Mathematics Accelerated 7 (9165) Course Overview Curriculum Document

Course Description

Mathematics Accelerated 7 is the second course of the two-course curriculum designed to provide an effective accelerated pathway to Algebra 1. Mathematics Accelerated 7 is a compressed curriculum of the Mathematics 7 and Mathematics 8 curriculum. Students begin the course with transformational geometry. They study rigid transformations and congruence, then scale drawings, dilations, and similarity (this provides background for understanding the slope of a line in the coordinate plane). Next, they expand their ability to work with linear equations in one and two variables and deepen their understanding of equivalent expressions. They then build on their understanding of proportional relationships from the previous course to study linear relationships. They express linear relationships using equations, tables, and graphs, and make connections across these representations. Building on their understanding of a solution to an equation in one or two variables, they understand what is meant by a solution to a system of equations in two variables. They apply their understanding of linear relationships to contexts involving data with variability. They learn that linear relationships are an example of a special kind of relationship called a function. They extend the definition of exponents to include all integers, and in the process codify the properties of exponents. They learn about orders of magnitude and scientific notation in order to represent and compute with very large and very small quantities. They encounter irrational numbers for the first time and informally extend the rational number system to the real number system, motivated by their work with the Pythagorean Theorem.

Credits	Prerequisites
N.A.	6th grade Math Acceleration Placement

Board Approved	Revised
June 2023	June 2024

Required Assessments

District-wide, standards-based common summative assessments

Textbooks/Resources

Illustrative Mathematics. (2020). *Middle School Math: Accelerated Grade 7*. Kendall Hunt.

Course Essential Understandings

As a result of successfully completing this course, students will understand that:

- all rational numbers, with a strong emphasis on positives and negatives, are used to solve problems, and can be explained on a number line.
- the ratios of circle measurements can be rewritten into equations. Working simple equations forwards and backwards solve different problems.
- the graphs, tables, and equations of proportional relationships are all used to solve problems.
- numbers in a variety of forms, percentage, fractions, and decimals can be used to solve different problems.
- variable expressions can be written in different but equal ways to help make calculations faster. Equal sides of equations can be changed together to solve more complex equations and inequalities.
- angles, surface area, and volume can be measured and calculated in different ways.
- prediction and comparison is a purpose of probability and statistics by evaluating samples, averages, and probability ratios.
- making sense of patterns through analyzing concrete, visual, and abstract representations and identifying connections between these help deepen their understanding of important mathematical concepts and relationships.
- to be successful mathematical thinkers, students must strategically choose appropriate tools and strategies while analyzing their progress to adjust and persevere towards a solution.

Course Relevance Questions

What thought-provoking questions will foster inquiry, meaning-making, and transfer?

- How can the relationship between quantities, how one number compares to another, be used to solve problems?
- When are variables used to stand for numbers that can change or used to stand for a single unknown number?
- How can our experience with transformations deepen our understanding of the connections between different models of linear relationships?
- How will our ability to represent relationships in multiple ways support us in making sense of equations, systems of equations, data, functions, exponents, irrational numbers, and 2D and 3D figures?

Unit Overviews

Unit Name	Unit Description	Unit Relevance Question	Instructional Standards	Assessed Standards
Unit 1 Rigid Transformations	In this unit, students look at pairs of cartoons, each of which illustrates a translation, rotation, or reflection. Students describe in their own words how to move one cartoon figure onto another. As the unit progresses, they solidify their understanding of these transformations, increase the precision of their descriptions, and begin to use associated terminology and recognize what determines each type of transformation. Lessons included: rigid transformations, properties of rigid transformations, congruence, angles in a triangle, and drawing polygons with given conditions.	• What patterns can we find between pre-images and their images formed through rigid transformations? • How does knowing two figures are congruent or similar help one to solve problems?	M.7.G.A.2 M.7.G.B.5 M.8.G.A M.8.G.A.1 M.8.G.A.1.a M.8.G.A.1.b M.8.G.A.1.c M.8.G.A.2 M.8.G.A.3 M.8.G.A.5	M.8.G.A.1 (mid, end) M.8.G.A.1.a (mid) M.8.G.A.1.b (mid) M.8.G.A.3 (mid) M.8.G.A.2 (end) M.7.G.A.2 (end) M.8.G.A.5 (end)
Unit 2 Scale Drawings, Similarity, and Slope	In this unit, students study scaled copies of pictures and plane figures, then apply what they have learned to scale drawings, such as maps and floor plans. This work leads to making scaled copies using a dilation given a center of dilation and a scale factor. Combining dilations with transformations leads students to defining similarity and determining if two shapes are similar to one another through a series of transformations and a dilation. Lessons included: scaled drawings, dilations, similarity, and slope.	• What is a scaled copy and how do you identify a scaled copy of a figure?	M.7.G.A.1 M.8.G.A M.8.G.A.2 M.8.G.A.3 M.8.G.A.4 M.8.G.A.5 M.8.EE.B.6	M.7.G.A.1 (mid) M.8.G.A (end) M.8.G.A.4 (end) M.8.G.A.5 (end) M.8.EE.B.6 (end)
Unit 3 Writing and Solving Equations	In this unit, students solve equations of the forms $px + q = r$ and $p(x + q) = r$ where p, q, and r are rational numbers. The unit starts with students representing relationships of two quantities with tape diagrams and with equations, and explaining correspondences between the two types of representations. They	• What is a tape diagram? • How do you represent and solve equations? • How do you use equations to solve problems?	M.7.EE.A.2 M.7.EE.B.3 M.7.EE.B.4 M.7.EE.B.4.a M.7.G.B.5	M.7.EE.B.4 (end) M.7.EE.B.4.a (end)

