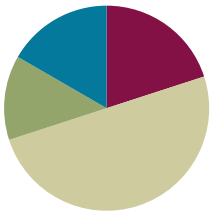
Lesson 6

Objective: Draw rows and columns to determine the area of a rectangle, given an incomplete array.

Related Topics: More Lesson Plans for the Common Core Math

Suggested Lesson Structure

Fluency Practice	(12 minutes)
Application Problem	(8 minutes)
Concept Development	(30 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (12 minutes)

- Group Counting **3.OA.1** (4 minutes)
- Write the Multiplication Fact **3.MD.7** (4 minutes)
- Products in an Array **3.OA.3** (4 minutes)

Group Counting (4 minutes)

Note: Group counting reviews interpreting multiplication as repeated addition.

Direct students to count forward and backward, occasionally changing the direction of the count.

- Sixes to 60
- Sevens to 70
- Eights to 80
- Nines to 90

Write the Multiplication Fact (4 minutes)

Materials: (S) Personal white boards

Note: This fluency reviews relating multiplication with area from G3–M4–Lesson 5.

T: (Project a 5 by 3 square-unit tiled rectangle. Write ___ × ___ = 15.) There are 15 tiles altogether. How many rows are there?

S: 5 rows.

T: (Write 5 × ___ = 15.) On your boards, fill in the blank to make a true equation.

S: (Write 5 × 3 = 15.)

T: (Project a 3 by 4 square-unit tiled rectangle. Write ___ × ___= 12.) There are 12 tiles altogether. How many columns are there?

S: 4 columns.

T: (Write ___ × 4 = 12.) On your boards, fill in the blank to make a true equation.

S: (Write 3 × 4 = 12.)

Continue with the following possible sequence, asking the students to first name either the number of rows or the number of columns: 4 by 6, 6 by 7, 5 by 8, and 7 by 8.

Products in an Array (4 minutes)

Materials: (S) Personal white boards

Note: This fluency supports the relationship between multiplication and area.

T: (Project an array with 2 rows of 6 stars.) How many rows of stars do you see?

S: 2 rows.

T: How many stars are in each row?

S: 6 stars.

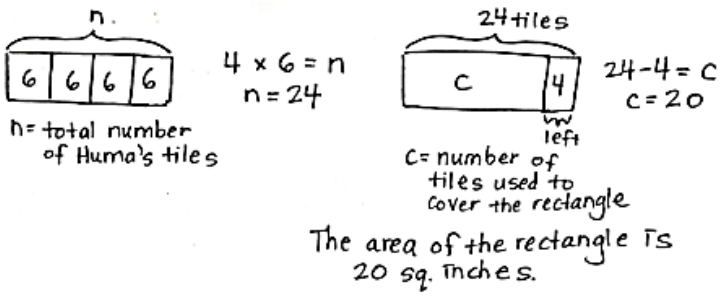
T: On your boards, write two multiplication sentences that can be used to find the total number of stars.

S: (Write 2 × 6 = 12 and 6 × 2 = 12.)

Continue with the following possible sequence: 3 by 7, 6 by 5, 8 by 6, and 4 by 9.

Application Problem (8 minutes)

Huma has 4 bags of square-inch tiles with 6 tiles in each bag. She uses them to measure the area of a rectangle on her homework. After covering the rectangle, Huma has 4 tiles left. What is the area of the rectangle?



NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Adjust the numbers in the Application Problem to challenge students working above grade level.

Note: This problem reviews multi-step word problems in the context of using square tiles to measure area.

Concept Development (30 minutes)

Materials: (S) Personal white board, straight edge, Problem Set, array template

Part 1: Estimate to draw the missing square units inside an array.

Students have the array template in their personal boards, looking at Array 1.

T: How can an array of square units help you find the area of a rectangle?

S: You can count the total number of square units inside the rectangle. → You can skip-count the rows to find the total.

T: (Project or display the image at right.) What do you notice about the array inside of this rectangle?

S: Some of the square units are missing.

T: What do you notice about the top row?

S: It has 4 square units and a rectangle.

T: Look at the second row. Can you use those square units to help you know how many square units make the top row?

S: The second row has 1 more square unit than the top row. You can just follow the line it makes to divide the rectangle into 2 square units.

T: Use your straight edge to draw that line now.

S: (Draw as shown at right.)

T: Talk to your partner: Use the top row to figure out how many square units will fit in each of the rows below. How do you know?

MP.2

S: Each row should have 6 square units, because rows in an array are equal!

