Algebra 1

State Standard Number	State Standard Area/Description	Unit Name	Course Topic Description
1	Number, Number Sense and Operations		
1.A	Use scientific notation to express large numbers and numbers less than one.	Unit 7: Polynomials	Section 1
1.B	Identify subsets of the real number system.	Unit 2: Real Numbers	Section 1
1.C	Apply properties of operations and the real number system, and justify when they hold for a set of numbers.	Unit 1: Variables and Expressions	Section 2
	Number and Number Systems		
1.C.1	Identify and justify whether properties (closure, identity, inverse, commutative and associative) hold for a given set and operations; e.g., even integers and multiplication.	Unit 1: Variables and Expressions	Section 2
1.D	Connect physical, verbal and symbolic representations of integers, rational numbers and irrational numbers.	Unit 1: Variables and Expressions	Section 2
1.E	Compare, order and determine equivalent forms of real numbers.	Unit 2: Real Numbers	Section 1
	Number and Number Systems		
1.E.2	Compare, order and determine equivalent forms for rational and irrational numbers.	Unit 2: Real Numbers	Section 1
1.F	Explain the effects of operations on the magnitude of quantities.		

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	Meaning of Operations		
1.F.3	Explain the effects of operations such as multiplication or division, and of computing powers and roots on the magnitude of quantities.		
1.G	Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions.	Unit 3: Equations	Section 3
	Computation and Estimation		
1.G.4	Demonstrate fluency in computations using real numbers.	Unit 1: Variables and Expressions	Section 3
1.H	Find the square root of perfect squares, and approximate the square root of non-perfect squares.	Unit 2: Real Numbers	Section 1
1.I	Estimate, compute and solve problems involving scientific notation, square roots and numbers with integer exponents.	Unit 1: Variables and Expressions Unit 7: Polynomials	Section 4 Section 1

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	Computation and Estimation		
1.I.5	Estimate the solutions for problem situations involving square and cube roots.	Unit 1: Variables and Expressions	Section 4
2	Measurement		
2.A	Solve increasingly complex non-routine measurement problems and check for reasonableness of results.		
2.B	Use formulas to find surface area and volume for specified three-dimensional objects accurate to a specified level of precision.		
2.C	Apply indirect measurement techniques, tools and formulas, as appropriate, to find perimeter, circumference and area of circles, triangles, quadrilaterals and composite shapes, and to find volume of prisms, cylinders, and pyramids.	Unit 1: Variables and Expressions Unit 7: Polynomials	Section 4 Section 3
2.D	Use proportional reasoning and apply indirect measurement techniques, including right triangle trigonometry and properties of similar triangles, to solve problems involving measurements and rates.		

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	Measurement Units		
2.D.1	Convert rates within the same measurement system; e.g., miles per hour to feet per second; kilometers per hour to meters per second.		
	Use Measurement Techniques and Tools		
2.D.2	Use unit analysis to check computations involving measurement.		
2.D.3	Use the ratio of lengths in similar two-dimensional figures or three-dimensional objects to calculate the ratio of their areas or volumes respectively.		
2.D.4	Use scale drawings and right triangle trigonometry to solve problems that include unknown distances and angle measures.		
2.D.5	Solve problems involving unit conversion for situations involving distances, areas, volumes and rates within the same measurement system.		
2.E	Estimate and compute various attributes, including length, angle measure, area, surface area and volume, to a specified level of precision.		

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2.F	Write and solve real-world, multi-step problems involving money, elapsed time and temperature, and verify reasonableness of solutions.		
3	Geometry and Spatial Sense		
3.A	Formally define geometric figures.		
3.B	Describe and apply the properties of similar and congruent figures; and justify conjectures involving similarity and congruence.		
3.C	Recognize and apply angle relationships in situations involving intersecting lines, perpendicular lines and parallel lines.		
3.D	Use coordinate geometry to represent and examine the properties of geometric figures.		
3.E	Draw and construct representations of two- and three-dimensional geometric objects using a variety of tools, such as straightedge, compass and technology.		
3.F	Represent and model transformations in a coordinate plane and describe the results.		

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3.G	Prove or disprove conjectures and solve problems involving two- and three-dimensional objects represented within a coordinate system.		
	Visualization and Geometric Models		
3.G.3	Analyze two-dimensional figures in a coordinate plane; e.g., use slope and distance formulas to show that a quadrilateral is a parallelogram.		
3.H	Establish the validity of conjectures about geometric objects, their properties and relationships by counter-example, inductive and deductive reasoning, and critiquing arguments made by others.		
3.I	Use right triangle trigonometric relationships to determine lengths and angle measures.		
	Characteristics and Properties		
3.I.1	Define the basic trigonometric ratios in right triangles: sine, cosine and tangent.		
3.I.2	Apply proportions and right triangle trigonometric ratios to solve problems involving missing lengths and angle measures in similar figures.		