	begin by examining correspondences between descriptions of situations and tape diagrams, then draw tape diagrams to represent situations in which the variable representing the unknown is specified. Next, they examine correspondences between equations and tape diagrams, then draw tape diagrams to represent equations, noticing that one tape diagram can be described by different (but related) equations. At the end of the section, they draw tape diagrams to represent situations in which the variable representing the unknown is not specified, then match the diagrams with equations. Lessons included: representing situations of the form $px + q = r$ and $p(x + q) = r$ and solving equations of the form $px + q = r$ and $p(x + q) = r$ and problems that lead to those equations.			
Unit 4 Inequalities, Expressions, and Equations	In this unit, students expand on their previous work writing and solving equations of the form $px + q = r$ and $p(x + q) = r$ in three directions: inequalities, equivalent expressions, and solving equations with a variable on each side. They gain greater fluency working with more complicated expressions and refine their understanding about what it means to be a solution to an inequality or equation. The work in this unit leads directly into work in a future unit on linear relationships, and, in particular, systems of equations. Lessons included: inequalities, writing equivalent expressions, and equations in one variable.	• Equivalent fractions and ratios are used to solve problems, what about equivalent expressions, equations, and inequalities?	M.6.EE.A.2.b M.6.EE.B.5 M.6.EE.B.6 M.6.EE.B.8 M.6.NS.C.7.a M.6.NS.C.7.b M.7.EE.A.1 M.7.EE.B.4 M.7.EE.B.4.b M.7.NS.A.1 M.7.NS.A.1.c M.8.EE.C M.8.EE.C.7 M.8.EE.C.7.a M.8.EE.C.7.b M.8.EE.C.8	M.7.EE.A.1 (end) M.7.EE.B.3 (end) M.7.EE.B.4 (end) M.7.EE.B.4.b (end) M.8.EE.C.7 (end) M.8.EE.C.7.b (end)
Unit 5 Linear Relationships	In this unit, students gain experience with linear relationships and their representations as graphs, tables, and equations through activities designed and sequenced to allow them to make sense of problems and persevere in solving them. They revisit earlier work with equations as they study systems of linear equations. The final sections of this unit ask students to examine bivariate data where they use scatter plots and fitted lines to analyze numerical data. Lessons included: proportional relationships, representing linear relationships, finding slopes and linear equations, systems of linear equations, associations in numerical data, and associations in categorical data. Lessons included: proportional relationships, representing linear relationships, finding slopes and linear equations, systems of linear equations, associations in numerical data, and associations in categorical data.	• How does representing relationships between variables in more than one way deepen our understanding of linear relationships? • How is understanding the key characteristics of a linear relationship helpful? • Why is it important to analyze and describe patterns of an association between two quantities?	M.8.EE.B M.8.EE.B.5 M.8.EE.B.6 M.8.EE.C M.8.EE.C.8 M.8.EE.C.8.a M.8.EE.C.8.b M.8.EE.C.8.c M.8.G.A.1 M.8.SP.A M.8.SP.A.1 M.8.SP.A.2 M.8.SP.A.3 M.8.SP.A.4	M.8.EE.B (mid) M.8.EE.B.5 (mid) M.8.EE.B.6 (mid) M.8.EE.C.7.b (end) M.8.EE.C.8 (end) M.8.EE.C.8.a (end) M.8.EE.C.8.b (end) M.8.EE.C.8.c (end) M.8.SP.A.1 (end) M.8.SP.A.2 (end) M.8.SP.A.3 (end)
Unit 6 Functions and Volume	In this unit, students are introduced to the concept of a function. They learn to understand and use the terms “input,” “output,” and “function”—for example, “temperature is a function of time.” They describe functions as increasing or decreasing between specific numerical inputs, and they consider the inputs of a function to be values of its independent variable and its outputs to be values of its dependent variable. (The terms “independent variable” and “dependent variable” were introduced in grade 6.) They use tables, equations, and graphs to represent functions, and describe information presented in tables, equations, or graphs in terms of functions. In working with linear functions, students coordinate and synthesize their understanding of “constant of proportionality” (which was introduced in an earlier course), “rate of change” and “slope” (which were introduced earlier in this course), and increasing and decreasing. Students then turn to focus on features of 3 dimensional shapes and consider volume formulas as examples of functions. They analyze and describe cross-sections of prisms, pyramids, and polyhedra. They understand and use the formula for the volume of a right rectangular prism, and solve problems involving area, surface area, and volume. Students perceive similarities in structure between pairs of volume formulas: for a rectangular prism and a cylinder; and for a cylinder and a cone. Students rearrange these formulas to show functional relationships and use them to reason about how the volume of a figure changes as another measurement changes—for example, the height of a cylinder is proportional to its volume; if the radius of a cylinder triples, its volume becomes nine times larger. Lessons included: inputs and outputs, representing and interpreting functions, linear functions and rates of change; prisms, cylinders and cones, and dimensions and spheres.	• How is understanding the key characteristics of a function helpful? • How can graphs be used to tell a story?	M.8.F.A M.8.F.A.1 M.8.F.A.2 M.8.F.A.3 M.8.F.B M.8.F.B.4 M.8.F.B.5 M.8.G.C M.8.G.C.9 M.7.G.A.2 M.7.G.A.3 M.7.G.B M.7.G.B.6 M.7.RP.A	M.8.F.A.1 (mid, end) M.8.F.A.2 (mid) M.8.F.A.3 (mid, end) M.8.F.B.4 (mid, end) M.8.F.B.5 (mid) M.8.EE.C (mid) M.7.G.A.3 (end) M.7.G.B.6 (end) M.8.G.C.9 (end)
Unit 7 Exponents and Scientific Notation	In grade 6, students studied whole-number exponents. In this unit, they extend the definition of exponents to include all integers, and in the process codify the properties of exponents. They apply these concepts to the base-ten system, and learn about orders of	• How can we use patterns to help determine whether two expressions involving exponents are equivalent?	M.8.EE.A.1 M.8.EE.A.3 M.8.EE.A.4	M.8.EE.A.1 (end) M.8.EE.A.3 (end) M.8.EE.A.4 (end)

