CCSS – SBAC Grade 11 Math Alignment Summary
(NA – Not Assessed)

SBAC Evidence Claim 1: Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.

The Real Number System N-RN

Extend the properties of exponents to rational exponents. 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. For example, we define 51/3 to be the cube root of 5 because we want (51/3)3 = 5(1/3)3 to hold, so (51/3)3 must equal 5	NA
2. Rewrite expressions involving radicals and rational exponents using the properties of exponents.	C1 TA
Use properties of rational and irrational numbers. 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.	C1 TB

Quantities★ N -Q

Reason quantitatively and use units to solve problems. 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.	C1 TC
2. Define appropriate quantities for the purpose of descriptive modeling.	NA
3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	NA

The Complex Number System N –CN – NOT ASSESSED

Vector and Matrix Quantities N –VM – NOT ASSESSED

Algebra

Seeing Structure in Expressions A-SSE

Interpret the structure of expressions	
1. Interpret expressions that represent a quantity in terms of its context.★	NA
a. Interpret parts of an expression, such as terms, factors, and coefficients.	NA
b. Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret P(1+r)n as the product of P and a factor not depending on P.	NA
2. Use the structure of an expression to identify ways to rewrite it. For example, see x4 – y4 as (x2)2 – (y2)2, thus recognizing it as a difference of squares that can be factored as (x2 – y2)(x2 + y2).	C1 TD
Write expressions in equivalent forms to solve problems	
3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.★	C1 TE
a. Factor a quadratic expression to reveal the zeros of the function it defines.	
b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.	
c. Use the properties of exponents to transform expressions for exponential functions.	
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.★	NA

Arithmetic with Polynomials and Rational Expressions A -APR

Perform arithmetic operations on polynomials	
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.	C1 TF
Understand the relationship between zeros and factors of polynomials	NA
Use polynomial identities to solve problems	NA
Rewrite rational expressions	NA

Creating Equations★ A -CED

Create equations that describe numbers or relationships	
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.	C1 TG
2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	C1 TG
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.	NA
4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V = IR to highlight resistance R.	NA

Reasoning with Equations and Inequalities A -REI

Understand solving equations as a process of reasoning and explain the reasoning	
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.	NA
2. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	C1 TH
Solve equations and inequalities in one variable	
3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	C1 TI
4. Solve quadratic equations in one variable.	C1 TI
a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x – p)2 = q$ that has the same solutions. Derive the quadratic formula from this form.	
b. Solve quadratic equations by inspection (e.g., for $x2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.	
Solve systems of equations	NA
Represent and solve equations and inequalities graphically	
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 (which could be a line).	C1 TJ
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.★	
12. Graph the solutions to a linear inequality in two variables as a halfplane (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.	

Interpreting Functions F-IF

Understand the concept of a function and use function notation	
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).	C1 TK
2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	NA
3. Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1.	C1 TK
Interpret functions that arise in applications in terms of the context	
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.★	C1 TL
5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.★	
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.★	
Analyze functions using different representations	
7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★	C1 TM
a. Graph linear and quadratic functions and show intercepts, maxima, and minima.	
b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.	
c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.	
d. (+) Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.	
e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.	
8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.	
a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.	
b. Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as y = (1.02)t, y = (0.97)t, y = (1.01)12t, y = (1.2)t/10, and classify them as representing exponential growth or decay.	
9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.	

Building Functions F-BF

Build a function that models a relationship between two quantities	
1. Write a function that describes a relationship between two quantities.★	C1 TN
a. Determine an explicit expression, a recursive process, or steps for calculation from a context.	
b. Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.	
c. (+) Compose functions. For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.	
2. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.★	

Build new functions from existing functions	NA

Linear, Quadratic, and Exponential Models★ F –LE – NOT ASSESSED

Trigonometric Functions F-TF -- NOT ASSESSED

Modeling – No specific standards. Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol (★).

Geometry

Congruence G-CO

Experiment with transformations in the plane	NA
Understand congruence in terms of rigid motions	NA
Prove geometric theorems	
9. Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.	C1 TO
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.	
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.	
Make geometric constructions	NA

Similarity, Right Triangles, and Trigonometry G-SRT – NOT ASSESSED

Circles G-C – NOT ASSESSED

Expressing Geometric Properties with Equations G-GPE – NOT ASSESSED

Geometric Measurement and Dimension G-GMD – NOT ASSESSED

Modeling with Geometry G-MG – NOT ASSESSED

Statistics and Probability

Interpreting Categorical and Quantitative Data S-ID

Summarize, represent, and interpret data on a single count or measurement variable	
1. Represent data with plots on the real number line (dot plots, histograms, and box plots).	C1 TP
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.	
3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).	
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.	NA
Summarize, represent, and interpret data on two categorical and quantitative variables	NA
Interpret linear models	NA

Making Inferences and Justifying Conclusions S-IC – NOT ASSESSED

Conditional Probability and the Rules of Probability S-CP – NOT ASSESSED

Using Probability to Make Decisions S-MD

Mathematical Practices

SBAC Evidence Claim 2: Students can solve a range of complex, well-posed problems in pure and applied mathematics, making productive use of knowledge and problem-solving strategies.

SBAC Evidence Claim 3: Students can clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others.

SBAC Evidence Claim 4: Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems.

Mathematical Practice 1: Make sense of problems and persevere in solving them.

Mathematical Practice 2: Reason abstractly and quantitatively.

Mathematical Practice 3: Construct viable arguments and critique the reasoning of others.

Mathematical Practice 4: Model with mathematics.

Mathematical Practice 5: Use appropriate tools strategically.

Mathematical Practice 6: Attend to precision.

Mathematical Practice 7: Look for and make use of structure.

Mathematical Practice 8: Look for and express regularity in repeated reasoning.