T: Use the lines that are already there as guides, and with your straight edge, draw lines to complete the array.

S: (Draw.)

T: How many rows of 6 are in this array?

S: 4 rows of 6.

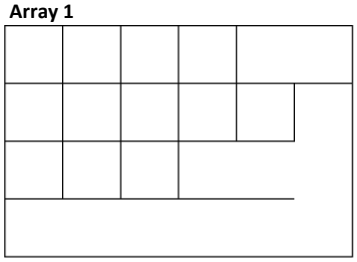
T: What equation can be used to find the area of the rectangle?

S: 4 × 6 = 24.

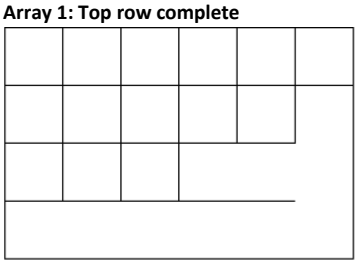
NOTES ON MULTIPLE MEANS FOR ACTION AND EXPRESSION:

Scaffold the following sequence further by beginning with a basic 2 by 2 rectangle in which 2 tiles are missing. Graduate to a 2 by 3 rectangle in which tiles or lines are missing. Continue step by step until students are ready for rectangles with larger areas. Also consider adding color to alternating tiles to assist counting or to distinguish tiles from rectangles or blank space.

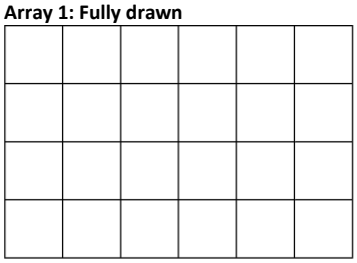
Array 1



Array 1: Top row complete



Array 1: Fully drawn



Part 2: Draw rows and columns to determine the area.

T: (Project the rectangle shown at right.) Turn your array template over. Can we estimate to draw unit squares inside the rectangle?

S: Yes.

T: It might take us longer, because fewer units are given. A quicker way to find the area is to figure out the number of rows and the number of columns. Let's start by finding the number of rows in our array. How can we find the number of rows?

S: The first column shows you how many rows there are.

T: With your finger, show your partner what you'll draw to find the number of rows. Then draw.

S: (Show and draw.)

T: How can we find the number of columns?

S: The first row shows you how many columns there are.

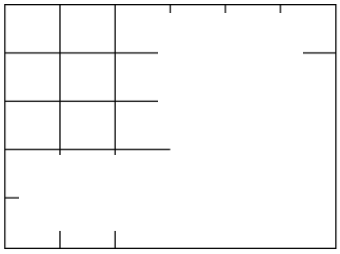
T: Use your straight edge to complete the first row. Label the side lengths of the rectangle, including units.

S: (Draw and label side lengths 5 units and 6 units.)

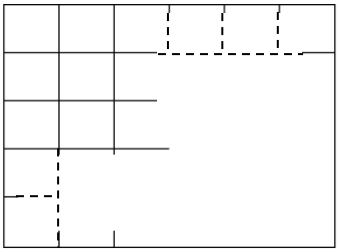
T: What number sentence can be used to find the area?

S: 5 × 6 = 30.

Array 2

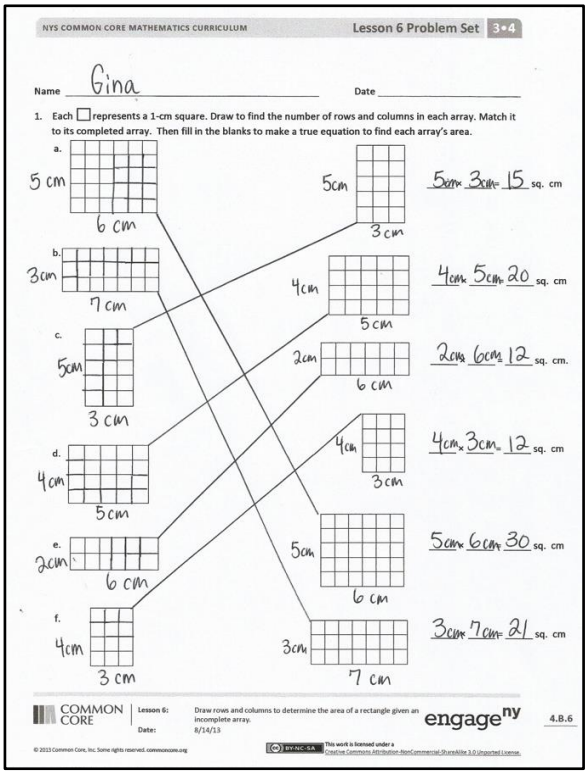


Array 2: 1 row and 1 column drawn



Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.



