

6th Grade Math Standards

Ratio and Proportional Relationships

- Standard 1: Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
- Standard 2: Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship.
- Standard 3: Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

The Number System

- Standard 1: Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.
- Standard 2: Fluently divide multi-digit numbers using the standard algorithm.
- Standard 3: Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
- Standard 4: Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor.
- Standard 5: Understand that positive and negative numbers are used together to describe quantities having opposite directions or values
- Standard 6: Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.
- Standard 7: Understand ordering and absolute value of rational numbers.
- Standard 8: Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.

Expressions and Equations

- Standard 1: Write and evaluate numerical expressions involving whole-number exponents.
- Standard 2: Write, read, and evaluate expressions in which letters stand for numbers.
- Standard 3: Apply the properties of operations to generate equivalent expressions.
- Standard 4: Identify when two expressions are equivalent
- Standard 5: Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
- Standard 6: Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.
- Standard 7: Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q and x are all nonnegative rational numbers.
- Standard 8: Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.
- Standard 9: Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.

Geometry	
Standard 1:	Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.
Standard 2:	Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = lwh$ and $V = bh$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.
Standard 3:	Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.
Standard 4:	Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.
Statistics and Probability	
Standard 1:	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.
Standard 2:	Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.
Standard 3:	Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.
Standard 4:	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
Standard 5:	Summarize numerical data sets in relation to their context

7th Grade Math Standards	
Ratio and Proportional Relationships	
Standard 1:	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.
Standard 2:	Recognize and represent proportional relationships between quantities.
Standard 3:	Use proportional relationships to solve multistep ratio and percent problems.
The Number System	
Standard 1:	Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
Standard 2:	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
Standard 3:	Solve real-world and mathematical problems involving the four operations with rational numbers.[1]
Expressions and Equations	
Standard 1:	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
Standard 2:	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.
Standard 3:	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form
Standard 4:	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
Geometry	
Standard 1:	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

Standard 2:	Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.
Standard 3:	Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.
Standard 4:	Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.
Standard 5:	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.
Standard 6:	Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.
Statistics and Probability	
Standard 1:	Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.
Standard 2:	Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.
Standard 3:	Informally assess the degree of visual overlap of two numerical data distributions with similar variability's, measuring the difference between the centers by expressing it as a multiple of a measure of variability.
Standard 4:	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.
Standard 5:	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
Standard 6:	Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.
Standard 7:	Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.
Standard 8:	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

8th Grade Math Standards	
The Number System	
Standard 1:	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.
Standard 2:	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions
Expressions and Equations	
Standard 1:	Know and apply the properties of integer exponents to generate equivalent numerical expressions.
Standard 2:	Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.
Standard 3:	Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.

Standard 4:	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.
Standard 5:	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.
Standard 6:	Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b .
Standard 7:	Solve linear equations in one variable.
Standard 8:	Analyze and solve pairs of simultaneous linear equations.
Functions	
Standard 1:	Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.
Standard 2:	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
Standard 3:	Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.
Standard 4:	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
Standard 5:	Describe qualitatively the functional relationship between two quantities by analyzing a graph. Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
Geometry	
Standard 1:	Verify experimentally the properties of rotations, reflections, and translations:
Standard 2:	Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.
Standard 3:	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
Standard 4:	Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.
Standard 5:	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.
Standard 6:	Explain a proof of the Pythagorean Theorem and its converse.
Standard 7:	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
Standard 8:	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
Standard 9:	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
Statistics and Probability	
Standard 1:	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
Standard 2:	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.

Standard 3:	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.
Standard 4:	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables.

Grades 9-12 Math Standards	
Number and Quantity	
The Real Number System	
Standard 1:	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.
Standard 2:	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
Standard 3:	Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.
Quantities	
Standard 1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
Standard 2:	Define appropriate quantities for the purpose of descriptive modeling.
Standard 3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
Standard 4:	Understand, analyze, apply, and evaluate some common voting and analysis methods in addition to majority and plurality, such as runoff, approval, the so-called instant-runoff voting (IRV) method, the Borda method and the Condorcet method.
Standard 5:	Describe the role of mathematics in information processing, particularly with respect to the Internet.
Standard 6:	Understand and apply elementary set theory and logic as used in simple Internet searches.
Standard 7:	Understand and apply basic number theory, including modular arithmetic, for example, as used in keeping information secure through public-key cryptography.
The Complex Number System	
Standard 1:	Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real.
Standard 2:	Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.
Standard 3:	Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.
Standard 4:	Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number
Standard 5:	Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation.
Standard 6:	Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.
Standard 7:	Solve quadratic equations with real coefficients that have complex solutions.
Standard 8:	Extend polynomial identities to the complex numbers.
Standard 9:	Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.
Vector and Matrix Quantities	