The Real Number System N-RN

CCSS	Evidence	Item Examples
Extend the properties of exponents to rational exponents. 2. Rewrite expressions involving radicals and rational exponents using the properties of exponents.	**Target A:** Extend the properties of exponents to rational exponents. 1. The student rewrites expressions involving radicals and rational exponents. 2. The student identifies flawed reasoning and/or steps in converting between radical and rational expressions using the properties of exponents.	1. SR (DOK 1) Prompt Features: The student is prompted to identify equivalent expression(s) when converting between expressions with radicals and rational exponents. Stimulus: The student is presented with numerical or algebraic expression(s) containing radicals or rational exponents. 2. CR (DOK 1, 2) Prompt Features: The student is prompted to find the value of or simplify numerical expression(s). Stimulus: The student is presented with one or more numerical expressions containing radicals or rational exponents. 3. SR (DOK 1, 2) Prompt Features: The student is prompted to identify the flawed step or expression presented in a conversion that leads to an incorrect result and/or identify the correct step or expression for the conversion. Stimulus: The student is presented with a flawed set of steps or expressions for a numerical or algebraic conversion containing radicals and/or rational exponents. 4. CR (DOK 2) Prompt Features 1: The student is prompted to compare reasoning behind multiple methods of converting between expressions involving radicals and rational exponents. 5. Prompt Features 2: The student is prompted to determine the flawed step or expression that leads to an incorrect result and explain and/or correct the error. Stimulus: The student is presented with accurate and/or flawed sets of steps converting between numerical or algebraic radical and rational exponent expressions.
Use properties of rational and irrational numbers. 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.	Target B: Use properties of rational and irrational numbers. 1. The student provides examples of addition or multiplication problems that will have sums or products of a specified type (either rational or irrational). 2. The student determines if the sum of two numbers is a rational number or an irrational number. 3. The student determines if the product of two numbers is a rational number or an irrational number. 4. The student provides an abstract generalization that the sum or product of any	1. CR (DOK 1, 2) Prompt Features 1: The student is prompted to give example addition problems that would have a sum that is either a rational or an irrational number. 2. Prompt Features 2: The student is prompted to give example multiplication problems that would have a product that is either a rational or an irrational number. Stimulus: The student is presented with a type of number (rational or irrational) and instructions that will fit student-generated example problems into a scorable format. 3. SR (DOK 1) Prompt Features 1: The student is prompted to identify whether the resulting sums for the addition problem(s) are rational or irrational. Stimulus 1: The student is presented with at least three addition problems having two addends where at least one addend is rational. Stimulus 2: The student is presented with at least three addition problems having two addends where at least one addend is irrational. 4. Prompt Features 2: The student is prompted to identify which type of number the other addend will be from a list of possible number types (e.g., rational, irrational). Stimulus 1: The student is presented with an addition problem having two addends and is given that one addend is a rational number and the sum is a rational number. Stimulus 2: The student is presented with an addition problem having two addends and is given that one addend is a rational number and the sum is an irrational number. Stimulus 3: The student is presented with an addition problem having two addends and is given that one addend is an irrational number and the sum is an irrational number. 5. SR (DOK 1) Prompt Features 1: The student is prompted to identify whether the resulting product(s) for the multiplication problem(s) are rational or irrational. Stimulus: The student is presented with at least three

	two rational numbers is rational, the sum of a rational number and an irrational number is irrational, and the product of a nonzero rational number and an irrational number is irrational.	multiplication problems having two factors where either both factors are nonzero rational numbers, or one factor is a nonzero rational number and one factor is an irrational number. 6. Prompt Features 2: The student is prompted to identify which type of number the other factor will be from a list of possible number types (e.g., rational, irrational). Stimulus 1: The student is presented with a multiplication problem having two factors and is given that one factor is a nonzero rational number and the product is an irrational number. Stimulus 2: The student is presented with a multiplication problem having two factors and is given that one factor is an irrational number and the product is an irrational number. 7. CR (DOK 2) Prompt Features 1: The student is prompted to explain what possible sums result by combining any rational number with either another rational number or an irrational number. 8. Prompt Features 2: The student is prompted to explain what possible products result by combining any nonzero rational number with an irrational number. Stimulus: The student is presented with two abstract quantities representing the set of rational numbers or the set of irrational numbers (e.g., x = rational number, y = irrational number).

Quantities★ N -Q

CCSS	Evidence	Item Examples
Reason quantitatively and use units to solve problems. 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.	Target C: Reason quantitatively and use units to solve problems. 1. The student chooses appropriate units of measurement in formulas. 2. The student interprets units of measurement in formulas, including units used in dimensional analysis. 3. The student chooses the scale in a graph. 4. The student interprets the scale in a graph.	1. SR (DOK 1) Prompt Features 1: The student is prompted to identify an appropriate unit of measurement in a calculation using a formula when given measurements in different units. 2. Prompt Features 2: The student is prompted to identify the correct unit that will result from a calculation using a formula. 3. Prompt Features 3: The student is prompted to identify conversion factors used in dimensional analysis. Stimulus 1: The student is presented with a set of measurements that are not in the same units (e.g., rectangular prism dimensions: length 3 ft 5 in., width 16 in., height 1 yd 1 ft; options for volume units: cm, in., m, yd, ft2, in.2, km2, yd3, cm3, ft3). Stimulus 2: The student is presented with a rate that is to be converted (e.g., miles per hour to feet per second). 4. CR (DOK 1, 2) Prompt Features 1: The student is prompted to determine an appropriate unit of measurement in a calculation using a formula when given measurements in different units. 5. Prompt Features 2: The student is prompted to perform a calculation using a formula to determine the correct unit that will result. 6. Prompt Features 3: The student is prompted to perform a measurement conversion using dimensional analysis. Stimulus 1: The student is presented with a set of measurements that are not in the same units (e.g., rectangular prism dimensions: length 3 ft 5 in., width 16 in., height 1 yd 1 ft; determine surface area and/or volume with correct units). Stimulus 2: The student is presented with a rate that is to be converted (e.g., miles per hour to feet per second). 7. SR (DOK 2) Prompt Features: The student is prompted to identify the correct description of units used in a graph. Stimulus: The student is presented with a coordinate graph of a function relating two units. 8. CR (DOK 2) Prompt Features: The student is prompted to describe the correct meaning or description of units used in a formula or graph. Stimulus 1: The student is presented with a context involving rates or other units of measurement (e.g., a population density of 800 people per square mile in a certain city means that for every square mile of space in that city, 800 people inhabit that area; or, the rate 2.5 gallons per minute means that for every minute that goes by, 2.5 gallons are used/lost/drained; or, the average speed a train travels is the distance it travels divided by the time it travels). Stimulus 2: The student is presented with a coordinate graph of a function relating two units. 9. SR (DOK 2) Prompt Features 1: The student is prompted to identify an appropriate scale to use in a graph. 10. Prompt Features 2: The student is prompted to identify the graph or graphs that use an appropriate scale based on a given context. Stimulus 1: The student is presented with a context and a set of four to six graphs with scales on each axis that differ from each other. Stimulus 2: The student is presented with multiple axes scales and prompted to identify which are appropriate for a context (e.g. x- and y-axes from 0 to 100 by 10s on one graph and x- and y-axes from 50 to 100 by 5s on another graph). Stimulus 3: The student is presented with a complete or incomplete table of values to be displayed in a graph. Graph types include: graphs on the coordinate plane, bar graphs, histograms, or any other graphs involving the use of axes.

