

Georgia Standards of Excellence Grade 6 Mathematics



“Where Young Men Soar to Greater Heights”

In Grade 6, instructional time should focus on four critical areas: (1) connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems; (2) completing understanding of division of fractions and extending the notion of number to the system of rational numbers, which includes negative numbers; (3) writing, interpreting, and using expressions and equations; and (4) developing understanding of statistical thinking.

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Unit 1: Number Fluency

4 -5 weeks

Standards: MGSE6.NS.1 MGSE6.NS.2
MGSE6.NS.3 MGSE6.NS.4

Concepts

- Apply and extend previous understandings of multiplication and division to divide fractions by fractions.
- Compute fluently with multi-digit numbers and find common factors and multiples.

Unit 3: Expressions

4 -5 weeks

Standards: MGSE6.EE.1;
MGSE6.EE.2,2a,2b,2c; MGSE6.EE.3;
MGSE6.EE.4; MGSE6.NS.4;

Concepts

- Apply and extend previous understandings of arithmetic to algebraic expressions.

Unit 5: Area and Volume

4 – 5 weeks

Standards: MGSE6.G.1 MGSE6.G.2 MGSE6.G.4

Concepts

- Solve real-world and mathematical problems involving area, surface area, and volume.

Unit 2: Rate, Ratio and Proportional Reasoning Using Equivalent Fractions

3 - 4 weeks

Standards: MGSE6.RP.1; MGSE6.RP.2;
MGSE6.RP.3,3a, 3b,3c,3d;

Concepts

- Understand ratio concepts and use ratio reasoning to solve problems.

Unit 4: One-Step Equations and Inequalities

4 -5 weeks

Standards: MGSE6.EE.5; MGSE6.EE.6;
MGSE6.EE.7; MGSE6.EE.8; MGSE6.EE.9;
MGSE6.RP.3,3a,3b,3c,3d;

Concepts

- Reason about and solve one variable equations and inequalities.
- Represent and analyze quantitative relationships between dependent and independent variables.

Unit 6: Statistics

3 – 4 weeks

Standards: MGSE6.SP.1 MGSE6.SP.2 MGSE6.SP.3
MGSE6.SP.4 MGSE6.SP.5

Concepts

- Develop understanding of statistical variability.
- Summarize and describe distributions

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Unit 7: Rational Explorations: Numbers and their Opposites

3 – 4 weeks

Standards: MGSE6.NS.5 MGSE6.NS.6,6b,6c;
MGSE6.NS.7,7a,7b,7c,7d; MGSE6.NS.8; MGSE6.G.3;

Concepts

- Apply and extend previous understandings of numbers to the system of rational numbers. Solve real-world and mathematical problems involving area, surface area, and volume.

Unit 8: Show What We Know

3 – 4 Weeks

These units were written to build upon concepts from prior units, so later units contain tasks that depend upon the concepts addressed in earlier units. All units will include the Mathematical Practices and indicate skills to maintain.

NOTE: Mathematical standards are interwoven and should be addressed throughout the year in as many different units and tasks as possible in order to stress the natural connections that exist among mathematical topics.

Grades 6-8 Key:

NS = The Number System

RP = Ratios and Proportional Relationships

EE = Expressions and Equations

G = Geometry

SP = Statistics and Probability

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Unit 1: Number System Fluency Rate, Ratio and Proportional

Unit Focus:

Extending students' experience with whole number computation in elementary grades, division of fractions by fractions and all four operations on decimals are a focus in the first unit. Tasks utilize hands-on activities as a means to building understanding, rather than rote memorization of algorithms. Students also find common factors and multiples and deepen and extend their understanding of the distributive property to work with fractions.

Standards/Elements:

Apply and extend previous understandings of multiplication and division to divide fractions by fractions.

MGSE6.NS.1 Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, including reasoning strategies such as using visual fraction models and equations to represent the problem.

For example:

- *How much chocolate will each person get if 3 people share $\frac{1}{2}$ lb of chocolate equally?*
- *How many $\frac{3}{4}$ -cup servings are in $\frac{2}{3}$ of a cup of yogurt?*
- *How wide is a rectangular strip of land with length $\frac{3}{4}$ mi and area $\frac{1}{2}$ square mi?*
- *Create a story context for $(\frac{2}{3}) \div (\frac{3}{4})$ and use a visual fraction model to show the quotient;*
- *Three pizzas are cut so each person at the table receives $\frac{1}{4}$ pizza. How many people are at the table?*
- *Use the relationship between multiplication and division to explain that $(\frac{2}{3}) \div (\frac{3}{4}) = \frac{8}{9}$ because $\frac{3}{4}$ of $\frac{8}{9}$ is $\frac{2}{3}$. (In general, $(\frac{a}{b}) \div (\frac{c}{d}) = \frac{ad}{bc}$.)*

Compute fluently with multi-digit numbers and find common factors and multiples.

MGSE6.NS.2 Fluently divide multi-digit numbers using the standard algorithm.

