



## Topic B

# Arithmetic Properties Using Area Models

## 3.6C, 3.6D

<b>Focus Standards:</b>	3.6C	Determine the area of rectangles with whole number side lengths in problems using multiplication related to the number of rows times the number of unit squares in each row.
	3.6D	Decompose composite figures formed by rectangles into non-overlapping rectangles to determine the area of the original figure using the additive property of area.
<b>Instructional Days:</b>	3	
<b>Coherence -Links from:</b>	G2–M2	Addition and Subtraction of Length Units
	G3–M1	Properties of Multiplication and Division and Solving Problems with Units of 2–5 and 10
	G3–M3	Multiplication and Division with Units of 0, 1, 6–9, and Multiples of 10
<b>-Links to:</b>	G4–M3	Multi-Digit Multiplication and Division
	G4–M7	Exploring Multiplication

Topic B begins with a concrete study of arithmetic properties. Students cut apart rectangular grids and rearrange the parts to create new rectangles with the same area. Lesson 6 lays the foundation for the work to come in Lessons 7 and 8.

In Lesson 7, students apply knowledge of the distributive property from Modules 1 and 3 to find area. In previous modules, they learned to decompose an array of discrete items into two parts, determine the number of units in each part, and then find the sum of the parts. Now, students connect this experience to using the distributive property to determine the unknown side length of an array that may, for example, have an area of 72 square units. They might decompose the area into an 8 by 5 rectangle and an 8 by 4 rectangle. The sum of the side lengths,  $5 + 4$ , gives the length of the unknown side.

In Lesson 8, students use a given number of square units to determine all possible whole number side lengths of rectangles with that area. Students engage in MP.3 as they justify that they have found all possible solutions for each given area using the associative property. Areas of 24, 36, 48, and 72 are chosen to reinforce multiplication facts that are often more difficult. Students realize that different factors give the same product. For example, they find that 4 by 12, 6 by 8, 1 by 48, and 2 by 24 arrays all have an area of 48 square units. They use understanding of the commutative property to recognize that area models can be rotated similar to the arrays in Modules 1 and 3.

### A Teaching Sequence Toward Mastery of Arithmetic Properties Using Area Models

**Objective 1: Analyze different rectangles and reason about their area.**  
(Lesson 6)

**Objective 2: Apply the distributive property as a strategy to find the total area of a larger rectangle by adding two products.**  
(Lesson 7)

**Objective 3: Demonstrate the possible whole number side lengths of rectangles with areas of 24, 36, 48, or 72 square units using the associative property.**  
(Lesson 8)