		11. TE (DOK 2) Prompt Features: The student is prompted to set the graphing window (including an appropriate scale) for a specific function, equation, or context using a computer-simulated graphing calculator. Stimulus: The student is presented with a function, equation, table of values, or a written context. Interaction: The student types in the range of values and intervals for both the x- and y-axes on a coordinate plane. 12. SR (DOK 2) Prompt Features: The student is prompted to identify what the scale in a graph represents. Stimulus: The student is presented with a context and its graph. Graph types include: graphs on the coordinate plane, bar graphs, histograms, or any other graphs involving the use of axes. 13. CR (DOK 2) Prompt Features 1: The student is prompted to explain or describe what the scale in a graph represents. 14. Prompt Features 2: The student is prompted to explain why a scale on a graph may or may not be appropriate for a given context. Stimulus: The student is presented with a context and its graph. Graph types include: graphs on the coordinate plane, bar graphs, histograms, or any other graphs involving the use of axes.

The Complex Number System N –CN – NOT ASSESSED
Vector and Matrix Quantities N –VM – NOT ASSESSED

Algebra

Seeing Structure in Expressions A-SSE

CCSS	Evidence	Item Examples
Interpret the structure of expressions 2. Use the structure of an expression to identify ways to rewrite it. For example, see x4 – y4 as (x2)2 – (y2)2, thus recognizing it as a difference of squares that can be factored as (x2 – y2)(x2 + y2).	Target D: Interpret the structure of expressions. The student recognizes and uses the structure of an expression to identify ways of rewriting the expression.	SR (DOK 2) 1. The student is prompted to identify all expressions that are equivalent forms of the given expression, as determined by the expression's structure. 2. The student is prompted to identify the description of the structure of the algebraic expression or other common forms of the expression (e.g., quadratic expression, difference of squares, difference of cubes). 3. The student is prompted to select all algebraic expressions that have the given structure from a list of algebraic expressions.
Write expressions in equivalent forms to solve problems. 3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.★	Target E: Write expressions in equivalent forms to solve problems. 1. The student factors a quadratic expression to produce an equivalent expression. 2. The student completes the square for a quadratic expression to produce an equivalent expression. 3. The student uses properties of exponents to produce an equivalent expression for an exponential expression. 4. The student relates the form of an expression to a property applicable to the expression. For example: a. The student understands that the factored form of a quadratic expression reveals the zeros of the function it defines. b. The student understands that completing the square for a quadratic equation reveals the maximum or minimum value of the function it defines. c. The student understands that an exponential expression can be rewritten to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.	1. SR (DOK 1) The student is prompted to identify the factored form of a quadratic expression. 2. CR (DOK 1, 2) Prompt Features: The student is prompted to factor a quadratic expression. 3. CR (DOK 2) Prompt Features: The student is prompted to complete the square for a given quadratic expression. 4. SR (DOK 1, 2) Prompt Features: The student is prompted to identify equivalent exponential expression(s). 5. SR (DOK 1, 2) Prompt Features: The student is prompted to identify the form of the expression that reveals a property of the quantity represented by the expression (e.g., factored form of a quadratic expression is used to find the roots; completing the square is used to find the vertex). 6. CR (DOK 2) Prompt Features: The student is prompted to produce the form of the expression that reveals a property of the quantity represented by the expression (e.g., factored form of a quadratic expression is used to find the roots; completing the square is used to find the vertex).

Arithmetic with Polynomials and Rational Expressions A -APR

CCSS	Evidence	Item Examples
Perform arithmetic operations on polynomials. 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.	Target F: Perform arithmetic operations on polynomials. 1. The student adds polynomials. 2. The student subtracts polynomials. 3. The student multiplies polynomials. 4. The student combines polynomials using two or more operations, including addition, subtraction, and multiplication.	1. SR (DOK 1) Prompt Features: The student is prompted to identify the sum of two or more polynomials. 2. CR (DOK 1) Prompt Features: The student is prompted to find the sum of two or more polynomials. 3. SR (DOK 1) Prompt Features: The student is prompted to identify the difference between two polynomials. 4. CR (DOK 1) Prompt Features: The student is prompted to find the difference between two polynomials. 5. SR (DOK 1, 2) Prompt Features: The student is prompted to identify the product of two or more polynomials. 6. CR (DOK 1, 2) Prompt Features: The student is prompted to find the product of three or more polynomials. 7. SR (DOK 2) Prompt Features: The student is prompted to identify the result when three or more polynomials are combined using two or more operations, including addition, subtraction, and multiplication. 8. CR (DOK 2) Prompt Features: The student is prompted to combine three or more polynomials using two or more operations, including addition, subtraction, and multiplication.

