

Grade 6

The following curriculum focal points and related connections are the recommended content emphases for mathematics in grade 6. It is essential that these focal points be addressed in contexts that promote problem solving, reasoning, communication, making connections, and designing and analyzing representations.

Grade 6 Curriculum Focal Points

Number and Operations: Developing an understanding of and fluency with multiplication and division of fractions and decimals.

Students use the meanings of fractions, multiplication and division, and the inverse relationship between multiplication and division to make sense of procedures for multiplying and dividing fractions and explain why they work. They use the relationship between decimals and fractions, as well as the relationship between finite decimals and whole numbers (i.e., a finite decimal multiplied by an appropriate power of 10 is a whole number), to understand and explain the procedures for multiplying and dividing decimals. Students use common procedures to multiply and divide fractions and decimals efficiently and accurately. They multiply and divide fractions and decimals to solve problems, including multistep problems and problems involving measurement.

Number and Operations: Connecting ratio and rate to multiplication and division.

Students use simple reasoning about multiplication and division to solve ratio and rate problems (e.g., “If 5 items cost \$3.75 and all items are the same price, then I can find the cost of 12 items by first dividing \$3.75 by 5 to find out how much one item costs and then multiplying the cost of a single item by 12”). By viewing equivalent ratios and rates as deriving from, and extending, pairs of rows (or columns) in the multiplication table, and by analyzing simple drawings that indicate the relative sizes of quantities, students extend whole number multiplication and division to ratios and rates. Thus, they expand the repertoire of problems that they can solve by using multiplication and division, and they build on their understanding of fractions to understand ratios. Students solve a wide variety of problems involving ratios and rates.

Algebra: Writing, interpreting, and using mathematical expressions and equations.

Students write mathematical expressions and equations that correspond to given situations, they evaluate expressions, and they use expressions and formulas to solve problems. They understand that variables represent numbers whose exact values are not yet specified, and they use variables appropriately. Students understand that expressions in different forms can be equivalent, and they can rewrite an expression to represent a quantity in a different way (e.g., to make it more compact or to feature different information). Students know that the solutions of an equation are the values of the variables that make the equation true. They solve simple one-step equations by using number sense, properties of operations, and the idea of maintaining equality on both sides

of an equation. They construct and analyze tables (e.g., to show quantities that are in equivalent ratios), and they use equations to describe simple relationships (such as $3x = y$) shown in a table.

Connections to the Focal Points

Number and Operations: Students' work in dividing fractions shows them that they can express the result of dividing two whole numbers as a fraction (viewed as parts of a whole). Students then extend their work in grade 5 with division of whole numbers to give mixed number and decimal solutions to division problems with whole numbers. They recognize that ratio tables not only derive from rows in the multiplication table but also connect with equivalent fractions. Students distinguish multiplicative comparisons from additive comparisons.

Algebra: Students use the commutative, associative, and distributive properties to show that two expressions are equivalent. They also illustrate properties of operations by showing that two expressions are equivalent in a given context (e.g., determining the area in two different ways for a rectangle whose dimensions are $x + 3$ by 5). Sequences, including those that arise in the context of finding possible rules for patterns of figures or stacks of objects, provide opportunities for students to develop formulas.

Measurement and Geometry: Problems that involve areas and volumes, calling on students to find areas or volumes from lengths or to find lengths from volumes or areas and lengths, are especially appropriate. These problems extend the students' work in grade 5 on area and volume and provide a context for applying new work with equations.

Related Expectations from Principles and Standards for School Mathematics Content Standards: Grade 6

The following content expectations are linked to the [Grade 6 focal points](#) or connections.

Number and Operations

- Work flexibly with fractions, decimals, and percents to solve problems
- Compare and order fractions, decimals, and percents efficiently and find their approximate locations on a number line
- Understand and use ratios and proportions to represent quantitative relationships
- Understand the meaning and effects of arithmetic operations with fractions, decimals, and integers
- Use the associative and commutative properties of addition and multiplication and the distributive property of multiplication over addition to simplify computations with integers, fractions, and decimals

- Understand and use the inverse relationships of addition and subtraction, multiplication and division, and squaring and finding square roots to simplify computations and solve problems
- Select appropriate methods and tools for computing with fractions and decimals from among mental computation, estimation, calculators or computers, and paper and pencil, depending on the situation, and apply the selected methods
- Develop and analyze algorithms for computing with fractions, decimals, and integers and develop fluency in their use
- Develop and use strategies to estimate the results of rational-number computations and judge the reasonableness of the results
- Develop, analyze, and explain methods for solving problems involving proportions, such as scaling and finding equivalent ratios

Algebra

- Represent, analyze, and generalize a variety of patterns with tables, graphs, words, and, when possible, symbolic rules
- Develop an initial conceptual understanding of different uses of variables
- Use symbolic algebra to represent situations and to solve problems, especially those that involve linear relationships
- Recognize and generate equivalent forms for simple algebraic expressions and solve linear equations
- Model and solve contextualized problems using various representations, such as graphs, tables, and equations

Geometry

- Precisely describe, classify, and understand relationships among types of two- and three-dimensional objects using their defining properties
- Recognize and apply geometric ideas and relationships in areas outside the mathematics classroom, such as art, science, and everyday life

Measurement

- Understand both metric and customary systems of measurement

- Understand relationships among units and convert from one unit to another within the same system
- Understand, select, and use units of appropriate size and type to measure angles, perimeter, area, surface area, and volume
- Solve problems involving scale factors, using ratio and proportion
- Solve simple problems involving rates and derived measurements for such attributes as velocity and density