MGSE6.NS.3 Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

MGSE6.NS.4 Find the common multiples of two whole numbers less than or equal to 12 and than or equal to 100.

a. Find the greatest common factor of 2 whole numbers and use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factors. (GCF) Example: $36 + 8 = 4(9 + 2)$

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b. Apply the least common multiple of two whole numbers less than or equal to 12 to solve real-world problems.

Additional Resources:

1. <https://www.georgiastandards.org/Georgia-Standards/Frameworks/6th-MathCurriculum-Map.pdf>
2. <https://www.georgiastandards.org/Georgia-Standards/Frameworks/6th-Math-Unit1.pdf>

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Unit 2: Rate, Ratio and Proportional Reasoning Using Equivalent

Unit Focus:

Students work extensively with ratios and rational thinking through tasks and activities that generate deep understanding. The unit explores unit rate and comparative “size”, while focusing on real-world problems.

Standards/Elements:

Understand ratio concepts and use ratio reasoning to solve problems.

MGSE6.RP.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.

For example, “The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak.” “For every vote candidate A received, candidate C received nearly three votes.”

MGSE6.RP.2 Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$ (b not equal to zero), and use rate language in the context of a ratio relationship.

For example, “This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is $3/4$ cup of flour for each cup of sugar.” “We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger.”

MGSE6.RP.3 Use ratio and rate reasoning to solve real-world and mathematical problems utilizing strategies such as tables of equivalent ratios, tape diagrams (bar models), double number line diagrams, and/or equations.

MGSE6.RP.3a Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.

MGSE6.RP.3b Solve unit rate problems including those involving unit pricing and constant speed.

For example, If it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?

MGSE6.RP.3c Find a percent of a quantity as a rate per 100 (e.g. 30% of a quantity means $30/100$ times the quantity); given a percent, solve problems involving finding the whole given a part and the part given the whole.

MGSE6.RP.3d Given a conversion factor, use ratio reasoning to convert measurement units within one system of measurement and between two systems of measurements (customary

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and metric); manipulate and transform units appropriately when multiplying or dividing quantities.

For example, given $1 \text{ in.} = 2.54 \text{ cm}$, how many centimeters are in 6 inches?

Additional Resources:

1. <https://www.georgiastandards.org/Georgia-Standards/Frameworks/6th-MathCurriculum-Map.pdf>
2. <https://www.georgiastandards.org/Georgia-Standards/Frameworks/6th-Math-Unit-2.pdf>

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Unit 3: Expressions

Unit Focus:

Students begin a more formal study of algebra as they move from arithmetic experiences to algebraic representations. Students learn to translate verbal phrases and numeric situations into algebraic expressions, understand like-terms, and work with exponential notation

Standards/Elements:

Apply and extend previous understandings of arithmetic to algebraic expressions.

MGSE6.EE.1 Write and evaluate numerical expressions involving whole-number exponents.

MGSE6.EE.2 Write, read, and evaluate expressions in which letters stand for numbers.

MGSE6.EE.2a Write expressions that record operations with numbers and with letters standing for numbers.

MGSE6.EE.2b Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity.

MGSE6.EE.2c Evaluate expressions at specific values for their variables. Include expressions that arise from formulas in real-world problems. Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).

MGSE6.EE.3 Apply the properties of operations to generate equivalent expressions.

MGSE6.EE.4 Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them).

MGSE6.NS.4 Find the common multiples of two whole numbers less than or equal to 12 and the common factors of two whole numbers less than or equal to 100.

a. Find the greatest common factor of 2 whole numbers and use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factors. (GCF) Example: $36 + 8 = 4(9 + 2)$

b. Apply the least common multiple of two whole numbers less than or equal to 12 to solve real-world problems.

Additional Resources:

1. <https://www.georgiastandards.org/Georgia-Standards/Frameworks/6th-Math-Curriculum-Map.pdf>
2. <https://www.georgiastandards.org/Georgia-Standards/Frameworks/6th-Math-Unit-3.pdf>

Unit 4: One-Step Equations and Inequalities

Unit Focus:

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Extending the study of algebra, students reason about and solve one-step equations and inequalities. Often two quantities are not balanced or equal, and this unit introduces them to inequalities and how numbers compare, including work with number lines.

Standards/Elements:

Reason about and solve one-variable equations and inequalities.

MGSE6.EE.5 Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.

MGSE6.EE.6 Use variables to represent numbers and write expressions when solving a realworld or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

MGSE6.EE.7 Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q and x are all nonnegative rational numbers.

MGSE6.EE.8 Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

Represent and analyze quantitative relationships between dependent and independent variables.

MGSE6.EE.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another.

- a. Write an equation to express one quantity, the dependent variable, in terms of the other quantity, the independent variable.
- b. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.
For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation $d=65t$ to represent the relationship between distance and time.

Understand ratio concepts and use ratio reasoning to solve problems.

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MGSE6.RP.3 Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

MGSE6.RP.3a Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.

MGSE6.RP.3b Solve unit rate problems including those involving unit pricing and constant speed.

