

Pre-Algebra

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.	Covered in Algebra I or II	
1.B	Identify subsets of the real number system.	Covered in Algebra I or II	
1.C	Apply properties of operations and the real number system, and justify when they hold for a set of numbers.	Number Basics	Integer Math
	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.	Number Basics	Number Properties
1.D	Connect physical, verbal and symbolic representations of integers, rational numbers and irrational numbers.	Number Basics	Significant Digits
1.E	Compare, order and determine equivalent forms of real numbers.	Covered in Algebra I or II	
	Number and Number Systems		
1.E.2	Compare, order and determine equivalent forms for rational and irrational numbers.	Covered in Algebra I or II	
1.F	Explain the effects of operations on the magnitude of quantities.	Number Basics	Integer Math

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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.	Covered in Algebra I or II	
1.G	Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions.	Probability	Probability
	Computation and Estimation		
1.G.4	Demonstrate fluency in computations using real numbers.	Throughout Course	
1.H	Find the square root of perfect squares, and approximate the square root of non-perfect squares.	Covered in Algebra I or II	
1.I	Estimate, compute and solve problems involving scientific notation, square roots and numbers with integer exponents.	Covered in Algebra I or II	

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	Computation and Estimation		
1.1.5	Estimate the solutions for problem situations involving square and cube roots.	Covered in Algebra I or II	
2	Measurement		
2.A	Solve increasingly complex non-routine measurement problems and check for reasonableness of results.	Basic Geometry	Three Dimensional Measurements
2.B	Use formulas to find surface area and volume for specified three-dimensional objects accurate to a specified level of precision.	Basic Geometry	Three Dimensional Measurements
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.	Basic Geometry	Geometric Formulas
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.	Covered in Geometry	

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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.	Covered in Geometry	
2.D.4	Use scale drawings and right triangle trigonometry to solve problems that include unknown distances and angle measures.	Covered in Geometry	
2.D.5	Solve problems involving unit conversion for situations involving distances, areas, volumes and rates within the same measurement system.	Covered in Geometry	
2.E	Estimate and compute various attributes, including length, angle measure, area, surface area and volume, to a specified level of precision.	Basic Geometry and Geometric Concepts	

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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.	Basic Geometry	Geometric Formulas
3.B	Describe and apply the properties of similar and congruent figures; and justify conjectures involving similarity and congruence.	Covered in Geometry	
3.C	Recognize and apply angle relationships in situations involving intersecting lines, perpendicular lines and parallel lines.	Covered in Geometry	
3.D	Use coordinate geometry to represent and examine the properties of geometric figures.	Geometric Concepts	
3.E	Draw and construct representations of two- and three-dimensional geometric objects using a variety of tools, such as straightedge, compass and technology.	Geometric Concepts	
3.F	Represent and model transformations in a coordinate plane and describe the results.	Geometric Concepts	

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3.G	Prove or disprove conjectures and solve problems involving two- and three-dimensional objects represented within a coordinate system.	Covered in Geometry	
	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.	Covered in Geometry	
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.	Covered in Geometry	
3.I	Use right triangle trigonometric relationships to determine lengths and angle measures.	Covered in Geometry	
	Characteristics and Properties		
3.I.1	Define the basic trigonometric ratios in right triangles: sine, cosine and tangent.	Covered in Geometry	
3.I.2	Apply proportions and right triangle trigonometric ratios to solve problems involving missing lengths and angle measures in similar figures.	Geometric Concepts	Proportions

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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.	Geometric Concepts	Arithmetic Sequences
	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.	Covered in Algebra I or II	
4.B	Identify and classify functions as linear or nonlinear, and contrast their properties using tables, graphs or equations.	Covered in Algebra I or II	
	Use Patterns, Relations and Functions		
4.B.1	Define function with ordered pairs in which each domain element is assigned exactly one range element.	Covered in Algebra I or II	
4.B.3	Describe problem situations (linear, quadratic and exponential) by using tabular, graphical and symbolic representations.	Covered in Algebra I or II	

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4.C	Translate information from one representation (words, table, graph or equation) to another representation of a relation or function.	Equations	Linear Equations
	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.	Covered in Algebra I or II	
4.D	Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations.	Covered in Algebra I or II	
	Use Algebraic Representations		
4.D.7	Use formulas to solve problems involving exponential growth and decay.	Covered in Algebra I or II	
4.D.11	Add, subtract, multiply and divide monomials and polynomials (division of polynomials by monomials only).	Covered in Algebra I or II	
4.D.12	Simplify rational expressions by eliminating common factors and applying properties of integer exponents.	Covered in Algebra I or II	

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4.E	Analyze and compare functions and their graphs using attributes, such as rates of change, intercepts and zeros.	Covered in Algebra I or II	
	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.	Covered in Algebra I or II	
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.	Covered in Algebra I or II	
4.F	Solve and graph linear equations and inequalities.	Covered in Algebra I or II	
	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.	Covered in Algebra I or II	

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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.	Covered in Algebra I or II	
4.G	Solve quadratic equations with real roots by graphing, formula and factoring.	Covered in Algebra I or II	
	Use Algebraic Representations		
4.G.10	Solve quadratic equations with real roots by factoring, graphing, using the quadratic formula and with technology.	Covered in Algebra I or II	
4.H	Solve systems of linear equations involving two variables graphically and symbolically.	Covered in Algebra I or II	
	Use Algebraic Representations		
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.	Covered in Algebra I or II	
4.I	Model and solve problem situations involving direct and inverse variation.	Covered in Algebra I or II	

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	Analyze Change		
4.I.13	Model and solve problems involving direct and inverse variation using proportional reasoning.	Covered in Algebra I or II	
4.I.14	Describe the relationship between slope and the graph of a direct variation and inverse variation.	Covered in Algebra I or II	
4.J	Describe and interpret rates of change from graphical and numerical data.	Covered in Algebra I or II	
	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.	Covered in Algebra I or II	
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.	Probability	Showing Data in Picture Forms

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	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.		
	Statistical Methods		
5.A.3	Analyze and interpret frequency distributions based on spread, symmetry, skewness, clusters and outliers.		
5.B	Evaluate different graphical representations of the same data to determine which is the most appropriate representation for an identified purpose.		
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.	Probability	Mean, Median, Mode
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.		

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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.		
5.G	Describe sampling methods and analyze the effects of method chosen on how well the resulting sample represents the population.	Probability	Data Analysis Project
	Statistical Methods		

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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.		
	Probability		
5.H.7	Use counting techniques and the Fundamental Counting principle to determine the total number of possible outcomes for mathematical situations.		
5.I	Design an experiment to test a theoretical probability, and record and explain results.		
	Probability		
5.I.8	Describe, create and analyze a sample space and use it to calculate probability.	Probability	Data Analysis Project
5.J	Compute probabilities of compound events, independent events, and simple dependent events.		

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	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.		
	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		
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.	Word Problems	Strategies

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6.B	Apply mathematical knowledge and skills routinely in other content areas and practical situations.	Word Problems	Strategies
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.	Throughout Course	
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.	Throughout Course	
6.E	Use a variety of mathematical representations flexibly and appropriately to organize, record and communicate mathematical ideas.	Throughout Course	
6.F	Use precise mathematical language and notations to represent problem situations and mathematical ideas.	Throughout Course	
6.G	Write clearly and coherently about mathematical thinking and ideas.	Throughout Course	
6.H	Locate and interpret mathematical information accurately, and communicate ideas, processes and solutions in a complete and easily understood manner.	Throughout Course	