



Module 1 Overview

Composing and Decomposing

“Understanding of and proficiency with measurement should flourish in the middle grades, especially in conjunction with other parts of the mathematics curriculum.”—Navigating through Measurement, page 4



Why is this Module named **Composing and Decomposing**?

Throughout Grade 6, students reason, look for structure, and identify similarities across mathematical domains: number and operations, proportionality, expressions, equations and relationships, measurement and data, and personal financial literacy.

Composing and Decomposing begins this work by deepening student understanding of numbers and shapes and exploring their relationships. Students compose familiar numbers and shapes into less familiar or more complicated ones. They decompose large numbers and complex shapes into smaller numbers and simpler shapes to perform calculations. As students become more flexible with how they see shapes and numbers, they will better understand their structure, which in turn will enable them to develop strategies for solving problems across mathematical domains.

Students learn to approach a problem by decomposing (taking apart) or composing (putting together) objects or numbers already understood. By grade 6, students

have developed some number sense; they have broken down numbers into sums, differences, products, and quotients. Now, students discover that numbers are composed of numerical expressions, and learn to make use of the distributive property. In previous grades, students studied basic shapes and determined their areas. Now, they calculate the area of complex shapes by composing them from familiar shapes. Students have studied whole numbers, fractions, and decimals. Now, they learn to see these forms of numbers as composing a single set that can all be plotted on the same number line.

Module 1 sets the stage for the habits of mind students will develop as they grow in their mathematical understanding. To see structure across domains, students must be able to shift perspective and see objects and numbers as entities on which to operate, not just as isolated objects or numbers. When students encounter a new idea, they should ask themselves, “Is this problem or idea similar to another problem or idea I’ve learned in the past?” “Are there similarities between this topic and a previously learned topic?”

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What is the mathematics of Composing and Decomposing?

Composing and Decomposing contains four topics: *Factors and Multiples*, *Positive Rational Numbers*, *Shapes and Solids*, and *Decimals*. Students begin this module by examining the relationships between numbers and shapes, using areas models to solve problems. They strengthen their skills with fraction and decimal operations, then use these skills to solve problems involving area of various shapes and volume of rectangular prisms.

Factors and Multiples connects number properties and the areas of two-dimensional shapes. Students use the distributive property and prime factorization to write equivalent numeric expressions and calculate greatest common factors and least common multiples. Throughout this topic, connections are drawn between area models and factors, using properties of arithmetic as tools for exploration.

Positive Rational Numbers merges the sets of numbers that students have previously studied into a single set of numbers. Students focus on representing, comparing, and creating equivalence of fractions using a physical model. They move from

the concrete model of fractions to a more abstract model on the number line. To understand relative size of fractions, students compare them to benchmark fractions and investigate the relationship of the numerator and denominator of fractions. They review multiplication of whole numbers with fractions using area models to develop understanding of fraction by fraction multiplication. Student draw on the inverse relationship between multiplication and division to develop an understanding of fraction division.

In *Shapes and Solids*, students begin with studying the relationships of angles and side lengths of triangles before they develop the area formula for a triangle by decomposing rectangles to calculate area. Students model the area formulas for parallelograms, trapezoids, and triangles by decomposing and composing parts of shapes due to the additive nature of area. Building off of Grade 5 mathematics knowledge of volume of cubes and rectangular prisms, students deepen their understanding of volume of rectangular prisms with positive rational number dimensions. The work with area and volume formulas in this topic serves to build fluency of operating with rational numbers.

Decimals builds on the number and operation skills developed in elementary

mathematics and established standard algorithms so that students can develop fluency throughout the course. Students begin by plotting, comparing and ordering rational numbers on a number line before operating with decimals. They use place value to estimate sums and differences and develop standard algorithms. Connecting to Positive Rational Numbers, students use physical models, such as the area model, to develop understanding of decimal multiplication and division before moving to the standard algorithms. To determine reasonableness to solutions, students continue to use place value to estimate products and quotients.



How is Composing and Decomposing connected to prior learning?

In **Composing and Decomposing**, students use what they already know about area, number properties, and volume to access grade 6 mathematics. Their prior knowledge is formalized and used as a basis for the fluency number standards.

The course begins with familiar shapes and numbers, and students move from an intuitive understanding of shape and how to compose and decompose numbers to a formalization of the ideas studied in elementary school. This module develops students' mathematical language around number properties and shape, putting formal language around operations, properties, and strategies students have used throughout elementary school.



When will students use knowledge from Composing and Decomposing in future learning?

Fluency develops over time. This module supports future learning by establishing the fluency standards at the beginning of the course, allowing students to practice these skills throughout the rest of the course.

Composing and Decomposing sets the stage for seeing structure in numbers and shapes. Students will continue to use fractions and decimals in their work with geometric shapes, percents, expressions, equations, graphs, and statistics.