Standard 1:	Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes
Standard 2:	Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.
Standard 3:	Solve problems involving velocity and other quantities that can be represented by vectors.
Standard 4:	Add and subtract vectors.
Standard 5:	Multiply a vector by a scalar.
Standard 6:	Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.
Standard 7:	Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled.
Standard 8:	Add, subtract, and multiply matrices of appropriate dimensions.
Standard 9:	Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties.
Standard 10:	Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.
Standard 11:	Multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector. Work with matrices as transformations of vectors.
Standard 12:	Work with 2×2 matrices as transformations of the plane, and interpret the absolute value of the determinant in terms of area.

Algebra

Seeing Structure in Expressions

Standard 1:	Interpret expressions that represent a quantity in terms of its context.
Standard 2:	Use the structure of an expression to identify ways to rewrite it. thus recognizing it as a difference of squares that can be factored as
Standard 3:	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.
Standard 4:	Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. For example, calculate mortgage payments.

Arithmetic with Polynomials and Rational Expressions

Standard 1:	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.
Standard 2:	Know and apply the Remainder Theorem.
Standard 3:	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
Standard 4:	Prove polynomial identities and use them to describe numerical relationships.
Standard 5:	Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer n , where x and y are any numbers, with coefficients determined for example by Pascal's Triangle.[1]
Standard 6:	Rewrite simple rational expressions in different forms.
Standard 7:	Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.

Creating Equations

Standard 1:	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
Standard 2:	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

Standard 3:	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.
Standard 4:	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
Reasoning with Equations and Inequalities	
Standard 1:	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
Standard 2:	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
Standard 3:	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters
Standard 4:	Solve quadratic equations in one variable
Standard 5:	Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
Standard 6:	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
Standard 7:	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically
Standard 8:	Represent a system of linear equations as a single matrix equation in a vector variable
Standard 9:	Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension 3×3 or greater).
Standard 10:	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve
Standard 11:	Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.
Standard 12:	Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.
9-12 Functions	
Interpreting Functions	
Standard 1:	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x . The graph of f is the graph of the equation $y = f(x)$
Standard 2:	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context
Standard 3:	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.
Standard 4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. ★
Standard 5:	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.

Standard 6:	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
Standard 7:	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
Standard 8:	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
Standard 9:	Compare properties of two functions each represented in a different way
Building Functions	
Standard 1:	Write a function that describes a relationship between two quantities.
Standard 2:	Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms
Standard 3:	Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology.
Standard 4:	Find inverse functions.
Standard 5:	Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.
Linear, Quadratic, and Exponential Models	
Standard 1:	Distinguish between situations that can be modeled with linear functions and with exponential functions.
Standard 2:	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs
Standard 3:	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function
Standard 4:	For exponential models, express as a logarithm the solution to $abct = d$ where a , c , and d are numbers and the base b is 2, 10, or e ; evaluate the logarithm using technology
Standard 5:	Interpret the parameters in a linear or exponential function in terms of a context
Trigonometric Functions	
Standard 1:	Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
Standard 2:	Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.
Standard 3:	Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$, $\pi/4$ and $\pi/6$, and use the unit circle to express the values of sine, cosine, and tangent for $\pi-x$, $\pi+x$, and $2\pi-x$ in terms of their values for x , where x is any real number.
Standard 4:	Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.
Standard 5:	Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.
Standard 6:	Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.
Standard 7:	Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.
Standard 8:	Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle.
Standard 9:	Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.