Creating Equations★ A -CED

CCSS	Evidence	Item Examples
Create equations that describe numbers or relationships 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. 2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	Target G: Create equations that describe numbers or relationships. 1. The student creates equations in one variable to solve problems. 2. The student creates inequalities in one variable to solve problems. 3. The student creates equations in two variables to represent relationships between quantities. 4. The student graphs equations in two variables to represent relationships between quantities.	1. SR (DOK 1) Prompt Features: The student is prompted to identify an equation that can be used to solve a given problem. 2. CR (DOK 2) Prompt Features: The student is prompted to create an equation that can be used to solve a given problem. 3. SR (DOK 1) Prompt Features: The student is prompted to identify an inequality that can be used to solve a given problem. 4. CR (DOK 2) Prompt Features: The student is prompted to create an inequality that can be used to solve a given problem. 5. SR (DOK 1) Prompt Features: The student is prompted to identify an equation that represents the relationship between two quantities in a contextual problem. 6. CR (DOK 2) Prompt Features: The student is prompted to create an equation that represents the relationship between two quantities in a contextual problem. 7. SR (DOK 1) Prompt Features: The student is prompted to select the correct graph of an equation. 8. TE (DOK 2) Prompt Features: 1: The student is prompted to graph a given equation. Interaction: The student uses a graphing tool to plot points representing part of the solution set of the equation and draws a line to connect the points. 2: The student is prompted to set the graphing window for a given equation. Interaction: The student uses a graphing tool to type in the range of values for both the x- and y-variables and the scale for a given function.

Reasoning with Equations and Inequalities A -REI

CCSS	Evidence	Item Examples
Understand solving equations as a process of reasoning and explain the reasoning 2. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	Target H: Understand solving equations as a process of reasoning and explain the reasoning. 1. The student solves radical equations in one variable. 2. The student solves rational equations in one variable. 3. The student identifies extraneous solutions when they arise as solutions of radical or rational equations.	1. SR (DOK 1, 2) Prompt Features: The student is prompted to identify the solution to a given radical equation (one variable). 2. SR (DOK 1, 2) Prompt Features: The student is prompted to identify the solution to a given rational equation. 3. CR (DOK 1, 2) Prompt Features: The student is prompted to determine if any solutions to an equation are extraneous, and if so, identify the reason(s) that makes the solution(s) extraneous.
Solve equations and inequalities in one variable 3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. 4. Solve quadratic equations in one variable. a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form (x – p)2 = q that has the same solutions. Derive the quadratic formula from this form. b. Solve quadratic equations by inspection (e.g., for x2 = 49), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. c. Recognize when the quadratic formula gives complex solutions and write them as a ± bi for real numbers a and b.	Target I: Solve equations and inequalities in one variable. 1. The student solves linear equations in one variable. 2. The student solves linear inequalities in one variable. 3. The student solves quadratic equations in one variable.	1. SR (DOK 1) Prompt Features: The student is presented with a linear equation containing a single variable, with or without a context. 2. CR (DOK 1) Prompt Features: The student is prompted to solve a given linear equation. 3. SR (DOK 1, 2): 1: The student is prompted to identify the solution of a given linear inequality, where the solution is given in inequality form. 2: The student is prompted to identify the graph of the solution to the linear inequality. 3: The student is prompted to identify the linear inequality that has a given solution. 4. TE (DOK 2) Prompt Features: The student is prompted to solve a given inequality and graph the solutions. The student is presented with a linear inequality containing a single variable. Interaction: The student uses a graphing tool to plot on a number line the set of points representing the solution to a linear inequality. 5. SR (DOK 1, 2) 1: The student is prompted to identify all real solutions, if they exist, to a given quadratic equation. Stimulus 1: The student is presented with a quadratic equation containing a single variable. Stimulus 2: The student is presented with a quadratic equation containing a single variable that has no real solutions. The Stimulus should be easily solved by inspection, such as a squared variable monomial or binomial equal to a negative real number. 6. Prompt Features 2: The student is prompted to identify quadratic equation(s) with a specified solution. Stimulus: The student is presented with multiple quadratic equations in one variable of the form x2 = k, ax2 = k, or (x + a)2 = k.

		7. Prompt Features 3: The student is prompted to identify the correct quadratic formula expression by substituting the values for a, b, and c into the formula. Stimulus: The student is presented with a quadratic equation that can be written in the form ax2 + bx + c = 0, where a, b, and c are real numbers. 8. Prompt Features 4: The student is prompted to identify the factored form of a quadratic equation. Stimulus: The student is presented with a quadratic equation in one variable. The quadratic equation must be one that can be factored as the product of two binomials or as a binomial squared. 9. CR (DOK 2): 1: The student is prompted to solve a given quadratic equation for all real or complex solutions. Stimulus: The student is presented with a quadratic equation containing a single variable. The equation should not be easily solved using methods of completing the square or factoring. 2: The student is prompted to solve a given quadratic equation by factoring. Stimulus: The student is presented with a quadratic equation in one variable. The quadratic equation must be one that can be factored as the product of two binomials or as a binomial squared. 3: The student is prompted to solve a given quadratic equation using the method of completing the square. Stimulus: The student is presented with a quadratic equation in the form x2 + bx = c or x2 + bx + c = 0 for real numbers b and c.

CCSS	Evidence	Item Examples
Represent and solve equations and inequalities graphically 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 (which could be a line). 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.★ 12. Graph the solutions to a linear inequality in two variables as a halfplane (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.	Target J: Represent and solve equations and inequalities graphically. 1. The student recognizes that the set of all points that make up the graph of a linear or a nonlinear equation in two variables is the solution set of that equation. 2. The student approximates solutions to systems of equations in two variables that are represented graphically. 3. The student graphs solutions to linear inequalities in two variables. 4. The student graphs solutions to systems of linear inequalities in two variables.	1. CR (DOK 2): Prompt Features 1: The student is prompted to find a solution set of ordered pairs corresponding to a linear or nonlinear coordinate graph. The solutions to be identified may or may not be visibly apparent on the stimulus (i.e., the student may need to interpolate to find non-integer solutions or extrapolate to identify solutions beyond the visible stimulus) or may include non-integers. 2. Prompt Features 2: The student is prompted to complete a table of values corresponding to a linear or nonlinear coordinate graph. Stimulus: The student is presented with a linear or nonlinear graph in a coordinate plane. 3. TE (DOK 2) Prompt Features: The student is prompted to graph the solution set of a linear or a nonlinear equation in two variables. Stimulus: The student is presented with a linear or a nonlinear equation in two variables. Interaction: The student uses a graphing tool to plot points representing part of the solution set of the equation and draws a line to connect the points. 4. SR (DOK 1) Prompt Features: The student is prompted to identify the approximate solution to a system of equations in two variables represented graphically on a coordinate plane. Stimulus: The student is presented with a system of equations graphed in the coordinate plane. The system may include two linear graphs, two nonlinear graphs, or one linear and one nonlinear graph. Nonlinear graphs could include polynomial, rational, absolute value, exponential, and logarithmic functions. 5. TE (DOK 2) Prompt Features: The student is prompted to write a system of equations and then solve the system by applying technology to graph the equations in the xy-plane and find the solutions. Stimulus: The student is presented with a pure or applied problem context involving a system of equations. The system may include two linear equations, two nonlinear equations, or one linear and one nonlinear equation. Nonlinear equations could include polynomial, rational, absolute value, exponential, or logarithmic functions. Interaction: The student uses a graphing tool to plot points representing part of the solution set of a system of two equations and draws two separate lines or curves to connect the points. 6. SR (DOK 1, 2) Prompt Features: The student is prompted to identify the graphical region representing the solution set of a linear inequality.

