

Major Work of Grade 6

The purpose of this document is to provide a brief overview of the most essential content in the grade level along with a progression of how the content was addressed in the prior grade level and will prepare students for content in the future grade level. This is not a comprehensive list of content in the grade level as defined in the Utah Core Standards, but rather highlights the major work of the grade level.

Major Work of Grade Band: Grades 6 - 8

- Apply and use operations with rational numbers
- Understand ratio concepts and apply proportional reasoning
- Simplify expressions and solve equations
- Represent and analyze relationships

Vertical Alignment of Major Work

Major Work: Operations with Rational Numbers

Prior grades: Students understand patterns in place value including decimals and powers of ten (5.NBT.1-3). Add, subtract, multiply and divide decimals to hundredths (5.NBT.7). Multiply a fraction or whole number by a fraction including real-world problems (5.NF.4,6). Divide unit fractions by whole numbers and whole numbers by unit fractions using reasoning about the relationship between multiplication and division (5.NF.7). Fluently multiply multi-digit whole numbers using the standard algorithm (5.NBT.5) and divide whole numbers with up to four-digit dividends and two-digit divisors (5.NBT.6).

Grade 6: Apply and extend understanding of operations with rational numbers: Apply previous understanding of all four operations with rational numbers (6.NS.1-3), with the extension of dividing fractions by fractions. Students are introduced to integers via opposite signs, value, and direction; number line models; and absolute value (6.NS.5-7).

Future grades: Students will apply previous understanding of operations with rational numbers to include integers in grade 7 (7.NS.1-3) and irrational numbers in grade 8 (8.NS.1-3). In Secondary Math II, students will expand the number system to include imaginary numbers (SII.N.CN.1, 2, 7-9).

Major Work: Ratio and Rate Reasoning

- **Prior grades:** In grades 4 and 5, students have created equivalent fractions (4.NF; 5.NF) and use equivalent fractions as a strategy to add and subtract fractions with unlike denominators including mixed numbers (5.NF.1-2). Fractions are interpreted as division of the numerator by the denominator (5.NF.3). Interpret multiplication as scaling (5.NF.5).

Grade 6: Understand ratio concepts and apply proportional reasoning: Understand ratio concepts (6.RP.1) and understand the concept of unit rate (6.RP.2). Use multiple representations to solve ratio/rate problems (tables of equivalent ratios, equations, and plot values on a coordinate plane in all four quadrants) (6.RP.3).

Future grades: In grade 7, students will recognize and represent proportional relationships between quantities using multiple representations (7.RP.1-2), and use proportional relationships to solve multi-step and percent problems (7.RP.3). In grade 8, students will extend their understanding of proportional relationships to linear equations, recognizing slope as the proportional relationship between quantities (8.EE.5) and that linear functions have a vertical shift of b units (8.EE.5-6; 8.F). In high school, students will identify functions based on rates of change (High School Functions standards).

Major Work: Simplify Expressions and Solve Simple One-Variable Equations and Inequalities

Prior grades: Students solve for unknown values starting in the early grades (K.OA.4; 1.OA.1; 2.OA.1; etc.), are introduced to equality and inequality symbols (1.NBT.3) and analyze patterns and relationships (5.OA.3). Students introduced to inequality symbols $<$, $>$, $=$ (1.NBT.3).

Grade 6: Simplify expressions and solve equations: Apply and extend previous understandings of arithmetic to using variables and generating equivalent algebraic expressions (6.EE.1-4). Reason about and, for the first time in their math education, formally solve simple one-variable equations and inequalities, *for example:* $(x+q < r)$ (6.EE.5-8).

Future grades: In grade 7, students will apply properties of operations to factor, expand, and convert between forms and assess reasonableness of an answer (7.EE.1-3). Students will use variables to represent quantities to construct and solve simple equations and inequalities (for example: $px+q < r$) (7.EE.4). In grade 8, students will solve complex linear equations and inequalities (8.EE.7). Students solve equations throughout high school and justify why solutions work (High School algebra standards).

Major Work: Represent and Analyze Relationships

Prior grades: In grade 5, students will generate two numerical patterns using two given rules (5.OA.3). Students also understand concepts of geometric measurement and relate volume to multiplication and to addition (5.MD.3-5).

Grade 6: Represent and analyze relationships: Solve simple problems using numerical and algebraic expressions (6.EE.5-8); represent and analyze quantitative relationships between dependent and independent variables and graph the relationship on a coordinate plane (6.NS.8; 6.EE.9).

Future grades: In grade 7, students will solve problems using numerical and algebraic expressions (7.EE-4), draw references between two populations (7.SP.3-4), and investigate probability models (7.SP.5-8). Students will represent two variable relationships, compare quantities, and analyze relationships throughout their mathematics career. In grade 8 and high school, students will continue to study and compare how multiple quantities interact and relate in all strands.