Student Debrief (10 minutes)

Lesson Objective: Draw rows and columns to determine the area of a rectangle, given an incomplete array.

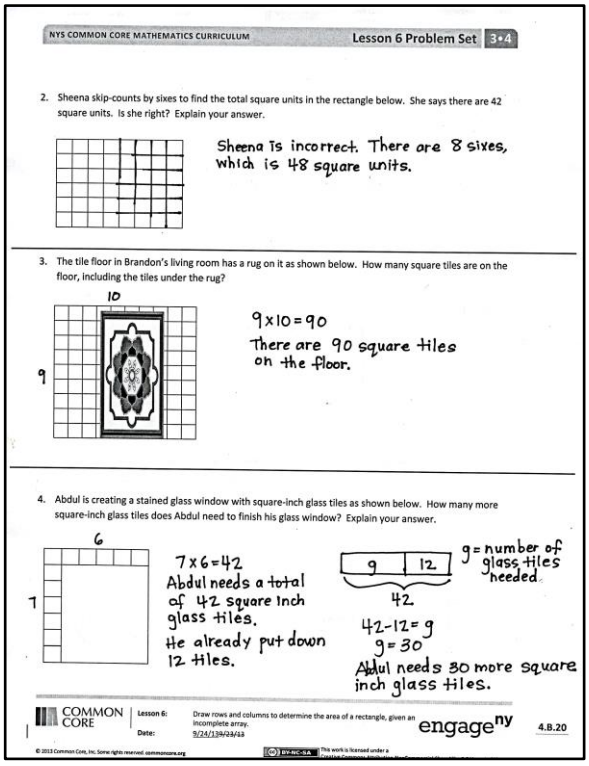
The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for

misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

You may choose to use any combination of the questions below to lead the discussion.

- How did you know where to draw the columns and rows in Problem 1?
- To find area, why don't we need to draw all of the square units in an incomplete array?
- What mistake did Sheena make in Problem 2?
- Is it necessary to have the rug to solve Problem 3? Why or why not?
- In Problem 3, how many tiles does the rug touch?
- There are multiple ways to find a solution to Problem 4. Invite students to share how they found the answer.


NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 6 Problem Set 3•4

2. Sheena skip-counts by sixes to find the total square units in the rectangle below. She says there are 42 square units. Is she right? Explain your answer.

Sheena is incorrect. There are 8 sixes, which is 48 square units.

3. The tile floor in Brandon's living room has a rug on it as shown below. How many square tiles are on the floor, including the tiles under the rug?

10, 9

9x10=90
There are 90 square tiles on the floor.

4. Abdul is creating a stained glass window with square-inch glass tiles as shown below. How many more square-inch glass tiles does Abdul need to finish his glass window? Explain your answer.

6, 7

7x6=42
Abdul needs a total of 42 square inch glass tiles.
He already put down 12 tiles.

9 | 12 | 42
g = number of glass tiles needed.
42-12=g
g=30
Abdul needs 30 more square inch glass tiles.

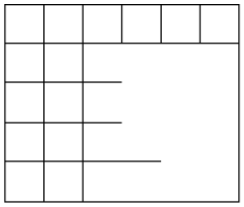
COMMON CORE Lesson 6: Draw rows and columns to determine the area of a rectangle, given an incomplete array. Date: 9/24/13 engage^ny 4.B.20

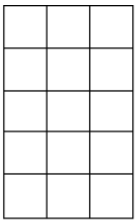
Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

Name _____ Date _____

1. Each ☐ represents a 1-cm square. Draw to find the number of rows and columns in each array. Match it to its completed array. Then fill in the blanks to make a true equation to find each array's area.

a. 



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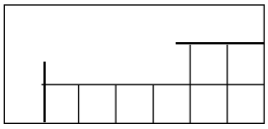
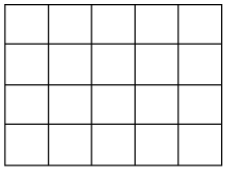
b. 



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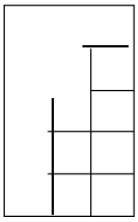
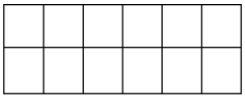
c. 