		Stimulus: The student is presented with a linear inequality in two variables. 7. TE (DOK 2) Prompt Features: The student is prompted to graph the solution set for a linear inequality. Stimulus: The student is presented with a linear inequality in two variables. Interaction: The student uses a tool to draw either a solid line or a dotted line to represent the graph of a linear inequality in two variables and shade the half-plane that represents the solution set to the inequality. 8. SR (DOK 1, 2) Prompt Features: The student is prompted to identify the graphical region, or point(s) within the graphical region, that represents the solution set of a system of linear inequalities. Stimulus: The student is presented with a system of linear inequalities in two variables. 9. TE (DOK 2) Prompt Features: The student is prompted to graph the solution set for a system of linear inequalities. Stimulus: The student is presented with a system of linear inequalities in two variables. Interaction: The student uses a graphing tool to draw either a solid line or a dotted line to represent the graph of each linear inequality and shades the intersection of the open or closed half-planes that represent the solution set to the system.

Interpreting Functions F-IF

CCSS	Evidence	Item Examples
Understand the concept of a function and use function notation 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). 3. Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1.	Target K: Understand the concept of a function and use function notations. 1. The student identifies and explains key properties of relationships that represent functions from relationships that do not represent functions. 2. The student identifies the domain and range of a function.	1. SR (DOK 1) Prompt Features: The student is prompted to identify which of the given relations are functions. Stimulus: The student is presented with relations described by words, by equation(s), by graph(s), by set(s) of ordered pairs, or by sequence(s). 2. CR (DOK 2) Prompt Features: The student is prompted to explain why the given relations are or are not functions. Stimulus: The student is presented with relations described by words, by equation(s), by graph(s), by set(s) of ordered pairs, or by sequence(s). 3. SR (DOK 2) Prompt Features: The student is prompted to identify the domain and/or range of a given function. Stimulus: The student is presented with a function written in function notation.
Interpret functions that arise in applications in terms of the context 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.★ 5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the	Target L: Interpret functions that arise in applications in terms of a context. 1. The student graphs functions based on given key features of the function. 2. The student interprets key features of graphs of functions. 3. The student interprets the average rate of change of a function over a specified interval.	1. SR (DOK 1) Prompt Features: The student is prompted to identify one or more graphs of functions that have specified key features. Stimulus: The student is presented with a written description of one or more key features (intercepts, relative maximums and minimums, symmetries, and end behavior) of a function. 2. CR (DOK 2) Prompt Features: The student is prompted to draw a function graph that has specified key features. Stimulus: The student is presented with a written description of one or more key features (intercepts, relative maximums and minimums, symmetries, and end behavior) of a function. 3. TE (DOK 2) Prompt Features: The student is prompted to graph a function that has the specified key features. Stimulus: The student is presented with one or more key features of a function in two variables, or key features of its graph. Interaction: The student uses a graphing tool to produce the graph of the function, either by plotting points or deriving a function rule and entering it to produce the graph. 4. CR (DOK 2) Prompt Features 1: The student is prompted to describe the meaning or significance of a given key feature of the graph of a given function (intercepts, relative maximums and minimums, symmetries, and end behavior). Stimulus: The student is presented with a function graph in the coordinate plane and a key feature of the graph.

positive integers would be an appropriate domain for the function.★ 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.★		5. Prompt Features 2: The student is prompted to determine a common key feature of two or more functions graphed in the coordinate plane and describe its meaning or significance. Stimulus: The student is presented with two or more function graphs. 6. SR (DOK 2) Prompt Features 1: The student is prompted to identify the meaning or significance of the average rate of change of the given functions over the specified interval. Stimulus: The student is presented with one or more function graphs in the coordinate plane and a specified interval of x-values. 7. Prompt Features 2: The student is prompted to identify, from a list, all graph intervals that have the specified average rate of change. Stimulus: The student is presented with one or more function graphs in the coordinate plane and a specified average rate of change. 8. Prompt Features 3: The student is prompted to identify all graphs, from a given set of function graphs, which have the specified rate of change over the given interval. Stimulus: The student is presented with an interval of x-values and a specified average rate of change. 9. CR (DOK 2) Prompt Features 1: The student is prompted to describe the meaning or significance of the average rate of change for each function over the interval. Stimulus: The student is presented with one or more graphs of functions in the coordinate plane and a specified interval of x-values. 10. Prompt Features 2: The student is prompted to compare the average rates of change over the given intervals of x-values for the functions whose graphs are given. Stimulus: The student is presented with two or more function graphs in the coordinate plane and a specified interval of x-values for each graph.
Analyze functions using different representations 7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.	Target M: Analyze functions using different representations. 1. The student graphs linear, quadratic, square root, cube root, piecewise-defined, polynomial, exponential, and/or logarithmic functions without the use of technology. 2. The student graphs linear, quadratic, square root, cube root, piecewise-defined, polynomial, exponential, and/or logarithmic functions with the use of technology. 3. The student compares properties of two functions represented in different	1. SR (DOK 1, 2) Prompt Features: The student is prompted to identify the graph(s) of linear, quadratic, square root, cube root, piecewise-defined, polynomial, exponential, and/or logarithmic function(s). Stimulus 1: The student is presented with a function equation. Stimulus 2: The student is presented with a written description that may or may not discuss properties or key features of the function. Stimulus 3: The student is presented with a table of values representing a function. 2. CR (DOK 2) Prompt Features: The student is prompted to draw graph(s) of linear, quadratic, square root, cube root, piecewise-defined, polynomial, exponential, and/or logarithmic function(s) without the use of technology. Stimulus 1: The student is presented with a function equation.

