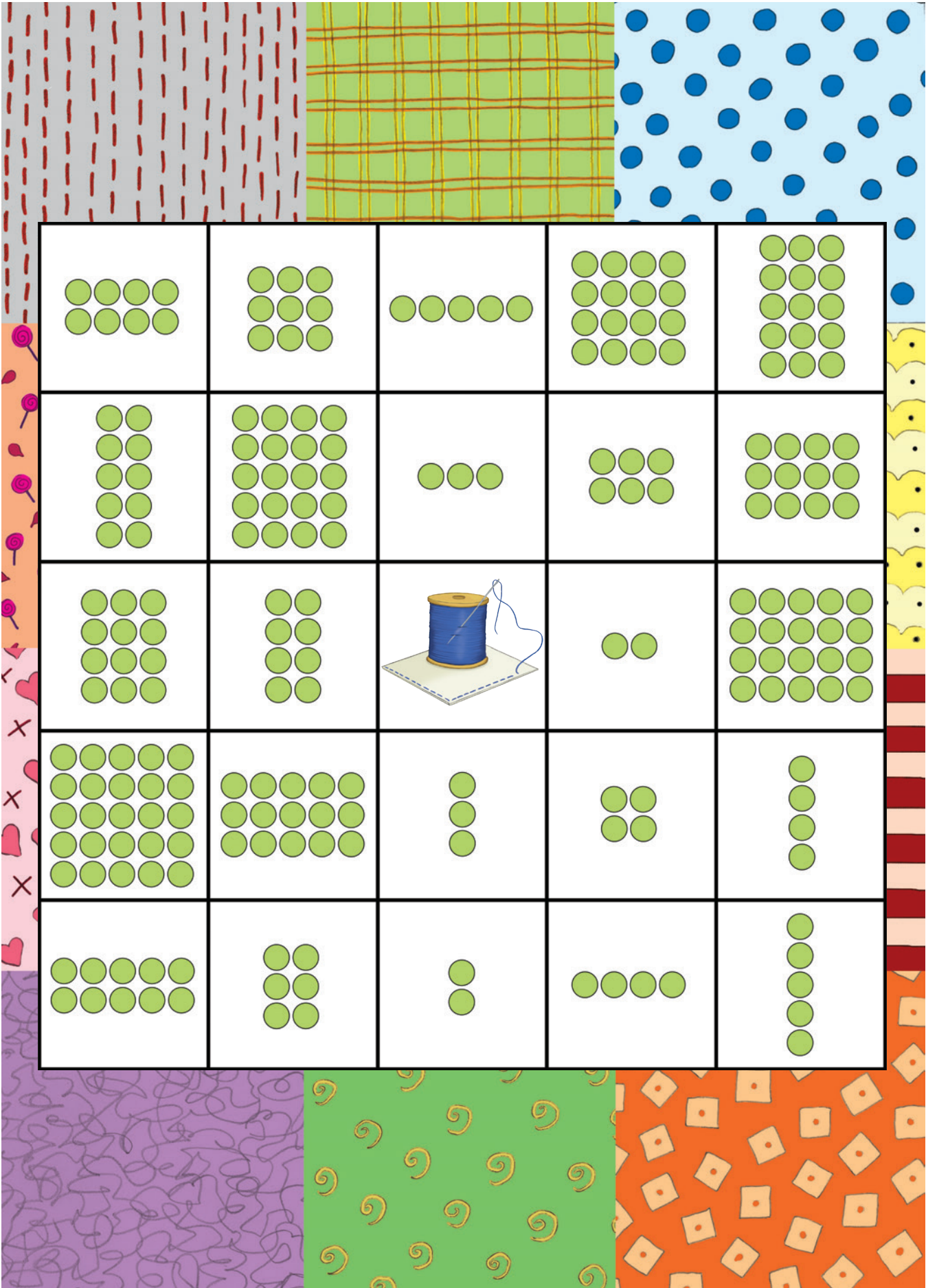
$$7 \times 1 = \underline{\quad}$$



$$2 \times 6 = \underline{\quad}$$









1×4	2×2	4×1
5×5	2×3	3×2
5×4	3×5	4×3
3×4	5×3	4×2
4×5	1×2	2×5
5×2	2×1	2×4
3×3	1×5	4×4
1×3	3×1	5×1