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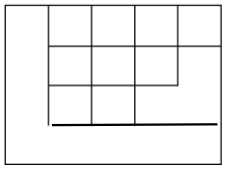
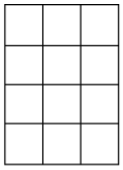
d. 



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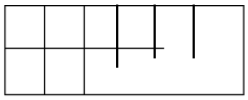
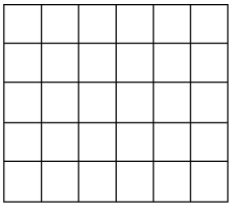
e. 



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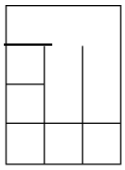
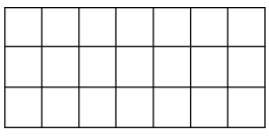
f. 



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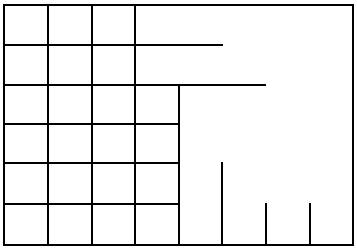
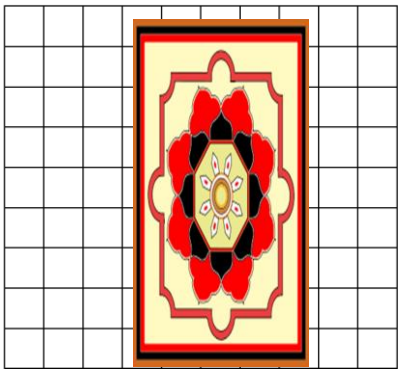
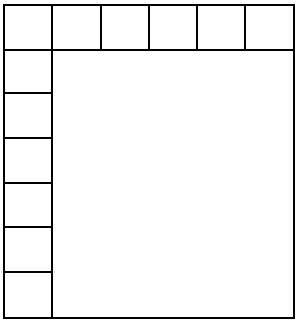
2. Sheena skip-counts by sixes to find the total square units in the rectangle below. She says there are 42 square units. Is she right? Explain your answer.



3. The tile floor in Brandon's living room has a rug on it as shown below. How many square tiles are on the floor, including the tiles under the rug?

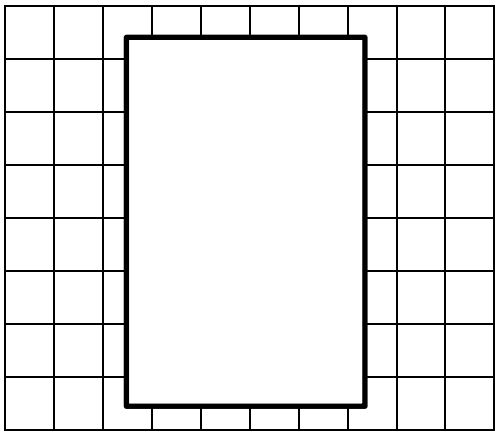


4. Abdul is creating a stained glass window with square-inch glass tiles as shown below. How many more square-inch glass tiles does Abdul need to finish his glass window? Explain your answer.



Name _____ Date _____

The tiled floor in Cayden's dining room has a rug on it as shown below. How many square tiles are on the floor, including the tiles under the rug?



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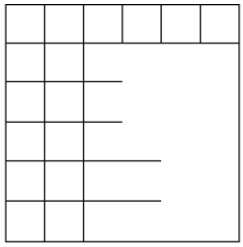
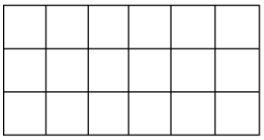
a. 



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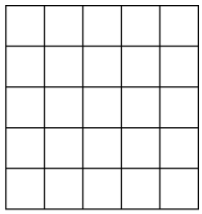
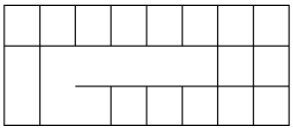


b. 

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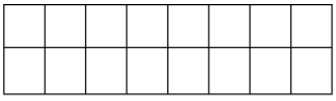

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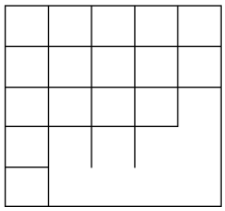
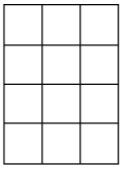
d. 



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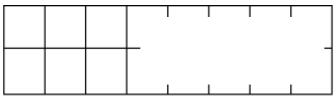
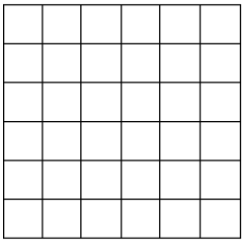
e. 