d. (+) Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.	ways (e.g., as equations, tables, graphs, or written descriptions). 4. The student recognizes and determines equivalent forms of functions that can be used to explain properties of the function.	Stimulus 2: The student is presented with a written description that may or may not discuss properties or key features of the function. Stimulus 3: The student is presented with a table of values representing a function. 3. TE (DOK 2) Prompt Features: The student is prompted to generate graphs of linear, quadratic, square root, cube root, piecewise-defined, polynomial, exponential, and/or logarithmic function(s). Stimulus 1: The student is presented with a function equation. Stimulus 2: The student is presented with a written description that may or may not discuss properties or key features of the function. Stimulus 3: The student is presented with a table of values representing a function. Interaction: The student uses a graphing tool to enter data points and/or a function equation and draw either a line or a curve to represent the graph of the function. 4. SR (DOK 1, 2) Prompt Features 1: The student is prompted to identify the relationship(s), common property(ies), or key feature(s) shared between two functions. Prompt Features 2: The student is prompted to identify, from a set, which two functions share common feature(s) or which function has feature(s) that compare in a specific way to another given function (e.g., which two functions have no zeros). Stimulus: The student is presented with two (or more) functions represented in different ways, either as a table of values, a graph, a function equation, or a written description. Functions include: linear, quadratic, square root, cube root, piecewise-defined, polynomial, exponential, and logarithmic functions. 5. CR (DOK 2) Prompt Features: The student is prompted to describe or determine the relationship(s), common property(ies), or key feature(s) shared between two functions. Stimulus: The student is presented with two functions represented in different ways, either as a table of values, a graph, a function equation, or a written description. Functions include: linear, quadratic, square root, cube root, piecewise-defined, polynomial, exponential, and logarithmic functions. 6. SR (DOK 1, 2) Prompt Features 1: The student is prompted to select the equivalent form of a given function that best identifies or explains key feature(s) of the function. Stimulus 1: The student is presented with a property or key feature of a function. Stimulus 2: The student is presented with a function. 7. Prompt Features 2: The student is prompted to identify the property(ies) or key feature(s) of a function that can be found within the function when written in given form(s). Stimulus: The student is presented with one or more functions.

		8. CR (DOK 2) Prompt Features: The student is prompted to construct the equivalent form of a given function that best identifies or explains key feature(s) of the function. Stimulus 1: The student is presented with a single function written in a given form. Stimulus 2: The student is presented with a function and given property(ies) or key feature(s) of the function.
8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. b. Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as y = (1.02)t, y = (0.97)t, y = (1.01)12t, y = (1.2)t/10, and classify them as representing exponential growth or decay.		See CCSS standards 7 a-e description above.
9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.		See CCSS standards 7 a-e description above.

Building Functions F-BF

CCSS	Evidence	Item Examples
Build a function that models a relationship between two quantities 1. Write a function that describes a relationship between two quantities.★ a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model. c. (+) Compose functions. For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time. 2. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.★	Target N: Build a function that models a relationship between two quantities. 1. The student writes recursive functions to describe relationships between two quantities. 2. The student writes explicit functions to describe relationships between two quantities. 3. The student translates between recursive functions and explicit functions.	1. SR (DOK 1, 2) Prompt Features: The student is prompted to identify a recursive function. Stimulus 1: The student is presented with at least four numbers of an arithmetic or geometric sequence. The sequence may also be presented in table format with corresponding term numbers. Stimulus 2: The student is presented with a contextual description of two quantities that have a functional relationship (e.g., revenue with respect to cost, speed with respect to time, area with respect to length, or sale price with respect to original price). 2. CR (DOK 2) Prompt Features: The student is prompted to provide a recursive function. Stimulus 1: The student is presented with at least four numbers of an arithmetic or geometric sequence. The sequence may also be presented in table format with corresponding term numbers. Stimulus 2: The student is presented with a contextual description of two quantities that have a functional relationship (e.g., revenue with respect to cost, speed with respect to time, area with respect to length, or sale price with respect to original price). 3. SR (DOK 1, 2) Prompt Features: The student is prompted to identify an explicit function. Stimulus 1: The student is presented with at least four numbers of an arithmetic or geometric sequence. The sequence may also be presented in table format with corresponding term numbers. Stimulus 2: The student is presented with a contextual description of two quantities that have a functional relationship (e.g., account balance with respect to previous year's account balance). 4. CR (DOK 2) Prompt Features: The student is prompted to provide an explicit function. Stimulus 1: The student is presented with at least four numbers of an arithmetic or geometric sequence. The sequence may also be presented in table format with corresponding term numbers. Stimulus 2: The student is presented with a contextual description of two quantities that have a functional relationship (e.g., account balance with respect to previous year's account balance). 5. SR (DOK 1, 2) Prompt Features 1: The student is prompted to identify a recursive function that is equivalent to a given explicit function. Stimulus: The student is presented with an explicit function that can be expressed recursively.

		6. Prompt Features 2: The student is prompted to identify an explicit function that is equivalent to a given recursive function. Stimulus: The student is presented with a recursive function that can be expressed explicitly. 7. Prompt Features 3: The student is prompted to identify which functions are equivalent. Stimulus: The student is presented with multiple explicit and recursive functions, some of which are equivalent. 8. CR (DOK 2) Prompt Features 1: The student is prompted to provide a recursive function that is equivalent to a given explicit function. Stimulus: The student is presented with an explicit function that can be expressed recursively. 9. Prompt Features 2: The student is prompted to provide an explicit function that is equivalent to a given recursive function. Stimulus: The student is presented with a recursive function that can be expressed explicitly.

Trigonometric Functions F-TF – NOT ASSESSED

Modeling – No specific standards. Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol (★).

