Major Work of Grade 8 Mathematics

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 and Irrational Numbers

***Prior grades*:** Students have performed all four operations with rational numbers, including integers in grade 7 (7.NS.1-3).

Grade 8: Apply and extend understanding of **operations with rational and irrational numbers**. Apply previous understanding of operations with rational numbers to include an understanding of irrational numbers (8.NS.1-2) and operations with radicals (8.NS.3). (Operations with all other rational numbers is being practiced in grade 7, with irrational numbers being new to the Core Standards for grade 8).

***Future grades*:** In Secondary Math I, students will use their understanding of real numbers to define appropriate quantities, to choose and interpret units and to level of accuracy on measurements (SI.N.Q.1-3). In Secondary Math II, students will expand understanding to complex numbers (SII.N.RN.1-3,7,8).

Major Work: Proportional Relationships (Linear Functions and Equations)

***Prior grades*:** Students have computed unit rates and created representations of proportional relationships between quantities using multiple representations. They have used proportional relationships to solve multi-step and percent problems (7.RP.1-3) and have solved problems using scale drawings of geometric figures (7.G.1).

Grade 8: Understand the connections between **proportional relationships, linear functions, and linear equations.** Identify the slope in a graph as the unit rate in a proportional relationship (8.EE.5); use similar triangles to explain why the slope is the same between any two distinct points on a non-vertical line (8.EE6).

***Future grades*:** In Secondary Math I, students will use their understanding of linear functions and equations to interpret linear functions in different representations and contexts (SI.IF.1-9; SI.F.BF.1-3; SI.F.LE.1-5).

Major Work: Simplify Expressions and Solve Equations

Prior grades: In grade 7, students have learned to apply properties of operations to factor, expand (7.EE.1), and convert between forms and assess the reasonableness of an answer (7.EE.2-3). They have used variables to represent quantities to construct and solve equations and inequalities (6.EE.6-8 and 7.EE.4).

Grade 8: Simplify expressions and solve equations: Solve linear equations and inequalities in one variable, recognizing when there are zero, one or infinite solutions (8.EE.7). Analyze and solve, by graphing only, pairs of simultaneous linear equations (8.EE.8). Identity, evaluate and compare linear functions, linear equations, and systems of linear equations (8.F.1-5; 8.SP.2-3).

Future grades: In Secondary Math I, students will interpret linear and exponential expressions with integer exponents (SI.A.SSE.1). They will solve systems of equations exactly and approximately (numerically, algebraically, and graphically) (SI.A.REI.6).

Major Work: Represent and Analyze Relationships (Pythagorean Theorem)

Prior grades: Students have learned to identify and classify right angles (4.G.1). Students have learned to write and evaluate numerical expressions involving whole-number exponents (6.EE.1).

Grade 8: Understand and apply the **Pythagorean Theorem** and its converse in real-world and mathematical problems in two and three dimensions, and to find the distance between two points in a coordinate system (8.G.6-8). Understand how to simplify radicals with emphasis on square roots (8.NS.3) as well as understanding solutions of square roots (8.EE.2).

Future grades: In Secondary Math I, students will use coordinates to compute perimeters of polygons and areas of triangles and rectangles, and will connect these concepts with the Pythagorean Theorem and the distance formula (SI.G.GPE.7).