

Common Core State Standards: Mathematics

Common Core Standard	Project Plan	City Essay	Virtual City	City Model	City Presentation
6.MP.1	Make sense of problems and persevere in solving them.			●	
6.MP.2	Reason abstractly and quantitatively.			●	
6.MP.3	Construct viable arguments and critique the reasoning of others.				
6.MP.4	Model with mathematics.			●	
6.MP.5	Use appropriate tools strategically.			●	
6.MP.6	Attend to precision.			●	
6.MP.7	Look for and make use of structure.				
6.MP.8	Look for and express regularity in repeated reasoning.				
6.RP.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.				
6.RP.2	Understand the concept of a unit rate a/b associated with a ratio $a:b$ with b does not equal 0, and use rate language in the context of a ratio relationship.				
6.RP.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.				
6.RP.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.				
6.RP.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.				
6.RP.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.				
6.NS.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.				
6.NS.2	Fluently divide multi-digit numbers using the standard algorithm.				
6.NS.3	Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.				
6.NS.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.				
6.NS.5	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.				
6.NS.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.				

Common Core Standard		Project Plan	City Essay	Virtual City	City Model	City Presentation
6.NS.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.					
6.NS.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.					
6.NS.7	Understand ordering and absolute value of rational numbers.					
6.NS.7	Understand ordering and absolute value of rational numbers.					
6.NS.7	Understand ordering and absolute value of rational numbers.					
6.NS.7	Understand ordering and absolute value of rational numbers.					
6.NS.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.					
6.EE.1	Write and evaluate numerical expressions involving whole-number exponents.					
6.EE.2	Write, read, and evaluate expressions in which letters stand for numbers.					
6.EE.2	Write, read, and evaluate expressions in which letters stand for numbers.					
6.EE.2	Write, read, and evaluate expressions in which letters stand for numbers.					
6.EE.3	Apply the properties of operations to generate equivalent expressions.					
6.EE.4	Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them).					
6.EE.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.					
6.EE.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.					
6.EE.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.					
6.EE.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.					
6.EE.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.					
6.G.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.					

Common Core Standard		Project Plan	City Essay	Virtual City	City Model	City Presentation
6.G.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.					
6.G.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.					
6.G.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.					
6.SP.1	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.					
6.SP.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.					
6.SP.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.					
6.SP.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.					
6.SP.5	Summarize numerical data sets in relation to their context, such as by:					
6.SP.5	Summarize numerical data sets in relation to their context, such as by:					
6.SP.5	Summarize numerical data sets in relation to their context, such as by:					
6.SP.5	Summarize numerical data sets in relation to their context, such as by:					
7.MP.1	Make sense of problems and persevere in solving them.				●	
7.MP.2	Reason abstractly and quantitatively.				●	
7.MP.3	Construct viable arguments and critique the reasoning of others.				●	●
7.MP.4	Model with mathematics.				●	●
7.MP.5	Use appropriate tools strategically.				●	
7.MP.6	Attend to precision.				●	
7.MP.7	Look for and make use of structure.					
7.MP.8	Look for and express regularity in repeated reasoning.					
7.RP.1	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.				●	
7.RP.2	Recognize and represent proportional relationships between quantities.				●	
7.RP.2	Recognize and represent proportional relationships between quantities.				●	
7.RP.2	Recognize and represent proportional relationships between quantities.				●	

Common Core Standard		Project Plan	City Essay	Virtual City	City Model	City Presentation
7.RP.2	Recognize and represent proportional relationships between quantities.				●	
7.RP.3	Use proportional relationships to solve multistep ratio and percent problems.				●	
7.NS.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.					
7.NS.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.					
7.NS.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.					
7.NS.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.					
7.NS.2	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.					
7.NS.2	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.					
7.NS.2	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.					
7.NS.2	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.					
7.NS.3	Solve real-world and mathematical problems involving the four operations with rational numbers. (Computations with rational numbers extend the rules for manipulating fractions to complex fractions.)					
7.EE.1	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.					
7.EE.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.					
7.EE.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.					
7.EE.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.					
7.EE.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.					
7.G.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.				●	
7.G.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.				●	
7.G.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.				●	

Common Core Standard		Project Plan	City Essay	Virtual City	City Model	City Presentation
7.G.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.				●	
7.G.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.				●	
7.G.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.				●	
7.SP.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.				●	●
7.SP.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.				●	●
7.SP.3	Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability.					
7.SP.4	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.					
7.SP.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.					
7.SP.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.					
7.SP.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.					
7.SP.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.					
7.SP.8	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.					
7.SP.8	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.					
7.SP.8	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.					
8.MP.1	Make sense of problems and persevere in solving them.				●	
8.MP.2	Reason abstractly and quantitatively.				●	
8.MP.3	Construct viable arguments and critique the reasoning of others.				●	●
8.MP.4	Model with mathematics.				●	●

Common Core Standard		Project Plan	City Essay	Virtual City	City Model	City Presentation
8.MP.5	Use appropriate tools strategically.				●	
8.MP.6	Attend to precision.				●	
8.MP.7	Look for and make use of structure.					
8.MP.8	Look for and express regularity in repeated reasoning.					
8.NS.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.					
8.NS.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 (e.g. π^2).					
8.EE.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions.					
8.EE.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 the square root of 2 is irrational.					
8.EE.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.					
8.EE.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.					
8.EE.5	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.					●
8.EE.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 .					
8.EE.7	Solve linear equations in one variable.					
8.EE.7	Solve linear equations in one variable.					
8.EE.8	Analyze and solve pairs of simultaneous linear equations.					
8.EE.8	Analyze and solve pairs of simultaneous linear equations.					
8.EE.8	Analyze and solve pairs of simultaneous linear equations.					
8.F.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. (Function notation is not required in Grade 8).					
8.F.2	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).					
8.F.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.					

Common Core Standard		Project Plan	City Essay	Virtual City	City Model	City Presentation
8.F.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.					
8.F.5	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.					
8.G.1	Verify experimentally the properties of rotations, reflections, and translations:					
8.G.1	Verify experimentally the properties of rotations, reflections, and translations:					
8.G.1	Verify experimentally the properties of rotations, reflections, and translations:					
8.G.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.				●	
8.G.3	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.				●	
8.G.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.				●	
8.G.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.					
8.G.6	Explain a proof of the Pythagorean Theorem and its converse.				●	
8.G.7	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.				●	
8.G.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.				●	
8.G.9	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.					
8.SP.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.					
8.SP.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.					
8.SP.3	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.					

Common Core Standard		Project Plan	City Essay	Virtual City	City Model	City Presentation
8.SP.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.					