Geometry
Congruence G-CO

CCSS	Evidence	Item Examples
Prove geometric theorems 9. Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. 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. 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.	Target O: Define trigonometric ratios and solve problems involving right triangles. 1. The student explains proofs or reasoning related to theorems about lines and angles. Theorems include, but are not limited to: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. 2. The student explains proofs or reasoning related to theorems about triangles. Theorems include, but are not limited to: 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. 3. The student explains proofs or reasoning related to theorems about circles. Include proof that all circles are similar. 4. The student explains proofs or reasoning related to theorems about parallelograms. Theorems include, but are not limited to: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.	1. SR (DOK 1, 2) Prompt Features 1: The student is prompted to identify what property or theorem is demonstrated by the given proof related to lines and angles. Stimulus: The student is presented with a complete proof (either 2-column proof or paragraph proof). 2. Prompt Features 2: The student is prompted to identify, from a list, statements or reasons that fill in the missing lines to complete a proof related to lines and angles. Stimulus: The student is presented with a proof with one or more lines missing. 3. Prompt Features 3: The student is prompted to identify in what line of a flawed proof (related to lines and angles) an error was first made. Stimulus: The student is presented with a flawed proof in which one line leads to a faulty conclusion or leads to a conclusion for the wrong reason. 4. Prompt Features 4: The student is prompted to identify the property or theorem (related to lines and angles) that can be proven using a geometric figure or animation. 5. Prompt Features 5: The student is prompted to identify a geometric principle, from a list, that justifies why the geometric construction works. Stimulus: The student is presented with a figure or animation that shows a geometric construction (related to lines and angles). 6. CR (DOK 2) Prompt Features: The student is prompted to complete a proof related to lines and angles. Stimulus: The student is presented with a proof that has one or more lines missing. 7. TE (DOK 1, 2) Prompt Features: The student is prompted to identify parts of the figure(s) that can be used to prove the property or theorem related to lines and angles. Stimulus: The student is presented with a geometric property or theorem and corresponding figure(s). Interaction: The student uses a tool to select and drag the names of the parts of the figure(s) to the appropriate spot. 8. SR (DOK 1, 2) Prompt Features 1: The student is prompted to identify what property or theorem is demonstrated by the given proof related to triangles. Stimulus: The student is presented with a complete proof (either 2-column proof or paragraph proof). 9. Prompt Features 2: The student is prompted to identify, from a list, statements or reasons that fill in the missing lines to complete a proof related to triangles. Stimulus: The student is presented with a proof with one or more lines missing.

		10. Prompt Features 3: The student is prompted to identify in what line of a flawed proof (related to triangles) an error was first made. Stimulus: The student is presented with a flawed proof in which one line leads to a faulty conclusion or leads to a conclusion for the wrong reason. 11. Prompt Features 4: The student is prompted to identify the property or theorem (related to triangles) that can be proven using a geometric figure or animation. 12. Prompt Features 5: The student is prompted to identify a geometric principle, from a list, that justifies why the geometric construction works. Stimulus: The student is presented with a figure or animation that shows a geometric construction (related to triangles). 13. CR (DOK 2) Prompt Features: The student is prompted to complete a proof Stimulus: The student is presented with a proof that has one or more lines missing. 14. TE (DOK 1, 2) Prompt Features: The student is prompted to identify parts of the figure(s) that can be used to prove the property or theorem related to triangles. Stimulus: The student is presented with a geometric property or theorem and corresponding figure(s). Interaction: The student uses a tool to select and drag the names of the parts of the figure(s) to the appropriate spot. 15. SR (DOK 1, 2) Prompt Features 1: The student is prompted to identify what property or theorem is demonstrated by the given proof related to circles. Stimulus: The student is presented with a complete proof (either 2-column proof or paragraph proof). 16. Prompt Features 2: The student is prompted to identify, from a list, statements or reasons that fill in the missing lines to complete a proof related to circles. Stimulus: The student is presented with a proof with one or more lines missing. 17. Prompt Features 3: The student is prompted to identify in what line of a flawed proof (related to circles) an error was first made. Stimulus: The student is presented with a flawed proof in which one line leads to a faulty conclusion or leads to a conclusion for the wrong reason. 18. CR (DOK 2) Prompt Features: The student is prompted to complete a proof related to circles. Stimulus: The student is presented with a proof that has one or more lines missing. 19. SR (DOK 1, 2) Prompt Features 1: The student is prompted to identify what property or theorem is demonstrated by the given proof related to parallelograms. Stimulus: The student is presented with a complete proof (either 2-column proof or paragraph proof). 20. Prompt Features 2: The student is prompted to identify, from a list, statements or reasons that fill in the missing lines to complete a proof

		related to parallelograms. Stimulus: The student is presented with a proof with one or more lines missing. 21. Prompt Features 3: The student is prompted to identify in what line of a flawed proof (related to parallelograms) an error was first made. Stimulus: The student is presented with a flawed proof in which one line leads to a faulty conclusion or leads to a conclusion for the wrong reason. 22. Prompt Features 4: The student is prompted to identify the property or theorem (related to parallelograms) that can be proven using a geometric figure or animation. 23. Prompt Features 5: The student is prompted to identify a geometric principle, from a list, that justifies why the geometric construction works. Stimulus: The student is presented with a figure or animation that shows a geometric construction (related to parallelograms). 24. CR (DOK 2) Prompt Features: The student is prompted to complete a proof related to parallelograms. Stimulus: The student is presented with a proof that has one or more lines missing. 25. TE (DOK 1, 2) Prompt Features: The student is prompted to identify parts of the parallelogram(s) that can be used to prove the property or theorem related to triangles. Stimulus: The student is presented with a geometric property or theorem and corresponding parallelogram(s). Interaction: The student uses a tool to select and drag the names of the parts of the parallelogram(s) to the appropriate spot.