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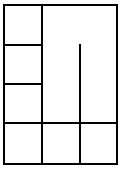
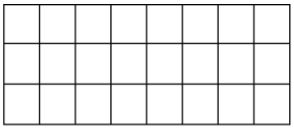
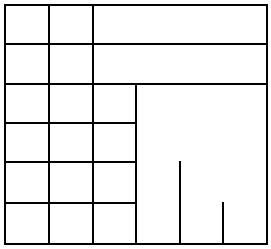
f. 

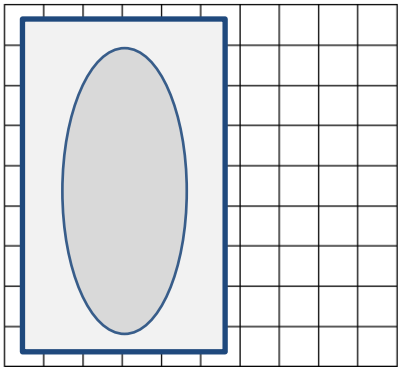


_____ × _____ = _____ sq cm

2. Minh skip-counts by sixes to find the total square units in the rectangle below. She says there are 36 square units. Is she correct? Explain your answer.

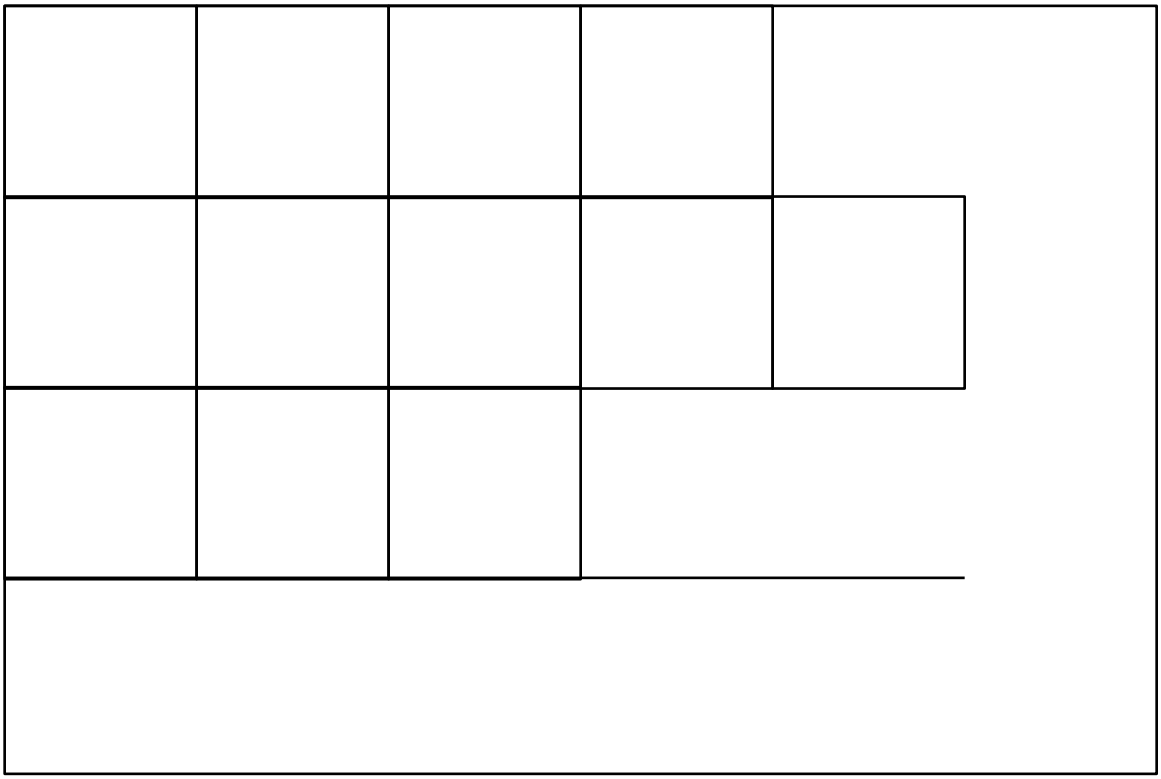


3. The tub in Paige's bathroom covers the tile floor as shown below. How many square tiles are on the floor, including the tiles under the tub?



4. Frank sees a book on top of his chessboard. How many squares are covered by the book? Explain your answer.

Array 1



Array 2