9-12 Geometry

Congruence

- Standard 1: Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
- Standard 2: Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not.
- Standard 3: Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
- Standard 4: Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
- Standard 5: Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.
- Standard 6: Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.
- Standard 7: Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.
- Standard 8: Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.
- Standard 9: Prove theorems about lines and angles.
- Standard 10: Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180° ; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.
- Standard 11: Prove theorems about parallelograms. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.
- Standard 12: Make formal geometric constructions with a variety of tools and methods.
- Standard 13: Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.

Similarity, Right Triangles, and Trigonometry

- Standard 1: Verify experimentally the properties of dilations given by a center and a scale factor.
- Standard 2: Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.
- Standard 3: Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.
- Standard 4: Prove theorems about triangles.
- Standard 5: Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.
- Standard 6: Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.
- Standard 7: Explain and use the relationship between the sine and cosine of complementary angles.
- Standard 8: Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.
- Standard 9: Derive the formula $A = \frac{1}{2} ab \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.
- Standard 10: Prove the Laws of Sines and Cosines and use them to solve problems.
- Standard 11: Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles.

Circles

Standard 1:	Prove that all circles are similar.
Standard 2:	Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.
Standard 3:	Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.
Standard 4:	Construct a tangent line from a point outside a given circle to the circle.
Standard 5:	Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.
Expressing Geometric Properties with Equations	
Standard 1:	Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation
Standard 2:	Derive the equation of a parabola given a focus and directrix
Standard 3:	Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.
Standard 4:	Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point $(1, \sqrt{3})$ lies on the circle centered at the origin and containing the point $(0, 2)$.
Standard 5:	Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems
Standard 6:	Find the point on a directed line segment between two given points that partitions the segment in a given ratio.
Standard 7:	Use coordinates to compute perimeters of polygons and areas of triangles and rectangles,
Standard 8:	Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments.
Standard 9:	Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.
Standard 10:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.
Standard 11:	Plot points in three-dimensions.
Standard 12:	Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects
Geometric Measurement and Dimension	
Standard 1:	Use geometric shapes, their measures, and their properties to describe objects
Standard 2:	Apply concepts of density based on area and volume in modeling situations
Standard 3:	Apply geometric methods to solve design problems
Standard 4:	Understand, analyze, evaluate, and apply vertex-edge graphs to model and solve problems related to paths, circuits, networks, and relationships among a finite number of elements, in real-world and abstract settings.
Standard 5:	Model and solve problems using at least two of the following fundamental graph topics and models: Euler paths and circuits, Hamilton paths and circuits, the traveling salesman problem (TSP), minimum spanning trees, critical paths, vertex coloring
Standard 6:	Compare and contrast vertex-edge graph topics and models
9-12 Statistics and Probability	
Interpreting Categorical and Quantitative Data	
Standard 1:	Represent data with plots on the real number line
Standard 2:	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.

Standard 3:	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points
Standard 4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.
Standard 5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.
Standard 6:	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
Standard 7:	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
Standard 8:	Compute (using technology) and interpret the correlation coefficient of a linear fit.
Standard 9:	Distinguish between correlation and causation.
Making Inferences and Justifying Conclusions	
Standard 1:	Understand statistics as a process for making inferences about population parameters based on a random sample from that population.
Standard 2:	Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?
Standard 3:	Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each
Standard 4:	Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling
Standard 5:	Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.
Standard 6:	Evaluate reports based on data.
Conditional Probability and the Rules of Probability	
Standard 1:	Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (or, "and," "not")
Standard 2:	Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent
Standard 3:	Understand the conditional probability of A given B as $P(A \text{ and } B)/P(B)$, and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B
Standard 4:	Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.
Standard 5:	Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.
Standard 6:	Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.
Standard 7:	Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and interpret the answer in terms of the model
Standard 8:	Apply the general Multiplication Rule in a uniform probability model, $P(A \text{ and } B) = P(A)P(B A) = P(B)P(A B)$, and interpret the answer in terms of the model

Standard 9: Use permutations and combinations to compute probabilities of compound events and solve problems	
Using Probability to Make Decisions	
Standard 1:	Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions
Standard 2:	Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.
Standard 3:	Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value.
Standard 4:	Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value
Standard 5:	Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.
Standard 6:	Use probabilities to make fair decisions
Standard 7:	Analyze decisions and strategies using probability concepts