MGSE6.RP.3c Find a percent of a quantity as a rate per 100 (e.g. 30% of a quantity means 30/100 times the quantity); given a percent, solve problems involving finding the whole given a part and the part given the whole.

MGSE6.RP.3d Given a conversion factor, use ratio reasoning to convert measurement units within one system of measurement and between two systems of measurements (customary and metric); manipulate and transform units appropriately when multiplying or dividing quantities.

For example, given $1 \text{ in.} = 2.54 \text{ cm}$, how many centimeters are in 6 inches?

Additional Resources:

1. <https://www.georgiastandards.org/Georgia-Standards/Frameworks/6th-MathCurriculum-Map.pdf>
2. <https://www.georgiastandards.org/Georgia-Standards/Frameworks/6th-Math-Unit-4.pdf>

Unit 5: Area and Volume

Unit Focus:

Students extend their work with area and volume from simple figures in elementary school to more complex figures, including those with sides of fractional lengths. Complex figures will be composed and decomposed into familiar triangles and rectangles in order to compute their areas. Nets of solid figures allow students to calculate the surface area of three-dimensional figures.

Standards/Elements:

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Solve real-world and mathematical problems involving area, surface area, and volume.

MGSE6.G.1 Find area of right triangles, other triangles, quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

MGSE6.G.2 Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths ($\frac{1}{2}$ u), and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = (\text{length}) \times (\text{width}) \times (\text{height})$ and $V = (\text{area of base}) \times (\text{height})$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.

MGSE6.G.4 Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.

Additional Resources:

1. <https://www.georgiastandards.org/Georgia-Standards/Frameworks/6th-MathCurriculum-Map.pdf>
2. <https://www.georgiastandards.org/Georgia-Standards/Frameworks/6th-Math-Unit-5.pdf>

Unit 6: Statistics

Unit Focus:

Students are introduced to the study of statistics, first by learning what constitutes a statistical question, then by collecting data through such questions and data sorting and analyzing. Statistical measures allow for the description of data through single-number summaries of center and distribution, and students explore and become familiar with what data “looks like” and find meaning in their samples.

Standards/Elements:

Develop understanding of statistical variability.

MGSE6.SP.1 Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.

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MGSE6.SP.2 Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.

MGSE6.SP.3 Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.

Summarize and describe distributions.

MGSE6.SP.4 Display numerical data in plots on a number line, including dot plots, histograms, and box plots.

MGSE6.SP.5 Summarize numerical data sets in relation to their context, such as by:

- a. Reporting the number of observations.
- b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
- c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range).
- d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data was gathered.

Additional Resources:

1. <https://www.georgiastandards.org/Georgia-Standards/Frameworks/6th-Math-Curriculum-Map.pdf>
2. <https://www.georgiastandards.org/Georgia-Standards/Frameworks/6th-Math-Unit-6.pdf>

Unit 7: Rational Explorations: Numbers and their Opposites

Unit Focus:

Up to this point, students have only encountered numbers with values greater than or equal to zero (Natural Numbers, Counting Numbers, and Whole Numbers). Unit 7 introduces students conceptually to circumstances best described with negative numbers, numbers with a value less than zero- the set of Integers. Integer operations are taught in seventh grade, but by introducing students to integers in sixth grade, they have the opportunity to explore situations appropriately represented by negative numbers, and graph points in all four quadrants of the coordinate plane. Using a number line, students learn about numbers and their “opposites” (additive inverses), and absolute value (distance from zero). This unit is intentionally placed at the end of sixth grade, as it is not an expectation of the standards for sixth grade students to do any operations with integers. Instead, this unit is intended as an introduction. It leads directly into the first seventh grade unit, Operations with Rational Numbers.

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Standards/Elements:

Apply and extend previous understandings of numbers to the system of rational numbers.

MGSE6.NS.5 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, debits/credits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.

MGSE6.NS.6 Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.

MGSE6.NS.6a Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., $-(-3) = 3$, and that 0 is its own opposite.

MGSE6.NS.6b Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.

MGSE6.NS.6c Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.

MGSE6.NS.7 Understand ordering and absolute value of rational numbers.

MGSE6.NS.7a Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram.

MGSE6.NS.7b Write, interpret, and explain statements of order for rational numbers in realworld contexts.

MGSE6.NS.7c Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a realworld situation.

MGSE6.NS.7d Distinguish comparisons of absolute value from statements about order.

MGSE6.NS.8 Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.

Solve real-world and mathematical problems involving area, surface area, and volume.

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MGSE6.G.3 Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.

Additional Resources:

1. <https://www.georgiastandards.org/Georgia-Standards/Frameworks/6th-MathCurriculum-Map.pdf>
2. <https://www.georgiastandards.org/Georgia-Standards/Frameworks/6th-Math-Unit-7.pdf>

Unit 8: Show What We Know

Unit Focus:

ALL

Standards/Elements:

ALL

- Review and Reteach all content standards
- Apply skills and concepts learned from all units
- Engage in problem-based learning
- Demonstrate mastery using summative assessments
- Preview the Unit 1 content for the upcoming grade level