Mathematical Content Standards Overview

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Kindergarten	Grade 1	Grade 2
Counting and Cardinality	**Counting and Cardinality**	
• Know number names and the count sequence. • Count to tell the number of objects. • Compare numbers.	• Know ordinal names and counting flexibility. • Count to tell the number of objects. • Compare numbers.	
Operations and Algebraic Thinking	**Operations and Algebraic Thinking**	**Operations and Algebraic Thinking**
• Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from. • Identify and continue patterns.	• Represent and solve problems involving addition and subtraction. • Understand and apply properties of operations and the relationship between addition and subtraction. • Add and subtract up to 20. • Work with addition and subtraction equations. • Identify and continue patterns.	• Represent and solve problems involving addition and subtraction. • Add and subtract up to 20. • Work with equal groups of objects to gain foundations for multiplication. • Identify and continue patterns.
Number and Operations in Base Ten	**Number and Operations in Base Ten**	**Number and Operations in Base Ten**
• Work with numbers 11–19 to gain foundations for place value.	• Extend the counting sequence. • Understand place value. • Use place value understanding and properties of operations to add and subtract.	• Understand place value. • Use place value understanding and properties of operations to add and subtract.
Measurement and Data	**Measurement and Data**	**Measurement and Data**
• Describe and compare measurable attributes. • Classify objects and count the number of objects in categories. • Work with time and money.	• Measure lengths indirectly and by iterating length units. • Work with time and money. • Represent and interpret data.	• Measure and estimate lengths in standard units. • Relate addition and subtraction to length. • Work with time and money. • Represent and interpret data.
Geometry	**Geometry**	**Geometry**
• Identify and describe shapes. • Analyze, compare, create, and compose shapes.	• Reason with shapes and their attributes.	• Reason with shapes and their attributes.

Mathematical Content Standards Overview

Grade 3	Grade 4	Grade 5
Operations and Algebraic Thinking • Represent and solve problems involving multiplication and division. • Understand properties of multiplication and the relationship between multiplication and division. • Multiply and divide up to 100. • Solve problems involving the four operations, and identify and explain patterns in arithmetic.	**Operations and Algebraic Thinking** • Use the four operations with whole numbers to solve problems. • Gain familiarity with factors and multiples. • Generate and analyze patterns.	**Operations and Algebraic Thinking** • Write and interpret numerical expressions. • Analyze patterns and relationships.
Number and Operations in Base Ten • Use place value understanding and properties of operations to perform multi-digit arithmetic.	**Number and Operations in Base Ten** • Generalize place value understanding for multi-digit whole numbers. • Use place value understanding and properties of operations to perform multi-digit arithmetic.	**Number and Operations in Base Ten** • Understand the place value system. • Perform operations with multi-digit whole numbers and with decimals to hundredths.
Number and Operations—Fractions • Develop understanding of fractions as numbers.	**Number and Operations—Fractions** • Extend understanding of fraction equivalence and ordering. • Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers. • Understand decimal notation for fractions, and compare decimal fractions.	**Number and Operations—Fractions** • Use equivalent fractions as a strategy to add and subtract fractions. • Apply and extend previous understandings of multiplication and division to multiply and divide fractions.
Measurement and Data • Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. • Represent and interpret data. • Geometric measurement: understand concepts of area and relate area to multiplication and to addition. • Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.	**Measurement and Data** • Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit and involving time. • Represent and interpret data. • Geometric measurement: understand concepts of angle and measure angles.	**Measurement and Data** • Convert like measurement units within a given measurement system and solve problems involving time. • Represent and interpret data. • Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.
Geometry • Reason with shapes and their attributes.	**Geometry** • Draw and identify lines and angles, and classify shapes by properties of their lines and angles.	**Geometry** • Graph points on the coordinate plane to solve real-world and mathematical problems. • Classify two-dimensional figures into categories based on their properties.

Mathematical Content Standards Overview

Grade 6	Grade 7	Grade 8
Ratios and Proportional Relationships	**Ratios and Proportional Relationships**	**Functions**
• Understand ratio concepts and use ratio reasoning to solve problems.	• Analyze proportional relationships and use them to solve real-world and mathematical problems.	• Define, evaluate, and compare functions. Use functions to model relationships between quantities.
The Number System	**The Number System**	**The Number System**
• 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. • Apply and extend previous understandings of numbers to the system of rational numbers.	• Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.	• Know that there are numbers that are not rational, and approximate them by rational numbers.
Expressions and Equations	**Expressions and Equations**	**Expressions and Equations**
• Apply and extend previous understandings of arithmetic to algebraic expressions. • Reason about and solve one-variable equations and inequalities. • Represent and analyze quantitative relationships between dependent and independent variables.	• Use properties of operations to generate equivalent expressions. • Solve real-life and mathematical problems using numerical and algebraic expressions and equations.	• Work with radicals and integer exponents. • Understand the connections between proportional relationships, lines, and linear equations. • Analyze and solve linear equations and pairs of simultaneous linear equations.
Geometry	**Geometry**	**Geometry**
• Solve real-world and mathematical problems involving area, surface area, and volume.	• Draw, construct and describe geometrical figures and describe the relationships between them. • Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	• Understand congruence and similarity using physical models, transparencies, or geometry software. • Understand and apply the Pythagorean Theorem. • Solve real-world and mathematical problems involving volume of cylinders, cones and spheres.
Statistics and Probability	**Statistics and Probability**	**Statistics and Probability**
• Develop understanding of statistical variability. • Summarize and describe distributions.	• Use random sampling to draw inferences about a population. • Draw informal comparative inferences about two populations. • Investigate chance processes and develop, use, and evaluate probability models.	• Investigate patterns of association in bivariate data.