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4	Patterns, Functions and Algebra		
4.A	Generalize and explain patterns and sequences in order to find the next term and the nth term.	Unit 4: Functions and Linear Equations Unit 10: Exponentials	Section 3 Section 3
	Use Patterns, Relations and Functions		
4.A.2	Generalize patterns using functions or relationships (linear, quadratic and exponential), and freely translate among tabular, graphical and symbolic representations.	Unit 4: Functions and Linear Equations Unit 8: Quadratics and Radicals Unit 10: Exponentials	Section 3 Section 1 Section 1
4.B	Identify and classify functions as linear or nonlinear, and contrast their properties using tables, graphs or equations.	Unit 4: Functions and Linear Equations	Section 2
	Use Patterns, Relations and Functions		
4.B.1	Define function with ordered pairs in which each domain element is assigned exactly one range element.	Unit 4: Functions and Linear Equations	Section 2
4.B.3	Describe problem situations (linear, quadratic and exponential) by using tabular, graphical and symbolic representations.	Unit 4: Functions and Linear Equations Unit 8: Quadratics and Radicals	Section 1, 2 Section 2

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		Unit 10: Exponentials	Section 1
4.C	Translate information from one representation (words, table, graph or equation) to another representation of a relation or function.	Unit 4: Functions and Linear Equations	Section 2
	Use Patterns, Relations and Functions		
4.C.2	Generalize patterns using functions or relationships (linear, quadratic and exponential), and freely translate among tabular, graphical and symbolic representations.	Unit 4: Functions and Linear Equations Unit 8: Quadratics and Radicals Unit 10: Exponentials	Section 3 Section 1 Section 1
4.D	Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations.	Unit 1: Variables and Expressions Unit 4: Fuinctions and Linear Equations Unit 5: Inequalities	Section 1, 5 Section 2 Section 1
	Use Algebraic Representations		
4.D.7	Use formulas to solve problems involving exponential growth and decay.	Unit 10: Exponentials	Section 2

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4.D.11	Add, subtract, multiply and divide monomials and polynomials (division of polynomials by monomials only).	Unit 1: Variables and Expressions Unit 7: Polynomials	Section 4 Section 2, 3
4.D.12	Simplify rational expressions by eliminating common factors and applying properties of integer exponents.	Unit 1: Variables and Expressions Unit 7: Polynomials	Section 4 Section 4
4.E	Analyze and compare functions and their graphs using attributes, such as rates of change, intercepts and zeros.		
	Use Patterns, Relations and Functions		
4.E.4	Demonstrate the relationship among zeros of a function, roots of equations, and solutions of equations graphically and in words.	Unit 8: Quadratics and Radicals	Section 1
4.E.5	Describe and compare characteristics of the following families of functions: linear, quadratic and exponential functions; e.g., general shape, number of roots, domain, range, rate of change, maximum or minimum.		
4.F	Solve and graph linear equations and inequalities.	Unit 4: Functions and Linear Equations Unit 5: Inequalities	Section 2 Section 1

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	Use Algebraic Representations		
4.F.6	Write and use equivalent forms of equations and inequalities in problem situations; e.g., changing a linear equation to the slope-intercept form.	Unit 4: Functions and Linear Equations Unit 5: Inequalities	Section 2, 4 Section 1
4.F.8	Find linear equations that represent lines that pass through a given set of ordered pairs, and find linear equations that represent lines parallel or perpendicular to a given line through a specific point.	Unit 4: Functions and Linear Equations	Section 2, 4
4.G	Solve quadratic equations with real roots by graphing, formula and factoring.	Unit 7: Polynomials Unit 8: Quadratics and Radicals	Section 5, 6 Section1
	Use Algebraic Representations		
4.G.10	Solve quadratic equations with real roots by factoring, graphing, using the quadratic formula and with technology.	Unit 8: Quadratics and Radicals	Section 1
4.H	Solve systems of linear equations involving two variables graphically and symbolically.	Unit 6: Solving Systems	Section 1, 2, 3
	Use Algebraic Representations		

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4.H.9	Solve and interpret the meaning of 2 by 2 systems of linear equations graphically, by substitution and by elimination, with and without technology.		
4.I	Model and solve problem situations involving direct and inverse variation.	Unit 4: Functions and Linear Equations Unit 9: Rational Expressions	Section 4 Section 1
	Analyze Change		
4.I.13	Model and solve problems involving direct and inverse variation using proportional reasoning.	Unit 4: Functions and Linear Equations Unit 9: Rational Expressions	Section 4 Section 1
4.I.14	Describe the relationship between slope and the graph of a direct variation and inverse variation.	Unit 4: Functions and Linear Equations Unit 9: Rational Expressions	Section 4 Section 1
4.J	Describe and interpret rates of change from graphical and numerical data.	Unit 4: Functions and Linear Equations	Section 2,4
	Analyze Change		
4.J.15	Describe how a change in the value of a constant in a linear or quadratic equation affects the related graphs.	Unit 8: Quadratics and Radicals	Section 1

