

Multiplication and Area

In this 20-day module, students explore area as an attribute of two-dimensional figures and relate it to their prior work with multiplication. Students will build understanding that a 2×6 , 1×12 , and 3×4 rectangle each have the same area, and will learn how to calculate the area of a floor plan of their own design.

Students will learn, through concrete experience, that each of these rectangles has the same area, and relate their learning to multiplication.

Key Terms and Ideas

New Terms:

Area - the amount of two-dimensional space inside a bounded region

Area model - a model for multiplication that relates rectangular arrays to area

Square unit - a unit of area (could be square centimeters, inches, feet, or meters)

Tile (as a verb) - to cover a region without gaps or overlaps

Unit Square - whatever the length unit (e.g. centimeters, inches), a unit square is a 1 unit by 1 unit square of that length

Whole Number - an integer number without fractions

Terms to Review:

Array

Commutative Property

Distribute

Length

Multiplication

Toward the end of this module, students will learn how to calculate the area of an irregular shape like this one by looking at the area of the rectangles within the shape.

What Came Before this Module:

We worked extensively on relating multiplication and division, learned several different strategies for those operations, and practiced our math facts.

What Comes After this Module:

We will begin to formalize our understanding of fractions as equal parts of a whole, using the number line as well as area models to support our learning.

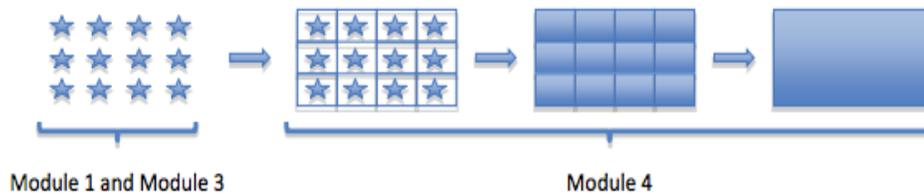
+ How you can help at home:

- ⇒ Continue to review multiplication and division math facts with your student
- ⇒ Practice drawing simple two-dimensional rectangular shapes and calculating the area using multiplication

Key Common Core Standards:

- **Geometric Measurement: understand concepts of area and relate area to multiplication and to addition**
 - A square with side length 1 unit, called “a unit square,” is said to have “one square unit” of area, and can be used to measure area
 - Measure areas by counting unit squares
 - Relate area to the operations of multiplication and addition

This flow chart shows how 3rd grade students start working with arrays in earlier Modules of *A Story of Units*. In Module 4, they become comfortable with the connection between rectangular arrays to the area of a two-dimensional region.



Spotlight on Math Models:

Area Models

You will often see this mathematical representation in *A Story of Units*.

A Story of Units has several key mathematical “models” that will be used throughout a student’s elementary years.

Students began in earlier grades to build arrays, showing multiplication and division as a series of rows and columns. In 3rd grade, they begin the transition to understanding these types of problems in the context of an area model.

As students move through the grades, the area model will be a powerful tool that can take them all the way into algebra and beyond. One of the goals in *A Story of Units* is to first give students concrete experiences with mathematical concepts, and then build slowly toward more abstract representations of those concepts. The area model is a tool that helps students to make that important leap.

Module 4 Sample Problem (Example taken from Lesson 13)

Anil finds the area of a 5-inch by 17-inch rectangle by breaking it into 2 smaller rectangles. Show one way that he could have solved the problem.

What is the area of the rectangle?

Possible Solution:

$$5 \times 17 = (5 \times 10) + (5 \times 7)$$

$$5 \times 17 = 50 + 35 = 85$$

The area of the rectangle is 85 sq. in.