	magnitude and scientific notation in order to represent and compute with very large and very small quantities. Lessons included: exponent review, exponent rules, and scientific notation.			
Unit 8 Pythagorean Theorem and Irrational Numbers	In this unit, students work with geometric and symbolic representations of square and cube roots. They understand and use notation such as $\sqrt{2}$ and $\sqrt[3]{5}$ for square and cube roots. They understand the terms “rational number” and “irrational number,” using long division to express fractions as decimals. They use their understanding of fractions to plot rational numbers on the number line and their understanding of approximation of irrationals by rationals to approximate the number-line location of a given irrational. Students learn (without proof) that $\sqrt{2}$ is irrational. They understand two proofs of the Pythagorean Theorem—an algebraic proof that involves manipulation of two expressions for the same area and a geometric proof that involves decomposing and rearranging two squares. They use the Pythagorean Theorem in two and three dimensions, e.g., to determine lengths of diagonals of rectangles and right rectangular prisms, and to estimate distances between points in the coordinate plane. Lessons included: side lengths and areas of squares, the Pythagorean Theorem, and decimal representation of rational and irrational numbers.	● How can we use patterns to help make sense of irrational numbers? ● How can the Pythagorean Theorem be used to solve problems about real-world situations?	M.8.NS.A M.8.NS.A.1 M.8.NS.A.2 M.8.EE.A.2 M.8.F.B M.8.G.B M.8.G.B.6 M.8.G.B.7 M.8.G.B.8	8.EE.A.2 (end) 8.G.B (end) 8.G.B.7 (end) 8.G.B.8 (end) 8.G.C.9 (end) 8.NS.A.1 (end) 8.NS.A.2 (end)