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5	Data Analysis and Probability		
5.A	Create, interpret and use graphical displays and statistical measures to describe data; e.g., box-and-whisker plots, histograms, scatterplots, measures of center and variability.	Unit 6: Solving Systems	Section 5
	Data Collection		
5.A.1	Classify data as univariate (single variable) or bivariate (two variables) and as quantitative (measurement) or qualitative (categorical) data.		
5.A.2	Create a scatterplot for a set of bivariate data, sketch the line of best fit, and interpret the slope of the line of best fit.	Unit 4: Functions and Linear Equations	Section 5
	Statistical Methods		
5.A.3	Analyze and interpret frequency distributions based on spread, symmetry, skewness, clusters and outliers.	Unit 6: Solving Systems	Section 5
5.B	Evaluate different graphical representations of the same data to determine which is the most appropriate representation for an identified purpose.		

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5.C	Compare the characteristics of the mean, median and mode for a given set of data, and explain which measure of center best represents the data.	Unit 1: Variables and Expressions Unit 6: Solving Systems	Section 5 Section 5
5.D	Find, use and interpret measures of center and spread, such as mean and quartiles, and use those measures to compare and draw conclusions about sets of data.	Unit 6: Solving Systems	Section 5
5.E	Evaluate the validity of claims and predictions that are based on data by examining the appropriateness of the data collection and analysis.		
	Statistical Methods		
5.E.4	Describe and compare various types of studies (survey, observation, experiment), and identify possible misuses of statistical data.		
5.F	Construct convincing arguments based on analysis of data and interpretation of graphs.		
	Statistical Methods		
5.F.6	Make inferences about relationships in bivariate data, and recognize the difference between evidence of relationship (correlation) and causation.	Unit 4: Functions and Linear Equations	Section 5

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5.G	Describe sampling methods and analyze the effects of method chosen on how well the resulting sample represents the population.		
	Statistical Methods		
5.G.5	Describe characteristics and limitations of sampling methods, and analyze the effects of random versus biased sampling; e.g., determine and justify whether the sample is likely to be representative of the population.		
5.H	Use counting techniques, such as permutations and combinations, to determine the total number of options and possible outcomes.	Unit 9: Rational Expressions	Section 5
	Probability		
5.H.7	Use counting techniques and the Fundamental Counting principle to determine the total number of possible outcomes for mathematical situations.	Unit 9: Rational Expressions	Section 5
5.I	Design an experiment to test a theoretical probability, and record and explain results.		
	Probability		

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5.I.8	Describe, create and analyze a sample space and use it to calculate probability.		
5.J	Compute probabilities of compound events, independent events, and simple dependent events.		
	Probability		
5.J.9	Identify situations involving independent and dependent events, and explain differences between, and common misconceptions about probabilities associated with those events.		
5.K	Make predictions based on theoretical probabilities and experimental results.	Unit 9: Rational Expressions	Section 5
	Probability		
5.K.10	Use theoretical and experimental probability, including simulations or random numbers, to estimate probabilities and to solve problems dealing with uncertainty; e.g., compound events, independent events, simple dependent events.		
6	Mathematical Processes		

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6.A	Formulate a problem or mathematical model in response to a specific need or situation, determine information required to solve the problem, choose method for obtaining this information, and set limits for acceptable solution.		
6.B	Apply mathematical knowledge and skills routinely in other content areas and practical situations.	Unit 1: Variables and Expressions Unit 3: Equations	Section 4 Section 5
6.C	Recognize and use connections between equivalent representations and related procedures for a mathematical concept; e.g., zero of a function and the x-intercept of the graph of the function, apply proportional thinking when measuring, describing functions, and comparing probabilities.	Unit 4: Functions and Linear Equations Unit 9: Rational Expressions	Section 4 Section 5
6.D	Apply reasoning processes and skills to construct logical verifications or counter-examples to test conjectures and to justify and defend algorithms and solutions.	Unit 1: Variables and Expressions	Section 5
6.E	Use a variety of mathematical representations flexibly and appropriately to organize, record and communicate mathematical ideas.	Throughout	Throughout
6.F	Use precise mathematical language and notations to represent problem situations and mathematical ideas.	Throughout	Throughout
6.G	Write clearly and coherently about mathematical thinking and ideas.	Throughout	Throughout

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6.H	Locate and interpret mathematical information accurately, and communicate ideas, processes and solutions in a complete and easily understood manner.	Throughout	Throughout