Similarity, Right Triangles, and Trigonometry G-SRT – NOT ASSESSED
Circles G-C – NOT ASSESSED
Expressing Geometric Properties with Equations G-GPE – NOT ASSESSED
Geometric Measurement and Dimension G-GMD – NOT ASSESSED
Modeling with Geometry G-MG – NOT ASSESSED

Statistics and Probability

Interpreting Categorical and Quantitative Data S-ID

CCSS	Evidence	Item Examples
Summarize, represent, and interpret data on a single count or measurement variable 1. Represent data with plots on the real number line (dot plots, histograms, and box plots). 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. 3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).	Target P: Summarize, represent, and interpret data on a single count or measurement variable. 1. The student uses statistics appropriate to the shape of the data distribution to compare center and spread of two or more different data sets. 2. The student interprets and explains the differences in shape, center, and spread in the context of two or more data sets. 3. The student interprets and explains the effects of outliers on the shape, center, and spread of two or more data sets.	1. CR (DOK 2) Prompt Features 1: The student is prompted to explain the differences in shape, center, and/or spread of the data sets, including the influence of possible outliers, based on the context of the data sets. 2. Prompt Features 2: The student is prompted to predict what the differences in shape, center, and/or spread of two or more data sets would be for the given data sets. (e.g., compare the graphs of the heights of 20 teachers vs. 20 students) Stimulus: The student is present with two or more graphs or data sets (listed or described) in context. 4. TE (DOK 2) Prompt Features: The student is prompted to adjust the box plots to represent the relationship between the centers and spreads of the given data sets. Stimulus: The student is presented with a written description of two or more data sets in context and a pair of generic parallel box plots. Interaction: The student uses a tool to click, drag, and stretch the box plots over certain values above a number line. 5. SR (DOK 1, 2) Prompt Features: The student is prompted to identify the effect of the removal or addition of outliers on the shape, center, and/or spread of the given data sets. Stimulus: The student is presented with two or more data sets or graphs of data sets. 6. CR (DOK 2) Prompt Features: The student is prompted to describe the effect of the removal or addition of outliers on the shape, center, and/or spread of the given data sets. Stimulus: The student is presented with two or more data sets or graphs of data sets.

Making Inferences and Justifying Conclusions S-IC – NOT ASSESSED
Conditional Probability and the Rules of Probability S-CP – NOT ASSESSED
Using Probability to Make Decisions S-MD – NOT ASSESSED

Mathematical Practices

CLAIM 2: Students can solve a range of complex, well-posed problems in pure and applied mathematics, making productive use of knowledge and problem-solving strategies.

Claim 2 Targets	Response Levels		Item Examples	Mathematical practices
Target A: Apply mathematics to solve well-posed problems arising in everyday life, society, and the workplace. **Target B**: Select and use appropriate tools strategically. **Target C**: Interpret results in the context of a situation. **Target D**: Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas).	Level 3 students should be able to map, display, and identify relationships, use appropriate tools strategically, and apply mathematics accurately in everyday life, society, and the workplace. They should be able to interpret information and results in the context of an unfamiliar situation.	Level 4 students should be able to analyze and interpret the context of an unfamiliar situation for problems of increasing complexity and solve problems with optimal solutions.	Constructed response and extended constructed response requiring student demonstration of two or three practices (for example, 1, 4, and 7 in a single item). See sample item specifications for Claim 2.	Mathematical Practice 1: Make sense of problems and persevere in solving them. Mathematical Practice 2: Reason abstractly and quantitatively. Mathematical Practice 4: Model with mathematics. Mathematical Practice 5: Use appropriate tools strategically. Mathematical Practice 7: Look for and make use of structure.

CLAIM 3: Students can clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others.

Target A: Test propositions or conjectures with specific examples. **Target B**: Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures. **Target C**: State logical assumptions being used. **Target D**: Use the technique of breaking an argument into cases. **Target E**: Distinguish correct logic or reasoning from that which is flawed and— if there is a flaw in the argument— explain what it is. **Target F**: Base arguments on concrete referents such as objects, drawings, diagrams, and actions. **Target G**: At later grades, determine conditions under which an argument does and does not apply. (For example, area increases with perimeter for squares, but not for all plane figures.)	Level 3 students should be able to use stated assumptions, definitions, and previously established results and examples to test and support their reasoning or to identify, explain, and repair the flaw in an argument. Students should be able to break an argument into cases to determine when the argument does or does not hold.	Level 4 students should be able to use stated assumptions, definitions, and previously established results to support their reasoning or repair and explain the flaw in an argument. They should be able to construct a chain of logic to justify or refute a proposition or conjecture and to determine the conditions under which an argument does or does not apply.	Extended constructed response requiring student demonstration of three or four practices. See sample item specifications for Claim 3.	Mathematical Practice 1: Make sense of problems and persevere in solving them. Mathematical Practice 2: Reason abstractly and quantitatively. Mathematical Practice 3: Construct viable arguments and critique the reasoning of others. Mathematical Practice 6: Attend to precision.

CLAIM 4: Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems.

Claim 2 Targets	Response Levels		Evidence Item Examples	Mathematical practices
Target A: Apply mathematics to solve problems arising in everyday life, society, and the workplace. **Target B**: Construct, autonomously, chains of reasoning to justify mathematical models used, interpretations made, and solutions proposed for a complex problem. **Target C**: State logical assumptions being used. **Target D**: Interpret results in the context of a situation. **Target E:** Analyze the adequacy of and make improvements to an existing model or develop a mathematical model of a real phenomenon. **Target F**: Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas). **Target G**: Identify, analyze, and synthesize relevant external resources to pose or solve problems.	Level 3 students should be able to apply mathematics to solve unfamiliar problems arising in everyday life, society, and the workplace by identifying important quantities and mapping, displaying, explaining, or applying their relationship and by locating missing information from relevant external resources. They should be able to construct chains of reasoning to justify a model used, produce justification of interpretations, state logical assumptions, and compare and contrast multiple plausible solutions.	Level 4 students should be able to apply mathematics to solve unfamiliar problems by constructing chains of reasoning to analyze a model, producing and analyzing justification of interpretations, stating logical assumptions, and constructing and comparing/contrasting multiple plausible solutions and approaches.	Performance tasks requiring students to use cross-domain understandings and skills for example, geometry, statistics and probability, and algebra) to demonstrate six or more practices in a single task. See specific sample performance tasks for more information.	Mathematical Practice 1: Make sense of problems and persevere in solving them. Mathematical Practice 2: Reason abstractly and quantitatively. Mathematical Practice 3: Construct viable arguments and critique the reasoning of others. Mathematical Practice 4: Model with mathematics. Mathematical Practice 5: Use appropriate tools strategically. Mathematical Practice 6: Attend to precision. Mathematical Practice 7: Look for and make use of structure. Mathematical Practice 8: Look for and express regularity in repeated reasoning.