Mathematical Content Standards Overview

HIGH SCHOOL CONTENT STANDARDS BY CONCEPTUAL CATEGORIES

Modeling	Number and Quantity	Algebra
Modeling links classroom mathematics and statistics to everyday life, work, and decision-making. Modeling is the process of choosing and using appropriate mathematics and statistics to analyze empirical situations, to understand them better, and to improve decisions. Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Specific modeling standards appear throughout the high school standards indicated by an asterisk (*). If the asterisk appears on the heading for a group of standards, it should be understood to apply to all standards in that group. There are other individual standards under clusters, domains and conceptual categories that have connections to modeling. Additionally, model with mathematics is a Standard for Mathematical Practice. This practice will be started in kindergarten.	**The Real Number System** • Extend the properties of exponents to rational exponents. • Use properties of rational and irrational numbers. **Quantities*** • Reason quantitatively and use units to solve problems. **The Complex Number System** • Perform arithmetic operations with complex numbers. • Represent complex numbers and their operations on the complex plane. + • Use complex numbers in polynomial identities and equations. **Vector and Matrix Quantities** • Represent and model with vector quantities. + • Perform operations on vectors. + • Perform operations on matrices and use matrices in applications. +	**Seeing Structure in Expressions** • Interpret the structure of expressions. • Write expressions in equivalent forms to solve problems. **Arithmetic with Polynomials and Rational Expressions** • Perform arithmetic operations on polynomials. • Understand the relationship between zeros and factors of polynomials. • Use polynomial identities to solve problems. • Rewrite rational expressions. **Creating Equations and Inequalities*** • Create equations and inequalities that describe numbers or relationships. **Reasoning with Equations and Inequalities** • Understand solving equations as a process of reasoning and explain the reasoning. • Solve equations and inequalities in one variable. • Solve systems of equations. • Represent and solve equations and inequalities graphically .

*Standards with connections to modeling. If asterisk appears on the category, domain, or cluster for a group of standards, it should be understood to apply to all standards in that group. There may be individual standards within clusters with connections to modeling.

+ Standards include additional mathematics that students should learn in order to take advanced courses such as calculus, advanced statistics, or discrete mathematics. There may be individual standards within clusters which include additional mathematics.

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HIGH SCHOOL CONTENT STANDARDS BY CONCEPTUAL CATEGORIES

Functions	Geometry	Statistics and Probability*
Interpreting Functions • Understand the concept of a function and use function notation. • Interpret functions that arise in applications in terms of the context. • Analyze functions using different representations. **Building Functions** • Build a function that models a relationship between two quantities.* • Build new functions from existing functions. **Linear, Quadratic, and Exponential Models*** • Construct and compare linear, quadratic, and exponential models and solve problems. • Interpret expressions for functions in terms of the situation they model. **Trigonometric Functions** • Extend the domain of trigonometric functions using the unit circle. • Model periodic phenomena with trigonometric functions. • Prove and apply trigonometric identities.	**Congruence** • Experiment with transformations in the plane. • Understand congruence in terms of rigid motions. • Prove geometric theorems. • Make geometric constructions. **Similarity, Right Triangles, and Trigonometry** • Understand similarity in terms of similarity transformations. • Prove theorems involving similarity. • Define trigonometric ratios and solve problems involving right triangles. • Apply trigonometry to general triangles. + **Circles** • Understand and apply theorems about circles. • Find arc lengths and areas of sectors of circles. **Expressing Geometric Properties with Equations** • Translate between the geometric description and the equation for a conic section. • Use coordinates to prove simple geometric theorems algebraically. **Geometric Measurement and Dimension** • Explain volume formulas and use them to solve problems. • Visualize relationships between two-dimensional and three-dimensional objects. **Modeling with Geometry** • Apply geometric concepts in modeling situations.*	**Interpreting Categorical and Quantitative Data** • Summarize, represent, and interpret data on a single count or measurement variable. • Summarize, represent, and interpret data on two categorical and quantitative variables. • Interpret linear models. **Making Inferences and Justifying Conclusions** • Understand and evaluate random processes underlying statistical experiments. • Make inferences and justify conclusions from sample surveys, experiments, and observational studies. **Conditional Probability and the Rules of Probability** • Understand independence and conditional probability and use them to interpret data. • Use the rules of probability to compute probabilities of compound events in a uniform probability model. **Using Probability to Make Decisions** • Calculate expected values and use them to solve problems. + • Use probability to evaluate outcomes of decisions. +